Wayne State University

Academic Program Review

For
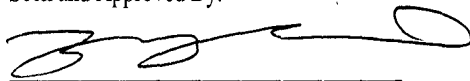
The Graduate Program of The
Department of Electrical and Computer Engineering

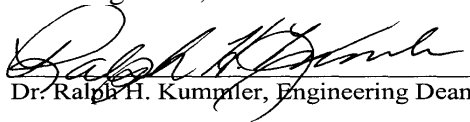## Self-Study Report

January, 2005

Seen and Approved By:

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Dr. Yang Zhao, ECE Chair

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Dr. Ralph H. Kummler, Engineering Dean

Table of Contents

3. Program Recruitment Materials – Form PMC3

Part 3 – Masters/Certificate Student Profile
1. General Data: Admission & Retention Data – Form SMC1
2. Recruitment Background Data Form SMC2
3. Support for Students – Form SMC3
   Admissions
   Recruitment
   Retention
   Mentoring
   Employment Assistance

Section 5:   Undergraduate Programs (Not Applicable)

Section 6:   Departmental Resources

Section 7:   Summary – Department Strengths, Weaknesses and Future

Appendix A   Faculty CVs
Appendix B   3DS Doctoral Student Profile
Appendix C   3M/CPS Masters/Certificate Student Profile
Appendix D   Recruitment Material Packets

Instructions for Completing the
Self-Study Guidelines for Departments

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♦ The following guidelines were developed as a guide to assist departments and/or program areas in preparing their self-studies.

♦ The guidelines for the most part are forms and checklists that are quick and easy to use.

♦ The data are required to be in ACCESS for future conversion to EXCEL spreadsheets.

♦ Data should be collected starting from the year of the last review through the Fall of the current review. For example, if the last review occurred in 1993 and this review is AY 2000-2001, then data should include AY 1993 through Fall 2000.

♦ Self-studies should be housed on your web site.

Section 1: Departmental Overview and Mission

Please respond to the following items:

1.   State the mission, goals and objectives of your department.

The mission of the Department of Electrical and Computer Engineering at Wayne State University is to:

Provide graduate students with outstanding academic and research experiences and to prepare them to meet the needs and challenges in electrical and computer engineering.

Our primary goal is to be one of the premier programs in providing education and cutting-edge research experiences to prepare our graduate students for careers in industry, academia and the public sector.

To advance this mission and achieve our goal we strive to the following objectives:

- To provide faculty and students with an environment that is conducive to carrying out cutting-edge research and excellence in teaching.

- To provide graduate students with focused instruction and research experiences in preparation for careers in industry, academia and the public sector.

- To provide support needed for faculty to become and continue to be scholars, educators and innovative researchers.

- To provide graduate students the opportunity to participate in professional projects, including internships with industry, for professional careers in industry.

- To instill graduate students with the desire for life-long learning, innovation and creativity for advancement of the engineering discipline.

2.   Describe governance, structure, and organization of your unit.

The department is governed with active participation of the faculty in policy making, and in decisions affecting academic programs, curriculum, and future directions for research. Faculty meetings are held regularly (approximately once a month) to discuss important issues and challenges facing the department and try to build consensus on how these issues should be tackled. Matters of more routine or mundane nature are usually communicated by the chair to the faculty through e-mail messages, informing them of items of importance and seeking input/feedback as necessary. All-important decisions are put on record in the form of meeting minutes, or action items. Besides the formal interaction between the chair and faculty at the meetings, extensive informal interactions regularly take place through office visitations and individual discussions.

The department chair administers the departmental budget, assigns workloads to faculty, and signs all academic, personnel, budget, and other administrative paperwork. The department is assisted by a full-time administrative assistant (Mary Anna Blair), full-time secretary II (Charles Alexander), a part-time graduate advisor shared with IME (Gail Evans), a full-time technician (Amir Husak) and seventeen half-time graduate teaching assistants (on general fund). Several student assistants are also employed by the department (on soft-money) to help with administrative functions such as reception, filing, word processing, grading homework, laboratory reports, etc. The chair supervises activities of all departmental personnel.

Three standing committees in the department are elected by the faculty each year: (1) Tenure and Promotion (T&P) Committee, (2) Salary (Personnel Evaluation) Committee, and (3) Budget Committee. The chair heads all committees; without vote on T&P, and with vote on the others. The departmental Salary Committee determines the unit-select portion of the faculty merit raises. With input from this committee, the chair provides recommendations to the dean regarding the relative merit raise to be awarded to individual faculty from the President/Dean's pool. The Budget Committee provides advice to the Chair on departmental budget priority.

Besides these committees, there are seventeen other committees: 1) Undergraduate, 2) Graduate, 3) Seminar, 4) Library, 5) IEEE faculty counselor, 6) ESFB representative, 7) College Executive Committee, 8) College AOC Committee, 9) College Academic Standards Committee, 10) College Computer Committee, 11) College Research Advisory Committee, 12) College Nomination Committee, 13) College Code of Ethics Committee, 14) College Math Committee, 15) Student Due Process Faculty Panel, 16) College Shop Committee, 17) College Faculty Budget Committee. Since the department is rather small (eighteen full time faculty and the chair), each faculty has to serve in two or more committees. This arrangement has served us well over the years. The department elects or assigns representatives to standing or ad hoc College committees, and supplies members to standing or ad hoc University committees, as well.

Finally, the chairman is assisted by a departmental faculty member, appointed as Graduate Program Officer--GPO (to administer Ph.D. graduate admissions and programs). The department shares an Academic Advisor with Industrial & Manufacturing Engineering, whose primary role is to monitor the curricular requirements of the M.S. graduate students. She assists both the chair and the Graduate Program Officer when student information is needed, and interfaces with the University Office of Admissions and Records in matters related to admission, registration, and certification of graduation.

From the academic standpoint, the department has the following specialty areas: systems & control, optics, computer systems, computer architectures, image processing, biomedical engineering, solid state & power electronics, smart sensors & VLSI. The full-time faculty teach undergraduate and graduate courses in their specialty areas, develop proposals, conduct research and supervise graduate students, and serve on departmental, college, university committees, as well as on local, national and international committees. In addition to full-time faculty, the department employs a few members of part-time/adjunct faculty members from local companies, who make valuable contributions to our academic program by teaching selected undergraduate and / or graduate courses.

The department has an Industrial Advisory Committee composed of prominent members of the electrical and computer engineering community representing both the private and public sector. This group of 9 senior engineers meets twice a year with the department chair and the selected faculty, and provides guidance and advise on strategic matters related to curriculum, research, and fund-raising issues.

Students participate in the activities of the student chapters of Institute of Electrical & Electronics Engineers (IEEE), Tau Beta Pi Honor Society, and Engineering Faculty & Student Board (EFSB). Faculty advisors provide guidance and supervision to these groups.

3.   Describe how your unit interacts with other units within the university or with similar units in other universities (collaborative efforts, cooperative arrangements, etc.).

Department faculty have a solid tradition of interdisciplinary activities within the university, outside the university, and with industry. For example, Dr. Hao Ying is collaborating with the School of Medicine to develop a highly sophisticated computer generated patient treatment models using fuzzy systems technology with discrete event systems technology. The flexible models will be applied to most diseases, including HIV/AIDS. The alternative energy curriculum development funded by NextEnergy requires collaboration among faculty members from all the engineering disciplines in the college. Two ECE faculty members have participated in this curriculum development. The goal of the Wayne State program is to establish an accredited master's degree program in Alternative Energy Technology (AET) by 2005. This creates an awareness and research to future cleaner energy alternatives to fossil fuels to be developed and utilized globally. Smart Sensors and Integrated

Microsystems (SSIM), under the direction of Dr. Auner with participation from faculty of various disciplines within the university, industry and other universities. SSIM within university collaborators are: Wayne State School of Medicine and Kresge Eye Institute, Children's Hospital and Karmanos Cancer Institute, College of Science and College of Engineering faculty. SSIM outside university collaborator: Arizona State University. SSIM industry collaborators are: Delphi, Ford Motor Co. and Fraunhofer USA. Delphi (the world's largest volume producer of MEMS-based sensor systems) has moved its facility to WSU creating 5000 sq. ft. of advanced clean-room space. In addition, Delphi is assigning three researchers to the lab.

Dr. Xiaoyan Han has collaborated with Physics department faculty and has developed a unique sensing and thermal imaging technique. Her innovative technique is being used in industry to detect minute fissures in aircraft skin and structures. The major aircraft manufacturer Boeing is using her invention.

4.   Is your program accredited? By what agency?

     ABET for Undergraduate.
     North Central Association for Graduate

5.   List the top 2 universities that you believe have departments of a similar nature to your department. How are they comparable?

The Electrical and Computer Engineering Department at Wayne State University has 19 full-time faculty (including the department chair), and offers BS, MS, and PHD programs in an urban setting. It has an undergraduate student population of 309 (as of Fall 2003), and has large masters and doctoral programs in terms of the numbers of students per full-time faculty. In Fall 2003, we had 216 active MS students, and 61 active PhD students. All full-time faculty are engaged meaningfully in research, and supervise doctoral students. The research conducted by the faculty is funded by federal, state, local government and private / industry sources. The research expenditures in FY 1998, FY 1999, FY 2000, FY 2001, FY 2002, FY 2003, and FY 2004 were $.785 million, $1.728 million, $2.348 million, $1.893 million, $2.652 million, and $4.967 million, 3.892 million respectively. Many of our graduate students are locally employed and attending our program part-time, and a good number of full-time students hold Graduate Research Assistant (GRA) or Graduate Teaching Assistant (GTA) positions. In Fall 2003, the department had 15 GRA's and 17 GTA's. A large percentage of our full-time students are international students.

Our graduate courses are offered in the evenings to accommodate working professionals. Typically, we offer our graduate courses after 5 pm, the classes being mostly held on two evenings per week. Our full-time students typically live on or near campus, and spend most of their time on their research projects in the laboratories. Upon graduation, many of our graduate students find positions in the Detroit area; some leave the state, and a good number of international students return to their home countries. Of the PhD graduates, many take advanced engineering positions in government and industry; some take academic positions. A majority of our PhD graduates, who are international students, take academic

positions in their home countries when they return.

We tried to identify two urban electrical and computer engineering departments, which have somewhat similar characteristics to ours. After considering several possibilities, we decided on the departments at the University of Houston and the University of Illinois at Chicago. Both of these departments are fairly similar to our department in terms of the degree programs offered, research specializations covered, research funding in terms of expenditures and funding agencies, the composition of the graduate student body, and the stature and quality of their faculty and graduate programs. Our research funding is very similar to both University of Illinois at Chicago and University of Houston. According to the NSF rankings based on FY 2002 research expenditures, our department ranks no. 79, Houston ranks no. 67, and Illinois-Chicago ranks no. 72.

Both of these universities are Carnegie 1 urban research universities. These universities were also used as comparable institutions for the entire college in a recent study conducted by the Dean and a committee of Chairs and the Faculty Assembly Executive Committee.

6. List the top university to which the department realistically aspires. How was this university selected?

The Electrical and Computer Engineering Department at the Michigan State University was selected as the one we realistically aspire to for the following reasons:
(1) It is a department, which ranks considerably higher than ours 61 vs 79, based on NSF research expenditures for FY 2002.
(2) It has a much larger faculty size – 34
(3) Its annual research expenditures is significantly more than ours ($6.129 M vs 4.967M in 2003)), with a higher amount of federal funding.
(4) It has a larger PhD program, and produces more PhD graduates per faculty per year.

They have been able to draw significant members of native-born MS and PhD students. We believe that what is being presently accomplished at MSU in terms of research productivity and PhD program characteristics is within our reach.

Section 2: Faculty

Part 1 - Overview

1. Describe the practices, policies, goals and achievements with regard to faculty:

    a. Recruitment

    The department has successfully recruited seven new faculty members since the last self-review. During the dot.com fiasco, two Computer Engineering faculty members switched to the Computer Science Department, and two left to seek their fortunes. The Computer Engineering faculty members who stayed have remained very active in research and doing collaborative work with Electrical Engineering faculty members. The strong research activities are reflected in the Year 2003 research expenditure of $4,967,000. The department research productivities received recognition from the Provost office, in the Provost's Enhancement Award of two enhancement positions. The ECE Department is currently recruiting for four tenure-track faculty positions in computer engineering and smart sensors areas for Fall 2005. This will bring the faculty size from 19 to 23. A faculty committee of five members plus the department chair has been created. Candidates are solicited through advertising in IEEE Spectrum, a nationally known publication for the Electrical and Computer Engineering professionals, and about five others top professional journals in Computer and Electrical Engineering. The openings are also posted in the Department website. In addition, faculty members are actively soliciting candidates through personal contacts. In the past recruiting effort, the Department received over 200 applications. The committee narrows down the applicants from four to six per available position. These candidates are then presented to the entire faculty for approval. The chosen candidates are invited for interview and to present their research. Each faculty provides feedback to the Chair, who then informs the candidate.

    b. Retention

    The ECE Department encourages retention of our regular and new faculty members. New faculty members are supported in numerous ways to make sure that they become successful and tenured faculty members. They are provided the necessary equipment and lab space to support their research. In the first two years, they are also provided with GRA support, reduced teaching loads, and summer support. Funding is provided to participate in conferences, attend grant-writing workshops, and to travel to pursue research opportunities. Three of the newly hired faculty members have been tenured and promoted.

    The department has an excellent retention record for tenured faculty members. We only lost faculty members due to: (1) retirement, (2) accepting a department chair position in another university, and (3) Computer Science and Computer Engineering failed merger. Tenured faculty members are provided with a flexible teaching load

and committee assignments, to pursue research interest to enhance WSU ECE Department visibility both domestically and internationally.

c. Mentoring

The department does not have a formal mentoring process, but most senior faculty members are available to junior faculty for any advice and suggestions. The department senior and junior faculty members have established several leading edge laboratories: Optolab, Enabling Technologies Laboratory (ETL), Nano Devices & Systems Laboratory(nDSL), Computation and Neural Networks Laboratory (CNNL), Multimedia Systems and Networking Research Lab, Suntracker, Cluster and Internet Computing Laboratory (CIC), Smart Sensors and Integrated Microsystems (SSIM) Program, 5000 sq foot class 100/10 advanced clean room facility in partnership with Delphi (the world's largest volume producer of MEMS-based sensor systems). With the existence of these laboratories made it very easy for a new faculty member to join any group and do collaborative research and publication. This enhances the chance to advance the tenure case for new faculty member. In the past several years ECE Department has 100% success rate in advancing the tenure case of junior faculty members.

d. Evaluation of teaching

The department currently relies on University-provided Student Evaluations of Teaching (SET). Any faculty considering for tenure or promotion is required to submit his/her teaching portfolio. The teaching portfolio typically contains a portion of the SET that pertain to questions on both the quality of the instructor / instruction and the quality of the course, the candidate's statement on teaching philosophy, course schedules, learning objectives, outcomes assessment, course materials (handouts, exams, homework, projects), and other pertinent documents. The Tenure and Promotion Committees at the departmental, college and university levels, the department Chair, the Dean, and ultimately the Provost evaluate the portfolio.

e. Affirmative action

Our department has made every effort to attract qualified minorities and women in every faculty search we have made. We have a diverse faculty base for our students. Our existing faculty breakdown is as follows: five Caucasian males, eleven Asian males, one Asian female, and two Arabic males.

2. What is the number of faculty the department expects to recruit in the next 7 years, given the expected retirements?

The department expects three senior faculty members to retire in the next seven

years. We are currently recruiting four new faculty members. These three replacements plus the four new hires this year will be used to change the makeup of the department to enhance the niche areas of the department to become more productive and more successful in obtaining external research funding.

3.   Describe the challenges you face in recruiting high quality faculty.

The challenges the department faces in recruiting high quality faculty are:

(1) It is difficult to gain commitments from the University for new faculty positions.

(2) Our university is not ranked in the US News and World Report and in NSF engineering funding research expenditures.

(3) Detroit's negative image has made it difficult to attract high quality candidates.

(4) Wayne State being an urban university has responsibilities of teaching courses in the evenings, which also present a challenge in recruiting high quality faculty.

4.   How do you expect these challenges to change in the next 7 years?

Delphi (the world's largest volume producer of MEMS-based sensor systems) has moved its facility to our department creating 5000 sq. ft. of advanced clean-room space. In addition, Delphi is assigning three researchers to the lab. This collaboration with our SSIM lab is expected to yield many wondrous applications for medicine, the environment, transportation and communications. Other SSIM lab collaborators are the Wayne State School of Medicine and Kresge Eye Institute, Children's Hospital and Karmanos Cancer Institute, Ford Motor Co. and Fraunhofer USA. SSIM lab has exciting on going research on developing novel micro-devices that hope will:

- Give sight to the blind
- Provide instant blood analysis and controlled chemical or drug release
- Detect cancerous tumors in their earliest stages in surgical real-time
- Monitor emissions streaming from vehicle tailpipes
- Hand-held pathogen monitor, which can instantly detect bacteria in food and water, and lethal gases and air-borne viruses in the field.

The new Delphi state of art clean-room facility and SSIM labs on going research are a major attraction for recruiting high quality faculty. The department has recently successfully recruited a high quality faculty from Caltech (Dr. Yong Xu) doing research on smart skins and intelligent textiles.

5.   Describe national and international impact of faculty on their discipline.

The faculty of the Electrical and Computer Engineering Department are leading experts in their fields with national and international recognition. They publish

regularly in prestigious journals, attend national and international conferences to present papers, chair technical sessions, and participate in committee meetings. Several faculty have participated in the organization of conferences; and have been reviewers of book manuscripts, journal and conference papers. The ECE faculty have published four books in the last ten years. Many faculty members also hold US patents. Some of them are commercialized (e.g. Dr. X. Han). Detailed information outlining specific contributions to the ECE discipline can be found in the attached faculty CVs.

6. For all faculty recruited during this review period, indicate when, and where, the faculty received Ph.D. and post-doctoral experience (if any).

New Tenure-track Appointments (1998 – present)

1. Ivan Avrutsky: PhD, General Physics Institute, Moscow, Russia, 1988
Post-doctoral work at University of Toronto, 1996-1997
Wayne State University tenure-track Assistant Professor appointment, 1998

2. Xiaoyan Han: PhD, Wayne State University, 1997
Assistant Professor (Visiting/Research), WSU Physics Dept 1997-1999
Wayne State University tenure-track Assistant Professor appointment, 1999

3. Hao Ying: PhD, University of Alabama @ Birmingham, 1990
Associate Professor, Univ of Texas Physiology & Biophysic 1998-2000
Wayne State University tenure-track Associate Professor appointment, 2000

4. Jaewu Choi: PhD, University of Nebraska, Lincoln, 1998
Research Associate, Louisiana State Univ, Center for Advanced Microstructures & Devices, 1998-2001
Wayne State University tenure-track Assistant Professor appointment, 2001

5. Yong Xu: PhD, California Institute of Technology, 2002
Wayne State University tenure-track Assistant Professor appointment, 2002

6. Qiang Cheng: PhD, University of Illinois @ Urbana-Champaign, 2002
Wayne State University tenure-track Assistant Professor appointment, 2002

7. Nabil Sarhan: PhD, Pennsylvania State University 2003
Wayne State University tenure-track Assistant Professor appointment, 2003

7. What recognition do faculty bring the program in the area of public service?

Individual faculty contributes in a variety of ways, most obviously with their active

participation in planning national and international conferences, and journal editorships.

Dr. Erlandson was also guest editor for a special section on rehabilitation robotics in the *IEEE Transactions on Rehabilitation Engineering, March 1995*.

Dr. Hassoun has served as Associate Editor and reviewer for a number of technical journals. He is currently the Co-Editor-in-Chief of *Neural Processing Letters*, as of January 1998. He served on the program committees of several international conferences on neural networks.

Dr. F. Lin served as the finance chair of the 36th Midwest Symposium on Circuits and Systems and the registration chair of the 33rd IEEE Conference on Decision and Control. He was a past member of Conference Editorial Board of IEEE Control Systems Society and an associate editor of IEEE Transactions on Automatic Control.

Dr. L. Y. Wang has served in the following capacities:

Plenary Speaker: Conference on Feedback Control, Nonlinearity, and Complexity, Montreal, Canada, May 6-7, 1994.

Plenary Speaker: 2000 Chinese Control Conference, Hong Kong, December 6-8, 2000.

Associate Editor, IEEE Transactions on Automatic Control

Editor, Journal of System Sciences and Complexity

Associate Editor, International Journal of Control and Intelligent Systems

Associate Editor, Journal of Control Theory and Applications

Panelist: Panel Workshop on "Trend in Robust Control and Identification", Siena, Italy, 1998.

Panelist: Mathematics Information and Signal Processing Committee, International Federation of Automatic Control, 1999-present

Panelist: Transportation Panel, Dynamic System and Control Div. of ASME, 1999-present.

Dr. Hao Ying has served in the following capacities:

- Associate Editor, *International Journal of Fuzzy Systems*

- Guest Journal Editor

  * *Information Sciences*

- *International Journal of Intelligent Control and Systems*

- *International Journal of Fuzzy Systems*

- *Acta Automatica Sinaca*

- Member, Fuzzy Systems Technical Committee, IEEE Neural Networks Society, 2002-2003

- International Conference Program Chair

  * The First International Joint Conference of North American Fuzzy Information Processing Society Conference, Industrial Fuzzy Control & Intelligent System Conference, and NASA Joint Technology Workshop on Neural Networks & Fuzzy Logic, Dec. 18-20, 1994, San Antonio, TX, USA.

  * The Third International Workshop on Intelligent Systems, Feb. 27-Mar. 3, 2000, Atlantic City, NJ, USA.

  * North American Fuzzy Information Processing Society Conference, June 27-29, 2005, Detroit, MI, USA.

- International Conference Publication Chair

  * IEEE International Conference on Fuzzy Systems, May 7-10, 2000, San Antonio, TX, USA.

- Program Committee Member for 17 International Conferences

- International Conference Tutorial Instructor

  * *"Fuzzy Control Theory"* at the 1994 First International Joint Conference of the North American Fuzzy Information Processing Society Biannual Conference, the Industrial Fuzzy Control and Intelligent Systems Conference, and the NASA Joint Technology Workshop on Neural Networks and Fuzzy Logic, December 18–20, 1994, San Antonio, TX, USA.

  * *"Fuzzy Control Theory: An Analytical Approach"* at the IEEE International Conference on Fuzzy Systems, September 8–11, 1996, New Orleans, LA, USA.

- International Conference Proceeding Co-editor

  * Proceeding of the 1994 First International Joint Conference of the North American Fuzzy Information Processing Society Conference, Industrial Fuzzy Control and Intelligent Systems Conference, and the NASA Joint Technology Workshop on Neural Networks and Fuzzy Logic, IEEE Press, 1994.

- Member, Projects Advisory Board, Idaho National Science Foundation Experimental Program to Stimulate Competitive Research (EPSCoR) Project, 2002-2004.

- Invited Reviewer for 42 International Journals

- Invited Reviewer for International Conferences, Including

    * IEEE International Conference on Fuzzy Systems

    * IEEE Conference on Decision and Control

    * American Control Conference

- <u>Invited Book Reviewer for Publishers</u>

8. Describe the faculty's participation in the university's goal to be the leading university in research applied to urban needs and problems.

Large portions of our faculty's research are directly applicable to solving urban needs and problems:

Dr. Erlandson directs the <u>Enabling Technologies Laboratory</u> with funding from NSF, Goodwill Industries, and Intermediate School Districts in southeastern Michigan: Jackson, Lenawee, Macomb, Monroe, Oakland Schools, St. Clair, Washtenaw, and Wayne RESA; The lab through student projects develop products based on the following philosophies:

- Designing products and services that improve everyone's performance

- Facilitating integrated activities between individuals with mental or physical disabilities and those without such disabilities

- Easing the one-on-one accommodations that supervisors may still need to provide for individuals with more severe disabilities.

Dr. Xiaoyan Han has developed a unique sensing and thermal imaging technique. Her innovative technique is being used in industry, among other applications, to detect minute fissures in aircraft skin and structures. Boeing Aircraft has invited her to their facility.

Smart Sensors and Integrated Microsystems (SSIM), under the direction of Dr. Auner with participation from faculty of various disciplines, has been developing sensors for detecting E. coli bacteria, anthrax, arsenic and other dangers in air and water, which will have a wide range of uses: including tracking E. Coli contamination in Lake St. Clair and its tributaries and chemical spills in the St. Clair River, detecting dangerous chemicals at Metro drinking water plants, monitor pathogens at hospitals, instantly detect contaminants in food processing plants. SSIM and Kresge Eye Institute have been collaborating in developing retinal and cortical implant chips that will restore sight to those who suffer retinal damage and deterioration. Hydrogen sensor is being developed that could be used in vehicle fuel cells for monitoring and controlling hydrogen production. With fuel cells expected by some to be huge part of the auto-supply market in the not-so-distant future, hydrogen sensor will be very important in the automotive industry. Delphi (the world's largest volume producer of

MEMS-based sensor systems) has moved its facility to our department creating 5000 sq. ft. of advanced cleanroom space. This collaboration is expected to yield many wondrous applications for medicine, the environment, transportation and communications.

Two ECE faculty members have participated in developing alternative energy curriculum funded by NextEnergy. The goal of the Wayne State program is to establish an accredited master's degree program in Alternative Energy Technology (AET) by 2005. This creates an awareness and research to future cleaner energy alternatives to fossil fuels to be developed and utilized globally.

Dr. Hao Ying is collaborating with the School of Medicine to develop highly sophisticated computer generated patient treatment models using fuzzy systems technology with discrete event systems technology. The flexible models will be applied to most diseases, including HIV/AIDS.

9. Describe the faculty's participation in the university's goals for global education.

Our faculty have been very active on the international scene participating in numerous conferences, as program chair, program committee member, invited reviewer, and tutorial instructor. In addition our faculty are very active in international journals serving as associate editor, and as guest editor. Some faculty members have joint research programs with overseas faculty, visiting campuses of foreign institutions to give seminars, and to recruit graduate students. A majority of our graduate students come from abroad. Some faculty members have spent their sabbatical leaves at foreign universities. Prof. Harpreet Singh has established University MOU's with Indian Universities.

10. Describe activities for faculty, such as colloquia, exchanges, lecture series, etc.

The Ph.D. committee is now requiring all Ph.D. students to attend two 1 cr. hr. seminar series. The seminar series will regularly invite speakers from industry and other universities for guest lectures; and also to have Ph.D. students present their research to fellow students and to faculty. Advanced Ph.D. students frequently co-author papers with their advisors and travel to national or international symposia to present their papers.

11. What is the degree of faculty access to relevant technology?

Faculty has excellent access to computer technology. The University WSU Office of Teaching and Learning provides conference workshops on improving classroom teaching and learning. The College has both PC Lab and UNIX Lab to support different types of CAD and simulation softwares to run a successful Electrical and Computer Engineering program. The department receives an annual budget from the University for equipment/software funding. This amount covers the cost of renewing licenses and upgrades to continue offering courses supported by this equipment/software.

12. Describe faculty involvement in alumni and development activities.

Our faculty members fully support alumni and development activities. Faculty members maintain contacts with the graduates. They attend college organized alumni functions such as the Night of the Stars, Order of the Engineer, Honors Convocation, and making contributions to fund raising efforts. With faculty participation, the department has recruited several alumni to serve on our Industrial Advisory Board.

Part 2 – Individual Faculty Supporting Data

1. Provide curricula vitae for all faculty with regular faculty status.

SEE ATTACHED **APPENDIX A**

Form F1						
Department Name: Electrical and Computer Engineering						
Please provide information starting with the year of the last review through the current Fall						
	98	**99**	**00**	**01**	**02**	**03**
New Appointments	1	1	1	1	2	1
Terminations						
Retirements			1			
Resignations						1
Percentage of undergraduate lecture courses taught by full-time faculty	80	75	75	75	80	80
Percentage of undergraduate lecture courses taught by part-time/adjunct faculty	20	25	25	25	20	20

Form F2	Individual Faculty Data				
Department Name: Civil and Environmental Engineering					
Faculty Name	**Greg Auner**	**I. Avrutsky**	**Q. Cheng**	**J. Choi**	**R. Erlandson**
Classification	FT	FT	FT	FT	FT
Rank	Professor	Associate Professor	Assistant Professor	Assistant Professor	Professor
Tenure date	1995	2004	N/A	N/A	1980
Regular Graduate Faculty Status (year)	1990	1998	2002	2001	1975
Area of Specialization	Sensors, Microsystems, Solid State Physics, Nanotechnology	Optoelectronics	Information and Signal Processing	Nano and Molecular Electronics	Bioengineering Rehabilitation Eng, Universal & Accessible Design
Date of Ph.D.	1990	1988	2002	1998	1970
National Honors/Awards (#)	3				3
Publications in Other Journal(s)	128	67	4	38	20
Books (#)					
Chapters(#)	1	1	5	1	6
Citations (#)				265	
Refereed abstracts (#)	152				3
Presentations (#)	152	29	14	33	79
Shows/exhibits/creative works (#)					
Grants submitted (#)					
Grants funded (#)	38	6	2	5	14
Total Funded amount	$25,928,904	$374,063	$23,000	$110,000	$2,844,479
Funding Source of Grants funded	Delphi, DOD, DTRA, DTE, NASA, NIH, NSF,MLSC, Children Hosp, etc.	NSF, Fed Highway Adm, TACOM, Lake Shore Cryotronics	WSU	NSF, WSU	NSF, National Foundation, Local Foundation, WSU

Form F2	Individual Faculty Data				
Department Name: Civil and Environmental Engineering					
Faculty Name	**X. Han**	**M. Hassoun**	**F. Lin**	**S. Mahmud**	**N. Sarhan**
Classification	FT	FT	FT	FT	FT
Rank	Associate Professor	Professor	Professor	Associate Professor	Assistant Professor
Tenure date	2004	1992	1994	1991	
Regular Graduate Faculty Status (year)	1999	1988	1988	1988	2003
Area of Specialization	Infrared Imaging & Sensing, Material Characterization	Machine Learning, Pattern Recognition, Neural Networks	Systems and Control, Image Processing, Biomedical Applications	Embedded Systems, Microprocessors, Real-Time Networking	Computer Engineering
Date of Ph.D.	1997	1986	1988	1984	2003
National Honors/Awards (#)	1		1		1
Publications in Other Journal(s)	17	4	42	23	1
Books (#)			1	2	
Chapters(#)		2	5		
Citations (#)					
Refereed abstracts (#)					
Presentations (#)	48	10	67	40	6
Shows/exhibits/creative works (#)	8				1
Grants submitted (#)					2
Grants funded (#)	25	4	19	10	0
Total Funded amount	$3,874,515	$325,811	$3,300,000	$477,506	
Funding Source of Grants funded	NSF, ONR, AFRL, NSWC, FORD, GM, SWPC, Budd	NSF, WSU	NSF, NASA, NIH, DARPA, FORD, GM, Johnson Control, Control Pak, ANR	FORD, Control Pak, Dimango Products	WSU

Form F2	Individual Faculty Data				
Department Name: Civil and Environmental Engineering					
Faculty Name	**D. Silversmith**	**H. Singh**	**P. Siy**	**L. Y. Wang**	**J. Woodyard**
Classification	FT	FT	FT	FT	FT
Rank	Professor	Professor	Professor	Professor	Associate Professor
Tenure date	1998	1984	1988	1996	1985
Regular Graduate Faculty Status (year)	1998	1981	1981	1991	1983
Area of Specialization	Physical Electronics, Micro-Electro-Mechanical Systems	Computer Engineering	Pattern Recognition, Image Processing, VLSI, RNS	Control Systems, Biomedical Information Processing,	Optoelectronic Devices and Development of Device Characterization Techniques
Date of Ph.D.	1969	1971	1973	1990	1966
National Honors/Awards (#)	4				1
Publications in Other Journal(s)	3	33	22	20	14
Books (#)					
Chapters(#)				3	
Citations (#)	10				
Refereed abstracts (#)	5				
Presentations (#)		64	56	31	15
Shows/exhibits/creative works (#)					2
Grants submitted (#)					
Grants funded (#)	3	30	17	9	7
Total Funded amount	$438,318	$1,250,000	$5,654,293	$1,952,275	$471,000
Funding Source of Grants funded	IEEE, US Dos		NSF, Henry Ford Health Sciences Ctr, Brookhaven Nat Lab. General Dynamics, FORD at UK	NSF, FORD, MEDC, Micro Systems, WSU	Chrysler Corp, NASA

Form F2	Individual Faculty Data				
Department Name: Civil and Environmental Engineering					
Faculty Name	**C. Xu**	**Y. Xu**	**H. Ying**	**Y. Zhao**	
Classification	FT	FT	FT	FT	FT
Rank	Associate Professor	Assistant Professor	Professor	Professor/ Chair	
Tenure date	2001		2003	1994	
Regular Graduate Faculty Status (year)	1995	2002	2000	1989	
Area of Specialization	Distributed and Parallel Computer Systems, Computer Architecture	MEMS/NEMS	Intelligent Systems, control modeling, image processing, sensor systems	Optics, photonics, and nano-structures	
Date of Ph.D.	1993	2002	1990	1989	
National Honors/Awards (#)				2	
Publications in Other Journal(s)	24	6	64	40	
Books (#)	2		1		
Chapters(#)	3		2	1	
Citations (#)					
Refereed abstracts (#)					
Presentations (#)	40	1	84	51	
Shows/exhibits/creative works (#)					
Grants submitted (#)					
Grants funded (#)	12	1	6	22	
Total Funded amount	$2,500,000	$275,434	$1,600,000	$2,182,000	
Funding Source of Grants funded	NSF, NASA, Suns Micro, Henry Ford Hosp, Global Engineering	WSU	NIH, DOD, WSU	NSF, ARO, ONR, AFOSR, NASA, FORD, GM Henry Ford	

Form F3	Dissertation Supervision		

Department Name: Electrical and Computer Engineering

For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review.

Faculty Name: Greg Auner

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997	1	5	
1998	2	3	
1999		4	
2000	1	5	
2001		6	
2002	1	16	
2003	2	20	
2004	1	23	

Form F3	Dissertation Supervision		
Department Name: Electrical and Computer Engineering			
For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review. **Faculty Name: Ivan Avrutsky**			
Year	**PhD Dissertation Completed (#)**	**PhD Dissertation In Progress (#)**	**Published (#)**
1997			
1998			
1999			
2000		1	
2001		1	
2002		1	
2003	1		
2004		4	

Form F3	Dissertation Supervision		
Department Name: Electrical and Computer Engineering			
For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review. **Faculty Name: Qiang Cheng**			
Year	**PhD Dissertation** **Completed (#)**	**PhD Dissertation** **In Progress (#)**	**Published (#)**
1997			
1998			
1999			
2000			
2001			
2002			
2003		1	
2004			

Form F3	Dissertation Supervision		

Department Name: Electrical and Computer Engineering

For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review.
Faculty Name: Jaewu Choi

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997			
1998			
1999			
2000			
2001		3	
2002		4	
2003	1	7	
2004			

Form F3	Dissertation Supervision		
Department Name: Electrical and Computer Engineering			
For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review. **Faculty Name: Robert F. Erlandson**			
Year	**PhD Dissertation Completed (#)**	**PhD Dissertation In Progress (#)**	**Published (#)**
1997			
1998	1	3	
1999			
2000			
2001			
2002			
2003	2	3	
2004	2		
2005		2	

Form F3	Dissertation Supervision		
Department Name: Electrical and Computer Engineering			
For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review. **Faculty Name: Xiaoyan Han**			

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997			
1998			
1999			
2000	1		
2001			
2002			
2003			
2004		3	

Form F3	Dissertation Supervision		

Department Name: Electrical and Computer Engineering

For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review.

Faculty Name: Mohammad Hassoun

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997			
1998			
1999			
2000			
2001			
2002	1		
2003	1	1	
2004			

Form F3	Dissertation Supervision		

Department Name: Electrical and Computer Engineering

For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review.

Faculty Name: Feng Lin

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997	1	1	
1998		3	
1999		3	
2000	1	2	
2001	2	1	
2002		1	
2003			
2004			

Form F3	Dissertation Supervision		

Department Name: Electrical and Computer Engineering

For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review.

Faculty Name: Syed Mahmud

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997			
1998			
1999			
2000			
2001			
2002	1		
2003			
2004			

Form F3	Dissertation Supervision		
Department Name: Electrical and Computer Engineering			
For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review. **Faculty Name: Nabil Sarhan**			
Year	**PhD Dissertation** **Completed (#)**	**PhD Dissertation** **In Progress (#)**	**Published (#)**
1997			
1998			
1999			
2000			
2001			
2002			
2003		1	
2004			

Form F3	Dissertation Supervision		

Department Name: Electrical and Computer Engineering

For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review.

Faculty Name: Donald J. Silversmithb

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997	1		
1998			
1999			
2000			
2001			
2002			
2003			
2004			

Form F3	Dissertation Supervision

Department Name: Electrical and Computer Engineering

For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review.

Faculty Name: Harpreet Singh

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997			
1998			
1999	1		
2000			
2001	1		
2002	1		
2003	1		
2004			

Form F3	Dissertation Supervision		

Department Name: Electrical and Computer Engineering			

For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review.

Faculty Name: Pepe Siy

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997			
1998		4	
1999		6	
2000	3	3	
2001	2	5	
2002	1	4	
2003	2	6	
2004	1	6	

Form F3	Dissertation Supervision

Department Name: Electrical and Computer Engineering

For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review.

Faculty Name: Le Yi Wang

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997	1	4	
1998		4	
1999	1	3	
2000	1	4	
2001	2	4	
2002	1	3	
2003		4	
2004			

Form F3	Dissertation Supervision		

Department Name: Electrical and Computer Engineering			

For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review.

Faculty Name: James R. Woodyard

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997			
1998		2	
1999		3	
2000		1	
2001		1	
2002		0	
2003		0	
2004		0	

Form F3	Dissertation Supervision		

Department Name: Electrical and Computer Engineering

For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review.
Faculty Name: Cheng-Zhong Xu

Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997			
1998			
1999		2	
2000		3	
2001		4	
2002		6	
2003		6	
2004		6	

Form F3	Dissertation Supervision		
Department Name: Electrical and Computer Engineering			
For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review. **Faculty Name: Yong Xu**			
Year	PhD Dissertation Completed (#)	PhD Dissertation In Progress (#)	Published (#)
1997			
1998			
1999			
2000			
2001			
2002			
2003			
2004			

Form F3	Dissertation Supervision		
Department Name: Electrical and Computer Engineering			
For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review. **Faculty Name:** Hao Ying			
Year	**PhD Dissertation Completed (#)**	**PhD Dissertation In Progress (#)**	**Published (#)**
1997			
1998			
1999			
2000		1	
2001		2	
2002	1		
2003			
2004		9	

Form F3	Dissertation Supervision		
Department Name: Electrical and Computer Engineering			
For each faculty member with regular faculty status, please provide the following information starting with the year of the last review through Fall of the current review. **Faculty Name: Yang Zhao**			
Year	**PhD Dissertation Completed (#)**	**PhD Dissertation In Progress (#)**	**Published (#)**
1997	1	2	
1998		2	
1999		2	
2000		3	
2001		3	
2002	1	3	
2003		3	
2004			

Section 3: The Doctoral Program

Part 1 - Background

1. Rank order the principal missions of your doctoral program (Note: No tied ranks).

   a. Training scholar teachers for academic careers

   ___2_

   b. Training practitioners for industry, business, or government

   ___1_

   c. Providing advanced learning opportunities for interested students

   ___3_

   independent of career objectives
   d. Other (please explain)—multi-disciplinary doctoral program

   ___4_

   _

   We support multi-disciplinary doctoral program. ECE received an IGERT NSF supported program. This is a multi-disciplinary program with active collaboration of faculty member from Physics, Chemistry, Medical School, Biomedical Engineering, Chemical Engineering, and Mechanical Engineering.

   _____

   _____

   _____

Form 1BD		
Department Name: Electrical and Computer Engineering		
List the 2 universities that you believe have doctoral programs similar to your department. For each, indicate which of the following factors you used to determine comparability. Check all that apply.		
CRITERIA The comparison departments:	**University of Houston**	**University of Illinois@Chicago**
Produces a similar number of Ph.D. graduates	X	X
Ph.D. graduates similar in quality to ours		
Places Ph.D. graduates in similar types of positions		
Ph.D. program is organized into similar divisions		
Ph.D. training curriculum is similar		
Students are drawn from a national pool to about the same extent as we do	X	X
Students drawn from a local pool to about the same extent as we do		
Students drawn from an international pool to about the same extent as we do	X	X
Faculty publish in top tier journals		
Number of faculty	X	X
Generates about the same amount of external funds	X	X
Receives funding from the same types of external sources		
Is a part of an urban university	X	X
Is ranked similarly to our department-indicate ranking index used for comparison		
Faculty have similar research interests	X	X
Faculty have members who publish about as many books as we do		
Faculty members perform or exhibit their creative works as often as we do		
Faculty members have similar numbers and types of awards in the profession	X	X
Faculty members participate to a similar extent in national, professional organizations	X	X
Faculty members scholarly quality is similar to ours	X	X
Other (please specify below)		

Form 2BD	**Doctoral Program Aspired to**
Department Name: Electrical and Computer Engineering	

CRITERIA The department we aspire to:	Michigan State University
Produces more/less Ph.D. graduates	**More**
Places more Ph.D. graduates in more applied positions	
Places more Ph.D. graduates in more academic positions	**Yes**
Has a Ph.D. program organized differently than ours	
Has a Ph.D. training curriculum that differs from ours	
Has faculty who publish more in top tier journals	
Has a smaller/larger faculty size	**Larger**
Generates more external funding	**Yes; $6.129M (2003)**
Receives more funding from federal/private sources	**Federal**
Conducts more research focused on urban issues	
Is ranked higher than our department (NSF research expenditures-2002)	**Yes; #61**
Has a faculty with different research interests	
Has faculty members who have more professional awards	**Yes**
Has faculty members who participate to a greater extent in national, professional organizations	
Has faculty members whose scholarly quality is greater than ours	
Produces Ph.D. students higher in quality than ours	**Yes**
Has faculty members who publish more books than we do	
Has faculty members who perform or exhibit their creative works more often than we do	
Has more students who apply nationally to the program	**Yes**
Enrolls more students drawn from a national pool	**Yes**
Enrolls more/less international students Other (please specify)	**Yes**

List the university that has the doctoral program to which your the doctoral program realistically aspires. How was this doctoral program selected? Check all factors that apply and where appropriate indicate which option you have chosen.

Form 1PD	Policies and Procedures Profile				

Department Name: Electrical and Computer Engineering

Please check each process that applies to the department. Indicate who in the department is responsible for the process.

PROCESS	APPLIES	RESPONSIBLE PERSON			
		CHAIR	ASSOC. CHAIR	GRAD. OFFICER	OTHER (DESCRIBE)
New Student orientation					**Grad School**
Advises students on Plan of Work	**X**			**X**	

Approves Plans of Work	X			X	
Chairs Graduate Committee	X			X	
Oversees graduate recruitment	X			X	
Oversees graduate admissions	X			X	
Informs students of departmental requirements	X			X	
Informs students of university requirements	X			X	
Approves written qualifying exam committees	X				PhD Committee
Approves oral qualifying exam committees	X	X			PhD Committee
Approves dissertation committees	X	X			
Distributes fellowship and scholarship information to students	X				PhD Committee
Oversees graduate information on Department website	X			X	
Serves as advisor for department graduate student organization	X			X	
Distributes information to students concerning Career options in the field	X	X			
Distributes information to students concerning job placement of students from the program	X	X			
Distributes information to student concerning time-to-degree for the program	X			X	
Oversees student record-keeping	X			X	Grad Advisor
Assigns teaching assistantships	X	X			
Evaluates performance of GTAs	X	X			
Observes GTAs in the classroom					Faculty for course
Supervises GTAs	X				Faculty for course
Distributes and collects applications For GTAs	X			X	
Oversees appointments of GRAs	X	X			
Hears grievances of undergraduates concerning GTAs	X	X			
Hears grievances of graduate students Involving faculty members	X	X			
Other					

Part 2PD – Program Policies and Procedures, Course Description and Assessment

2. List any 700 and 800 courses (since the year of the last review):

a.   offered less than once a year but more than every 2 years

ECE 7450 System Identification and Adaptive Control
ECE 7460 Stochastic Control
ECE 7480 Advanced Control System Design
ECE 7540 Advanced Computational Electronics

b.   offered less than once every 2 years

ECE 7670 – Pattern Recognition
ECE 7830 – Nonlinear Optics

ECE 8120 – Advanced Artificial Neural Systems
ECE 8550 – Advanced Solid State Electronics II

    (5) Have department requirements changed since the last review? __X_yes
       ___no
If yes, please describe the changes:

Doctoral students are now required to complete their preliminary exams within a set period of time (usually one year) after beginning the Ph.D. program. Additionally, students must complete two one credit hour of Ph.D. seminar by graduation. In this course they are expected to perform research on their area of study, and deliver presentations on this work to fellow students.

    (6) How does the curriculum prepare a graduate who will be living and working in an increasingly global society?

The fields of electrical and computer engineering do not have cultural border and apply globally. Students can apply their learned knowledge anywhere in the world. Research in computer hardware, smart sensors for medical applications, alternative energy, control, communication etc. can be used globally. Many of our international students are being employed in their home country as a result of migration of many U.S. research facilities.

    (7) Discuss the relationship of the doctoral program to the undergraduate program.

Undergraduate curriculum provides exposure to many diverse areas of Electrical and Computer Engineering fields, while the doctoral program provides in-depth knowledge and specialized laboratory skills necessary to conduct research in the chosen area of specialization. Many of our doctoral students serve as teaching assistants in laboratory courses. They thus have the opportunity to transfer their learned knowledge and skills to the undergraduate students. Several faculty members have Research Education for Undergraduate (REU) grants, where undergraduate students are hired as student assistants by our faculty, and get to work and interact with the doctoral students on their projects where significant information transfer takes place. Many of our faculty teach both undergraduate and advanced graduate level (doctoral) courses, this interaction provides   a common link between the undergraduate and doctoral program.

    (8) Check all that apply. The Graduate Officer in the department receives the following compensation:
  a. Release time from teaching   _____
  b. How much?   _____
  c. Summer salary   ___X__
  d. Stipend   _____
  e. Travel money   _____
  f. Research funds   _____

     g. GRA   _____

     h. Secretarial support   __ X__

     i. Merit pay   _____

     j. Other (please indicate)   _____

(9) The appointment of the Graduate Officer is: ___X___ 9-month   _____ 12-month

(10)   What do you view as the most important external threats to your doctoral programs

The most important external threat is the declining enrollment. Majority of our PhD students are international students, with current immigration restrictions that makes it difficult for international students to study in the U.S., will have a major impact on PhD enrollment. In addition with many local companies cutting back on their reimbursement of tuition for employees, will also further decline domestic graduate students enrollment. Also, the employments requiring PhD degree are becoming scarce. This is major reason why very few domestic/local students are pursuing PhD degree.

Part 3DS - Doctoral Student Profile

Form 1DS	General Data – Doctoral Student Profile						
Department Name: Electrical and Computer Engineering							
Please provide the following information starting with the year of the last review through the Fall of the current review.							
ADMISSIONS DATA							
		98	99	00	01	02	03
Number of students applied (completed applications)		13	27	16	31	74	32
TOTAL		13	27	16	31	74	32
Number of international students admitted		9	17	13	19	15	13
Number of minority students admitted		0	0	0	0	NO	1
Number of all other students admitted		0	0	0	0	1	4
TOTAL		9	17	13	19	16	18
Average GPA of international students admitted							
Average GPA of minority students admitted		N/A	N/A	N/A	N/A	N/A	N/A
Average GPA of all other students admitted		N/A	N/A	N/A	N/A	N/A	N/A
Average GRE score of students admitted		N/A	N/A	N/A	N/A	N/A	N/A
Average GRE score of students enrolled		N/A	N/A	N/A	N/A	N/A	N/A

1. What is the current number of full-time students in the Ph.D. program?   47

2. What is the current number of part-time students in the Ph.D. program?   14

3. What is the average time to degree (Ph.D. applicant date minus
    graduation date)?   4.5 yrs

4. How many students are pre-candidates?   24

5. How many students are candidates?   24

6. What is the average time to candidacy (Ph.D. applicant date minus
    candidacy date for all students achieving candidacy since the last
    review)?   2

7. How many Ph.D. students graduated between the last review and
    the year prior to this review?   35

Form 2DS	# of Ph.D. Graduates Since the last review					
	98	99	00	01	02	03
	6	7	1	5	10	6

Individual Doctoral Student Data[1]

**The following data should be kept in an EXCEL compatible database. You may be
required to submit this data in whole or part to The Graduate School.**

(see APPENDIX B)

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1 . If you do not already maintain a database on the information requested, or if the university does not provide any of the
following information, see sample forms S1 and S2 for data collection model. If you wish to have a copy of this program,
please call 577-8968. Specify whether you want the program on a disk or as an e-mail attachment. The forms were developed
using ACCESS. ACCESS can be converted into an EXCEL spreadsheet to tabulate the items marked with an asterisk (*). You
must have ACESS and EXCEL software installed to run the program.

Recruitment

1.	List in order, the 5 universities from where your department most frequently enrolls doctoral students (i.e., where do most of your doctoral students come from?). List should include the first year after the last review of the department and the last 2 years preceding this departmental review.

Form 4DS	Recruitment Background		
University	1998	2002	2003
Univ of Mich-Dearborn	N/A	0	2
Henry Ford Comm College	N/A	0	2
University of Windsor	N/A	0	1
Univ of Science & Tech Of China	N/A	0	1
University of Texas At Dallas	N/A	1	0

2.	Check all that apply. The recruitment activities of the department include:
   a.	Creating department-specific recruitment print materials 	__X___
   b.	Advertising program to other faculty in the field 	__X___
   c.	Making information about program available at conferences 	__X___
   d.	Sending faculty to give talks at other schools 	_____
   e.	Having faculty contact prospective students 	__X__
   f.	Sending students to give talks at other schools 	_____
   g.	Having students contact prospective students 	__X__
   h.	Inviting prospective students to campus 	_____
   i.	Inviting admitted students to campus 	_____
   j.	Appointing a recruitment director separate from the Graduate Officer_____

3.	Check all that apply. The department website contains the following information for recruitment:
   a.	List of faculty 	__X__
   b.	Faculty e-mail addresses 	__X__
   c.	Faculty phone numbers 	__X__
   d.	Faculty research interests 	__X__
   e.	Faculty publications 	__X__
   f.	Faculty grants 	__X__
   g.	Student publications 	_____
   h.	Student profiles 	_____
   i.	Statements from present and past students 	_____
   j.	Degree requirements 	_____
   k.	Types of support available 	_____
   l.	Time-to-degree for graduates in the last 5 years 	_____
   m.	Program placement information for graduates in the last 5 years 	_____

4.	When were print materials for recruitment last updated? 	_Dec'04_

Teaching

1.	Check all that apply. The department supports graduate teaching assistants by:

a. Observing first year GTAs in the classroom at least once a semester   __X__
b. Observing first time GTAs teaching at least once a semester   __X___
c. Observing all GTAs in the classroom at least once a semester   _____
d. Providing written feedback on performance in the classroom   __X__
e. Discussing teaching evaluations with the GTA   _____
f. Recognizing good teaching with a departmental award   __X__
g. Recognizing good teaching by nominating students for the
   Heberlein award   _____
h. Videotaping GTAs in the classroom at least once   _____
i. Offering a course on teaching in the discipline   _____
j. Providing faculty teaching mentors for students   _____
k. Providing a faculty member or staff person who serves as an
   instructional consultant for GTAs   _____
l. Encouraging use of the Office for Teaching and Learning   _____
m. Making information available concerning the Graduate Certificate in
n. College and University Teaching   _____
o. Other (please indicate)   _____

2. For each semester in the last 3 academic years, list the percentage of lecture
   sections (not including laboratories or discussion sections) that have been taught by
   doctoral students.

   Our doctoral students only teach lab courses.

Form 5DS	Sections taught by GTA				
	1999	2000	2001	2002	2003
Fall	0	0	0	0	0
Winter	0	0	0	0	0
Spring/Summer	0	0	0	0	0

3. How many Ph.D. students have been supported in each of the following categories since
   the year of the last review through the Fall of the current review?

Form 6DS						
Type of Support	1999	2000	2001	2002	2003	2004
Graduate research assistantships	15	15	5	15	15	15
Graduate teaching assistantships	13	17	17	15	17	17
Fellowships	1	0	2	2	2	3
Not supported	15	10	19	20	27	N/A
Other support (please explain)						

4. How does the number of supported Ph.D. students compare with the similar
   universities you listed above? With the university to which you aspire (Begin with
   the year of the last review up through the Fall of the current review.

Form 7DS	Doctoral Student Support – Comparative Data				
University Name	Graduate research assistantships	Graduate teaching assistantships	Fellowships	Not supported	Other support (please explain)
	#UC/#WSU				
Univ of Houston(2003)	70	25	4	0(61PhD)	4
Univ of Illinois @Chicago(2002)	44	34	7	0(64PhD)	0
Michigan State Univ(2003)	103	24	22	0(97PhD FullTime only)	0

Part 6-Mentoring

1. Check all that apply. Our department creates a sense of community among our doctoral students by:

   a. Encouraging students to attend seminars on campus   __X__
   b. Requiring students to attend seminars on campus   __X__
   c. Having a graduate student organization   _____
   d. Having a listserv that includes graduate students   _____
   e. Having a graduate student newsletter   _____
   f. Having a graduate student webpage   _____
   g. Having a graduate research day   _____
   h. Other (please indicated)   _____

2. Check all that apply. Our department socializes doctoral students into the profession by:

   a. Encouraging students to attend conferences off campus   __X__
   b. Encouraging students to present papers at conferences   __X__
   c. Encouraging students to give talks at departmental seminars __X__
   d. Requiring students to give talks at departmental seminars   __X__
   e. Conducting a workshop or course on grant writing   _____
   f. Conducting a workshop or course on publishing   _____
   g. Conducting a workshop on how to prepare a vitae   _____
   h. Conducting a workshop on how to interview for a position   _____
   i. Encouraging students to apply for external fellowships   _____

3. How often does the department offer organized seminars, colloquia, or sponsored conferences during the academic year at which graduate students can present their research or creative works? (In addition to seminar frequency for the department, if the department is divided into areas list each area and indicate event frequency separately for each.)
4.
   Once a week   _____

Less than once a week, but more than once a month   __X___

Once a month   _____

Less than once a month, but more than once a semester   _____

Once a semester   _____

Less than once a semester, but more than once a year   _____

Once a year   _____

Never   _____

5. Describe procedures used to conduct an annual student review. Please indicate the areas of student performance evaluated, who provides the review, and in what form the information is communicated. Please provide a copy of the evaluation form or template used. If no formalized annual review process exists, provide plans for implementing a review and include a timetable for implementation.

    Each PhD student is required to fill out the "Annual Evaluation of Ph.D. Students" form. The student advisor provides feedback on the student course work and research accomplishments. The graduate program officer provides feedback on the student's progress. The student is given a copy of the evaluation for his information and signature. The department Graduate Program Officer kept the records.

Employment

1. Describe procedures used to aid students in obtaining employment. Check all that apply:

    a. Department conducts workshop on how to interview for a position   _____
    b. Student gives a practice job talk before going on an interview   _____
    c. Advisor makes phone calls to other faculty or industry contacts
        on behalf of student   __X__
    d. Students are advised on where to look for job announcements   __X__
    e. Advisor writes reference letters   __X__
    f.   Interviewers are brought into the department   __X__
    g. Students are provided travel funds to attend conferences in order
        to interview for positions   __X__
    h. Other (specify)   _____

2. Describe the current and immediate future job market in the discipline.

    Part-time Doctoral students are more often than not already working within the industry when they begin their degrees. These students usually continue to work, although a few graduates have left industry and accepted academic positions. International full-time students who are academically oriented students usually return home to take academic positions in their home country. Several international students are supported by their government to earn Ph.D. and had positions reserved for them upon completion. Ph.D. graduates in computer, communication, and control areas have no difficulty finding suitable jobs.

Section 4. Master's and Certificate Programs

PLEASE NOTE: Information in this section is for _terminal Masters_ only.

Part 1: M/CP - Background

1. Rank order the principal missions of your Master's and Certificate programs
    (Note: No tied ranks).

    a. Training scholar teachers for academic careers

    _   __2__

    b. Training practitioners for industry, business, or government

    _   __1__

    c. Providing advanced learning opportunities for interested students

    _   __3__

       independent of career objectives
    d. Other (please explain)

                                                                               _____
       _
    _____

    _____

    _____

	Form 1BM/C	Comparable Universities		
	Department Name: Electrical and Computer Engineering			
	List the 2 universities that you believe have masters and/or certificate programs similar to your department. For each, indicate which of the following factors you used to determine comparability. Check all that apply.			
	CRITERIA		Comparable University 1: **Univ of Houston**	Comparable University 2: **University of Illinois @ Chicago**
	The comparison departments:			
1	Produces a similar number of Master's and Certificate graduates		X	X
2	Master's and Certificate graduates similar in quality to ours			
3	Places Master's and Certificate graduates in similar types of positions			
4	Master's and Certificate program is organized into similar divisions			
5	Master's and Certificate training curriculum is similar			
6	Students are drawn from a national pool to about the same extent		X	X
7	Students drawn from a local pool to about the same extent as we as we do			
8	Students drawn from an international pool to about the same extent as we do		X	X
9	Faculty publish in top tier journals			
10	Number of faculty		X	X
11	Generates about the same amount of external funds		X	
12	Receives funding from the same types of external sources			
13	Is a part of an urban university		X	X
14	Is ranked similarly to our department//indicate ranking index used for comparison			
15	Faculty have similar research interests			
16	Faculty have members who publish about as many books as we do			
17	Faculty members perform or exhibit their creative works as often as we do			
18	Faculty members have similar numbers and types of awards in the profession			
19	Faculty members participate to a similar extent in national, professional organizations		X	X
20	Faculty members scholarly quality is similar to ours		X	X
21	Other (please specify below)			

Form 2BM/C	Masters and Certificate Programs Aspired to	
Department Name: Electrical and Computer Engineering		
List the university that has the Master's and Certificate programs to which your the Master's and Certificate program realistically aspires. How were these programs selected? Check all factors that apply and where appropriate indicate which option you have chosen.		
CRITERIA **The department we aspire to:**		**Michigan State University**
Produces more/less Master's and Certificate graduates		**Same**
Places more Master's and Certificate graduates in more applied positions		**Same**
Places more Master's and Certificate graduates in more academic positions		**NA**
Has a Master's and Certificate program organized differently than ours ours (Please describe)		
Has a Master's and Certificate training curriculum that differs from ours (Please describe)		
Has faculty who publish more in top tier journals		
Has a smaller/larger faculty size		**Larger**
Generates more external funding		**Yes**
Receives more funding from federal/private sources		**Yes**
Conducts more research focused on urban issues		**Yes**
Is ranked higher than our department _____ (based on NSF research expenditure 2002)		**Yes/61**
Has a faculty with different research interests (Please specify)		
Has faculty members who have more professional awards		**Yes**
Has faculty members who participate to a greater extent in national, professional organizations		
Has faculty members whose scholarly quality is greater than ours		
Produces Master's and Certificate students higher in quality than ours		
Has faculty members who publish more books than we do		
Has faculty members who perform or exhibit their creative works more often than we do		
Has more students who apply nationally to the program		**Yes**
Enrolls more students drawn from a national pool		**Yes**
Enrolls more/less international students Other (please specify)		**Less**

Part 2: M/CP – Program Policies and Procedures, Course Description and Assessment

1. Please provide link to the WEB site address where the following information can be obtained:
   a. Programs offered   www.ece.eng.wayne.edu
   b. Type of degrees   www.ece.eng.wayne.edu
   c. Majors   www.ece.eng.wayne.edu
   d. Areas of specialization   www.ece.eng.wayne.edu
   e. Description of the common core requirements
                                        www.ece.eng.wayne.edu
   f. Rationale for each program including selection of subject matter for study and prerequisites   www.ece.eng.wayne.edu
   g. Typical time to degree   N/A

2. List courses for which students may receive degree credit under the headings: a) lab courses; b) lecture courses; c) problems courses; d) reading courses; e) seminars; f) other.

   Almost all of the courses offered in our department are credited as lecture sections. As of Fall 2003, we recognize the following courses for our MS programs:

   Lab Courses
   ECE 5630 – Microcomputer Laboratory
   ECE 5730 – Communications Laboratory
   ECE 5760 – Fiber Optics Engineering Laboratory

   Lecture Courses
   ECE 5440 – Computer-Controlled Systems
   ECE 5470 – Control Systems II
   ECE 5550 – Solid State Electronics I
   ECE 5610 – Introduction to Parallel and Distributed Systems
   ECE 5620 – Advanced Microprocessors
   ECE 5640 – Advanced Operating Systems
   ECE 5650 – Network Programming for Engineers
   ECE 5680 – Switching Circuits
   ECE 5690 – Digital Image Processing
   ECE 5700 – Analog and Digital Communication Circuits
   ECE 5770 – Digital Signal Processing
   ECE5870 – Optical Communication Networks
   ECE 6100 – Enabling Technology
   ECE 6180 – Bioinstrumentation
   ECE 6550 – Solid State Electronics II
   ECE 6570 – Smart Sensor Technology I
   ECE 6600 – Engineering Software Design
   ECE 6640 – Database Machine
   ECE 6660 – Introduction to VLSI
   ECE 6690 – Introduction to Fuzzy Systems

ECE 7030 – Mathematical Methods in Engineering I
ECE 7100 – Mathematical Modeling in Impact Biomechanics
ECE 7120 – Artificial Neural Systems II
ECE 7160 – Impact Biomechanics
ECE 7420 – Nonlinear Control Systems
ECE 7430 – Control of Discrete Event Systems
ECE 7440 – Dynamic Systems and Optimal Control
ECE 7450 – System Identification and Adaptive Control
ECE 7530 – Advanced Digital VLSI Design Using VHDL
ECE 7550 – Advanced Solid State Electronics I
ECE 7570 – Smart Sensor Technology II
ECE 7610 – Advanced Parallel and Distributed Systems
ECE 7620 – Real-Time Languages
ECE 7660 – Parallel Computer Architecture
ECE 5630 – Microcomputer Laboratory
ECE 7670 – Pattern Recognition
ECE 7680 – Advanced Digital Image Processing and Applications
ECE 7690 – Advanced Fuzzy Systems
ECE 7700 – Statistical Communication Theory
ECE 7830 – Information Optics
ECE 7850 – Fiber and Integrated Optics

Seminar Courses
ECE 8570 – Smart Sensor Technology Seminar
ECE 9997 – Doctoral Seminar

Other Courses
ECE 5995 – Special Topics in Electrical and Computer Engineering I
ECE 7990 – Directed Study
ECE 7995 – Special Topics in Electrical and Computer Engineering II
ECE 7996 – Directed Research
ECE 8999 – MS thesis
ECE 999X – Ph.D. Dissertation

3. Briefly describe service courses and continuing education courses.

Our department does not provide any service courses to other units. However, we do have courses that are cross-listed by other departments. Specifically, the smart sensors course series (ECE6570,7570) is being taken by students in biomedical engineering and physics departments. Also, we do not offer continuing education courses.

4. Describe the unit's development of interdisciplinary teaching and research through such means as the development of linkages with other departments, centers, or

institutes.

The department through the NSF funded Interdisciplinary graduate education and research traineeship (IGERT) program on smart sensors has developed a curriculum that combines education and research from faculty in various disciplines. The faculty involved are from our department, physics, chemical engineering, chemistry, mechanical and school of medicines. This resulted in the SSIM lab directed by Dr. G. Auner. This lab has brought in faculty from various disciplines to conduct state of the art research in the field of medicine, air-pollutants detection, alternative energy research etc.

5. Briefly describe the methods your unit has developed, to enhance student appreciation for other cultures and the place of their discipline within the values of their own culture and those of others.

The ECE Department population is comprised mainly of international students. They bring a wealth of culture and values to our department. More often than not, they share their experience with classmates and instructors over the course of their studies. Many of our courses require group project to encourage students to work together in a common goal of achieving the best project by cooperation and not by competition. Seminar series is implemented to invite international and domestic experts to present their research, as well as senior Ph.D. students presenting their research to fellow students.

6. Describe the off-campus courses and programs offered by the department. How does the department assure the quality of the programs and the adequacy of resources (faculty, library, laboratory, etc.)?

Prior to 2001 (see table below) the department has an active program in Electronics & Computer Control Systems (ECCS) program that was developed for Ford Motor Co. The Students complete a lock-step program, where our professors travel to Ford to teach their students in a company-only environment. This is a re-training program for Ford employee to become a computer and control literate. The program has been very successful, but eventually terminated due to the demand has been satisfied.

Masters	1998	1999	2000	2001	2002	2003
ECCS	44	71	96	78	19	4

7. Describe procedures used to assess quality and effectiveness of course offerings; to delete dormant courses; to develop and approve new courses; and to determine frequency and scheduling of offerings.

The main instruments for assessing the effectiveness of graduate course offerings are

the feedback obtained from SET evaluations at the end of each semester. In addition, the Chair entertains students' complains on faculty's teaching at the midst of the course. The chair studies these evaluations or complains very carefully, and addresses any issues he sees appropriate by having a meeting with the faculty in question.

The University keeps track of courses not offered for a specified length of time, and flags such courses to the department as "dormant". The department graduate committee decides whether to delete such courses permanently, or set a date (semester) for offering them. Scheduling of courses is the department chair's responsibility. He does this on a three-year planning window, with input from the faculty, and based on the demand for the courses as jointly assessed by the faculty and the chair.

8. Describe accreditation status of your program, if an appropriate accreditation organization exists.

    We are accredited under the North Central Association.

9. How does your program compare with the programs of similar departments in other leading universities, considering factors such as staff, students, admission standards, research, and scholarly activities, etc.?

    Our programs are comparable to those of other universities. Our curriculum encompasses all the major areas of interests in electrical and computer engineering. In addition, we have a unique curriculum in smart sensors technology program. Our admission standard requires GRE score and GPA in the upper 70%. The department SSIM lab & DELPHI advanced clean-room facility has many exciting leading edge research in sensor materials, MEMs, nano-technology, VLSI etc. Our department has both thesis and non-thesis option. The thesis option is encourage for students who intend to pursue Ph.D. degree. Being an urban university, we have many part-time students, who have no interest in a PhD program, usually pursue the non-thesis option.

10. Describe current trends in the discipline and how your department is responding to these trends.

    The trends in electrical and computer engineering are in the fields of MEM, nano-technology, communications, smart sensors, and VLSI. The department has responded by successfully recruiting faculty in each of these areas. In addition, the department has four new open slots to recruit faculty in the smart sensors and computer areas.

11. Describe how your unit provides access to programs and services for evening and weekend students.

    Majority of our graduate courses are taught after 5:00 PM, or early in the morning at

8:30 AM, and occasionally on weekends.

12. Describe how your unit provides a balanced Spring/Summer schedule including 1) a balance of senior, junior and graduate faculty, 2) a balanced range of course offerings, and 3) the availability of support services.

The department works closely with the College of Lifelong Learning to schedule courses and compensate instructors. Only courses that usually have good enrollment can be offered. The department chair determines courses with large enrollment and in consultation with faculty or part-time faculty who want to teach during summer semester determine the course offering. The offering is usually limited because majority of our faculty do research during summer.

13. Describe how your unit identifies academically talented students and its programming for those students.

Academically talented students are identified during graduate admission process. Students are ranked based on their GPA, TOEFL, and GRE scores, publications, and department faculty recommendation. Such students are usually awarded GTA, GRA or Rumble fellowship positions in the department. In addition, our faculty members usually identify talented students from personal contact with professors in another university nationally or internationally.

14.

Form 1M/CP	Policies and Procedures Profile				

Department Name: Electrical and Computer Engineering

Please check each process that applies to the department. Indicate who in the department is responsible for the process.

PROCESS	APPLIES	CHAIR	ASSOC. CHAIR	GRAD. OFFICER	RESPONSIBLE PERSON Other Describe
Conducts an orientation for new students	X				Graduate School
Advises students on Plan of Work	X			X	
Approves Plans of Work	X			X	
Chairs Graduate Committee	X			X	
Oversees graduate recruitment	X			X	
Oversees graduate admissions	X			X	Graduate Advisor
Informs students of departmental requirements	X			X	
Informs students of university requirements	X			X	
Distributes fellowship and scholarship information to students	X			X	
Oversees graduate information on department website	X			X	
Serves as advisor for department graduate student organizations	X				Faculty
Distributes information to students concerning career options in the field	X			X	
Distributes information to students concerning job placement of students from the program	X			X	Faculty advisor
Distributes information to student concerning time-to-degree for the program	X			X	
Oversees student record-keeping	X				Graduate Advisor
Assigns teaching assistantships					No GTA for MS students
Evaluates performance of GTAs					No GTA for MS students
Observes GTAs in the classroom					No GTA for MS students
Supervises GTAs					No GTA for MS students
Distributes and collects applications For GTAs					No GTA for MS students
Oversees appointments of GRAs					Research Advisor
Hears grievances of undergraduates concerning GTAs	X	X			
Hears grievances of graduate students Involving faculty members	X	X			
Other					

1. List any 700 and 800 courses (since the year of the last review):
   a. Offered less than once a year but more than every 2 years
   b. Offered less than once every 2 years

   Answered in doctoral section.

2. Have department requirements changed since the last review? __X__yes _____no
   If yes, please describe the changes:

   New courses and program offerings have been developed to better meet the changing needs of industry and students.

3. How does the curriculum prepare a graduate who will be living and working in an increasingly global society?

   Answered in doctoral section.

4. Discuss the relationship of the masters program to the undergraduate program.

   Masters and undergraduate students share some common courses (5000 level), which are pre-requisite courses to more advance courses (7000 level). In addition, masters and undergraduate students interact very closely with project oriented courses. This interactions are very beneficial to undergraduate students to be able to work with a more mature students who can guide them to possibly pursue graduate studies.

5. Check all that apply. The Graduate Officer in the department receives the following compensation:

   a. Release time from teaching   _____
   b. How much?
   c. Summer salary   __X__
   d. Stipend   _____
   e. Travel money   _____
   f. Research funds   _____
   g. GRA   _____
   h. Secretarial support   __X__
   i. Merit pay   _____
   j. Other (please indicate)   _____

6. The appointment of the Graduate Officer is: __X_ 9-month   _____ 12-month

7. What do you view as the most important external threats to your masters programs?

   The most important external threat is the declining enrollment. Majority of our MS students are international students, with current immigration restrictions that makes it difficult for international students to study in the U.S., will have a major impact on MS enrollment. In addition with many local companies cutting back on their reimbursement of tuition for employees, will also decline domestic students enrollment; further declining the total MS enrollment.

Part 3: M/CSP – Masters/Certificate Student Profile

1.   Describe recruitment procedures for masters/certificate programs. Provide
      brochures, if available.

      Recruitment of students for our MS program is done by our graduate brochure
      (APPENDIX D) and by posting information about our graduate programs on our
      department's web page. The department gets numerous inquiries from prospective
      graduate students by e-mail and telephone. These inquiries are answered by our
      Graduate Program Officer (GPO), or Academic Graduate Adviser who provide
      information about admissions policy, financial aid, and refers the students to the
      University website for electronic on-line application procedures. GPO also refers the
      applicants to individual faculty if more specific information is being requested. Many
      of our applicants find out about our graduate programs from the students who are
      already in the program. The college provides funds for piggy ack recruitingon
      international and domestic trips. MOU's with other universities also help.

2.   Describe admission criteria.

      Applicants must have BS degree in Electrical/Computer Engineering (or equivalent)
      to be admitted to our MS program. Candidates from other engineering disciplines
      and from science background are evaluated and may be given a qualified admission
      with remedial course requirements. We require a GPA of 3.0 or better for regular
      admission to the Masters program. Applicants with lower GPA's are evaluated and
      admitted on a qualified basis if they demonstrate sufficient strength in their
      background to be able to succeed in our program. In such cases they are usually
      required to obtain B or better grades in the first 12 credit hours of graduate level
      EE/CMPE course work.

      Students without a degree from ABET accredited institutions and generally all
      foreign students are required to provide GRE scores. A TOEFL score of 550/213 or
      higher is required of all international students.

3.   Describe orientation, advising, and retention procedures.

      The department does not have a formal orientation program for the MS students.
      Much of this takes place on a one-on-one basis with the graduate advisor, graduate
      program officer (GPO), and chair. The College of Engineering holds a Welcome
      Back Picnic at the beginning of every Fall semester, where all new students get an
      opportunity to meet with faculty, staff and other students.

      MS students, pursuing course work option, are advised by academic graduate
      advisor. For each student pursuing the thesis option, an individual faculty thesis
      advisor is selected in consultation with the GPO, who directs the students to
      faculty member with similar research interests. The thesis advisor then work

closely with their students in selecting courses to make sure that they will be helpful in their research work.

As far as retention, when a student is in academic difficulty (GPA <3.0), an administrative hold is placed on his/her registration for the next semester. Such students must see the graduate advisor to have the hold removed. Advising takes place at this stage with the aim of assisting the students in improving their academic success.

4. Describe practices, policies and goals, in regard to affirmative action in terms of recruitment and retention of students.

We have made every effort to recruit and obtain minority students, as well as women. Majority of the qualified students are offered GRA positions by faculty members through their grants. Our goal is to recruit a larger numbers of minority students to our graduate program.

5. In addition to affirmative action recruitment, describe practices, policies and goals with regard to improving the recruitment and retention of a diverse student body (e.g. Underrepresented cultural groups from the Detroit area, national and international students).

The ECE department is well represented in terms of diversity. We regularly draw students from Canada and several international countries each semester. Our goal is maximize the diversity of our student population by aggressively recruiting nationally, internationally, local industry, and local university. Our faculty by personal contact has been successfully recruiting talented students nationally, and internationally.

6. Describe teaching, research, internships and fieldwork opportunities for masters/certificate.

MS students do not teach in our department. Courses that are not taught by regular faculty are taught by part-timer with an earned doctorate degree and work experience. Research funding is available for some MS students, but pre-dominantly Ph.D. students, who are in the program for a longer period of time, hold most of these positions. The department has internship program available to MS students.

7. How are students encouraged to combine academic work with on-the-job experience?

The department has instituted industrial internship (ECE6991) to become an integral part of the MS curriculum. These enable students who desire to obtain

on-the-job experience to complement their academic work to accept full-time employment for one or at most two semesters. International students on F-1 visa can also participate in the internship as the course ECE6991 satisfies the requirements of Curricular Practical Training.

8. Describe the nature of opportunities for faculty- masters/certificate interchanges in the department.

    Faculty members provide regular office hours to interact with students; to answer course-related problems. Students, who pursue the thesis option, can use the directed study course to get more interaction with a faculty member to identity a possible thesis topic. Once thesis topic has been identified, student will usually have a regular meeting with the thesis advisor.

9. Describe procedures to assess students, research and academic standing and programs toward degree, including method of feedback to students.

    Students who pursue the thesis option have extensive interactions with faculty thesis advisors. Such interactions involve regular research meetings. Other interactions between the students and faculty take place in the classroom during lectures, in faculty offices during their office hours on course-related topics, and during academic advising.

10. Describe policies and procedures for dealing with a student whose performance in the program is unsatisfactory.

    The ECE department allows a maximum of one repeated course; a "B-" grade or better must be earned in all core courses; 3.0 GPA required for graduation.

    If a student's progress is determined to be unsatisfactory (GPA<3.0), they are placed on academic probation. This probation places a hold on their registration that must be released by the graduate advisor each semester prior to enrollment. If the student fails to make satisfactory progress within the next 12 credit hours, the graduate advisor has the option of terminating them from the program.

11. Describe the policies and procedures for increasing retention of students at-risk for dropping out.

    The graduate advisor works closely with at-risk students to improve their chance for success. They might be asked to consider changing their specialty area where they would most likely succeed, or to consider taking fewer courses.

12. Describe procedures used to aid students in obtaining employment or graduate program placement; include description of current and future job market in the discipline.

The College regularly hosts a job fair, where students can drop their resumes to the potential employers. The department also has instituted an internship program, which enable students to be placed in a work environment as an intern. The internship experience usually turns into a permanent employment for many students. Students who successfully obtained internships/employments in-turn help other students.

13.   Provide a profile of current masters/certificate student enrollment in the majors, e.g., part-time/full-time, gender, age and race.

Please refer to the attached current MS student database, which contains information relevant to this question (APPENDIX C)

14.   Describe procedures that have been adopted in your unit regarding assessment of student knowledge in the major. Please make clear the methodology adopted for accomplishing this purpose, including or in addition to any outcome measurements that have been developed. How and in what way will results of the assessment process be used to enhance programs?

All assessment of student knowledge in the major is done at the individual course level. Each course in the department must provide a syllabus to the students in the beginning of the semester containing class and exam schedule, references and other resources to be used in the course, and most importantly the learning objectives for the course. Instructors are expected to design and implement the delivery of the course in a way to be able to judge to what degree these learning objectives are being met. When the exams and other course assignments are prepared and evaluated on the basis of these objectives, student knowledge can be directly assessed from the results. Student feedback through SET evaluations is incorporated in the overall assessment of the course at the end. Department chair may provide input into this assessment and the needed changes, as appropriate.

15.

Form 1M/CSP	General Data – Masters and Certificate Student Profile					
Department Name: Electrical and Computer Engineering						
Please provide the following information starting with the year of the last review through the Fall of the current review.						
ADMISSIONS DATA						
	1998	**1999**	**2000**	**2001**	**2002**	**2003**
Number of students applied (completed applications)	295	404	432	399	335	333
TOTAL						
Number of international students admitted	219	249	276	243	107	138
Number of minority students admitted	N/A	N/A	N/A	N/A	N/A	N/A
Number of all other students admitted						
TOTAL						
Number of international students enrolled band **ACTIVE/GRADUATED**	N/A	N/A	N/A	N/A	N/A	N/A
Number of minority students enrolled and **ACTIVE/GRADUATED**	N/A	N/A	N/A	N/A	N/A	N/A
Number of all other students enrolled and **ACTIVE/GRADUATED**	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL						
Average GPA of international students admitted (Conservative GPA conversion for Indian grading system)						
Average GPA of minority students admitted	NA	NA	NA	NA	NA	NA
Average GPA of **all** students admitted						
Average GRE score of students admitted						
Average GRE score of students enrolled						

16. What is the current number of full-time students in the Masters and Certificate programs? (List the academic year prior to the year of this review)

                                                                                    Year

 #

        Masters   2003___   127___

        Certificate   _____   _____

17. What is the current number of part-time students in the Masters
    and Certificate programs? (List the academic year prior to the year of review)

        Masters   2003___   89___

        Certificate   _____   _____

18. What is the average time to degree (Masters and Certificate applicant
    date minus graduation date)?

        Masters   2003___   2.5 yrs.

        Certificate   _____   _____

19. How many Masters and Certificate students graduated between the last
    review and the year prior to this review?

Form 2 M/CSP	# Masters/Certificate Graduates Since the Last Review					
	1998	1999	2000	2001	2002	2003
Masters						
EE & CMPE	154	125	135	143	126	137
ECCS	44	71	96	78	19	4
Certificate						

Individual Masters and Certificate Student Data[2]

The following data should be kept in an EXCEL compatible database. You may be required to submit this data in whole or part to The Graduate School.

(see APPENDIX C)

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2 . If you do not already maintain a database on the information requested, or if the university does not provide any of the following information, see sample forms S1 and S2 for data collection model. If you wish to have a copy of this program, please call 577-8968. Specify whether you want the program on a disk or as an e-mail attachment. The forms were developed using ACCESS. ACCESS can be converted into an EXCEL spreadsheet to tabulate the items marked with an asterisk (*). You must have ACESS and EXCEL software installed to run the program.

Recruitment

1. List in order, the 5 universities from where your department most frequently enrolls Masters and Certificate students (i.e., where do most of your Masters and Certificate students come from?). List should include the first year after the last review of the department and the last 2 years preceding this departmental review.

Form 4 M/CSP	Recruitment Background		
University	1998	2002	2003
Wayne State University	N/A	8	10
Jawaharlal Nehru Tech Univ	N/A	3	4
University of Madras	N/A	2	3
Henry Ford Comm College	N/A	1	4
Punjab Techical Univ	N/A	1	2

2. Check all that apply. The recruitment activities for Masters and Certificate students include:

 a. Creating department-specific recruitment print materials   __X__
 b. Advertising program to other faculty in the field   _____
 c. Making information about program available at conferences   __X__
 d. Sending faculty to give talks at other schools   _____
 e. Having faculty contact prospective students   _____
 f. Sending students to give talks at other schools   _____
 g. Having students contact prospective students   __X__
 h. Inviting prospective students to campus   _____
 i. Inviting admitted students to campus   _____
 j. Appointing a recruitment director separate from the Graduate Officer   _____

2. Check all that apply. The department website contains the following information for recruitment:

 a. List of faculty   __X__
 b. Faculty e-mail addresses   __X__
 c. Faculty phone numbers   __X__
 d. Faculty research interests   __X__
 e. Faculty publications   __X__
 f. Faculty grants   __X__
 g. Student publications   _____
 h. Student profiles   _____
 i. Statements from present and past students   _____
 j. Degree requirements   __X__
 k. Types of support available   _____
 l. Time-to-degree for graduates in the last 5 years   _____   _____
 m. Program placement information for graduates in the last 5 years   _____

    _____

3. When were print materials for recruitment last updated?

    January 2005.

Teaching – MS students do not teach in our department

1. Check all that apply. The department supports graduate teaching assistants by:

    a. Observing first year GTAs in the classroom at least once a semester   _____
    b. Observing first time GTAs teaching at least once a semester   _____
    c. Observing all GTAs in the classroom at least once a semester   _____
    d. Providing written feedback on performance in the classroom   _____
    e. Discussing teaching evaluations with the GTA   _____
    f. Recognizing good teaching with a departmental award   _____
    g. Recognizing good teaching by nominating students for the
    h. Heberlein award   _____
    i. Videotaping GTAs in the classroom at least once   _____
    j. Offering a course on teaching in the discipline   _____
    k. Providing faculty teaching mentors for students   _____
    l. Providing a faculty member or staff person who serves as an
        instructional consultant for GTAs   _____
    m. Encouraging use of the Office for Teaching and Learning   _____
    n. Making information available concerning the Graduate Certificate in
    o. College and University Teaching   _____
    p. Other (please indicate)   _____

2. For each semester in the last 3 academic years, list the percentage of lecture
    sections (not including laboratories or discussion sections) that have been taught by
    graduate students.

Form 5 M/CSP	Sections taught by GTA's		
Semester	**2001**	**2002**	**2003**
Fall	0	0	0
Winter	0	0	0
Spring/Summer	0	0	0

Part 6 – Student Support

1. How many Masters and Certificate students have been supported in each of the following categories since the year of the last review through the Fall of the current review?

Form 6M/CSP	Masters/Certificate Student Support					
	YEAR					
Type of Support	1999	2000	2001	2002	2003	2004
Graduate research assistantships	0	0	0	0	0	N/A
Graduate teaching assistantships	10	9	5	2	2	N/A
Fellowships	0	0	0	0	0	N/A
Not supported	115	126	138	124	135	N/A
Other support (please explain)						

2. How does the number of supported Masters and Certificate students compare with the similar universities you listed above? With the university to which you aspire (Begin with the year of the last review up through the Fall of the current review.

Form 7M/CSP	Masters and Certificate Student Support – Comparative Data				
University Name	Graduate research assistantships	Graduate teaching assistantships	Fellowships	Not supported	Other support (please explain)
University 1 Comparable	N/A	N/A	N/A	N/A	N/A
University 2 comparable	N/A	N/A	N/A	N/A	N/A
University Aspired to	N/A	N/A	N/A	N/A	N/A

Part 7 - Mentoring

1. Check all that apply. Our department creates a sense of community among our graduate students by:

   a. Encouraging students to attend seminars on campus __X__
   b. Requiring students to attend seminars on campus __ __
   c. Having a graduate student organization __X__
   d. Having a listserv that includes graduate students _____
   e. Having a graduate student newsletter _____
   f. Having a graduate student web page _____
   g. Having a graduate research day _____
   h. Other (please indicated) _____

2. Check all that apply. If these have been answered in the previous Ph.D. Section please put "ap" on the line. Our department socializes graduate students into the profession by:

    a. Encouraging students to attend conferences off campus   _X__
    b. Encouraging students to present papers at conferences   _X__
    c. Encouraging students to give talks at departmental seminars   _X__
    d. Requiring students to give talks at departmental seminars   ____
    e. Conducting a workshop or course on grant writing   _____
    f. Conducting a workshop or course on publishing   _____
    g. Conducting a workshop on how to prepare a vitae   _____
    h. Conducting a workshop on how to interview for a position   _____
    i. Encouraging students to apply for external fellowships   _____

3. How often does the department offer organized seminars, colloquia, or sponsored conferences during the academic year at which graduate students can present their research or creative works? (In addition to seminar frequency for the department, if the department is divided into areas list each area and indicate event frequency separately for each.) . If these have been answered in the previous Ph.D. Section please put "ap" on the line.

Once a week   _____
Less than once a week, but more than once a month   __X__

Once a month   _____
Less than once a month, but more than once a semester   _____

Once a semester   _____
Less than once a semester, but more than once a year   _____

Once a year   _____

Never   _____

4. Describe procedures used to conduct an annual student review. Please indicate the areas of student performance evaluated, who provides the review, and in what form the information is communicated. Please provide a copy of the evaluation form or template used. If no formalized annual review process exists, provide plans for implementing a review and include a timetable for implementation.

    The Dean's office monitors the performance of each graduate student. Each student whose GPA falls below 3.0 is put on hold. The Graduate Advisor then discusses with these students how to improve their performance prior to releasing their hold. Each of these students is closely monitored each semester to make sure that they are progressing reasonably well.

Employment

1. Describe procedures used to aid Master's and Certificate students in obtaining employment. Check all that apply:

    a. Department conducts workshop on how to interview for a position   _____

    b. Student gives a practice job talk before going on an interview   _____

    c. Advisor makes phone calls to other faculty or industry contacts on behalf of student   __X__

    d. Students are advised on where to look for job announcements   __X__

    e. Advisor writes reference letters   __X__

    f. Interviewers are brought into the department   _____

    g. Students are provided travel funds to attend conferences in order to interview for positions   __X__

    h. Other (specify)   _____

2. Describe the current and immediate future job market in the discipline for Masters and Certificate students.

The job market for our MS graduates has been very good. This trend can be seen from the number of MS students who have obtained industrial internship since the program start. As of summer of 2003, there are seventeen interns and eleven companies involved. Several students were offered two terms of internship and subsequently offered permanent employment.

Section 6.   Resources: Support Staff, Physical Facilities and Other Resources

1. Describe adequacy of all facilities necessary to your program, such as: library and information retrieval resources, laboratories, computer facilities, equipment, classroom, and office space.

    The library and information retrieval resources at Wayne State University are generally adequate for instruction and research purposes. Our departmental instructional laboratories have been improved. However, several labs are currently being shared between two different areas. Research labs are nicely equipped for cutting-edge research. Computer facilities in the college have been improved in this past years and many software packages are available for research purpose. However, some UNIX workstations are now outdated. Further expansion needs more space and infrastructure support. We have purchased several newer UNIX workstations and a server to setup a new VLSI lab. The new Unix workstations need to be connected to Computer Center servers. Office space is currently inadequate; many offices are currently shared among three GTA/GRA.

2. Describe the adequacy of support staff for your program (academic staff, secretarial, technical, and other staff assistance).

    The department has one administrative assistant and one secretary to handle paper works for purchasing, class scheduling, travel expense forms, paying invoices, and personnel appointment. While the paper work can be handled by these two staff members, faculty has difficulty to get accurate accounting information of their research accounts. SSIM has a business officer who separately handles that group and a development officer.

    We have a full-time undergraduate advisor (A. J. Lietz), she provides student record keeping, advising, and degree certification for undergraduate. We share a graduate advising staff position with Industrial & Manufacturing Engineering. The graduate advising staff person (Gail Evans) provides us support in student record keeping, M.S graduate advising, M.S. degree certification and admission.

    We have a full-time technician (Amir Husak) whose main focus is on providing support to the faculty in managing all of the computer resources of the department and maintaining all the instructional labs. We have two half-time front desk assistants (student assistants) and three college work study students who handles the faxing, filing, and providing information and directing students to advisors.

3. Describe your unit's plan(s) for systematically evaluating its future staffing levels and mix.

    We frequently discuss our staffing needs and how to make most efficient use of the existing staff at our faculty meetings. We would like to have a full-time dedicated

graduate advising staff to support record keeping, admission action management, and help with recruiting efforts. In addition, we assess what our staff needs will be for any big collaborative grant contract to include budgets funds for staff support.

4. What measures is your unit taking to insure diversity in the staff?

Diversity in our staff has never been a problem, because we strictly follow the University's personnel hiring policies. Current staff composition includes one Caucasian woman, one Caucasian man, one African-American woman, and one African-American man. Among student assistants, their composition is reflective of the student university graduate population. Our department has a consistent record of employing a diverse workforce.

5. Please list steps taken in your unit to increase awareness among staff of the importance of providing quality service.

Faculty send their feedback to the department chair on the performance of our staff, both positive and negative. Whenever warranted, the chair conveys to the staff the faculty's and his concerns about the quality of service, and discusses ways and means for improvements. He also compliments good efforts. Wayne State offers many opportunities for staff training, and our staff has been encouraged to attend such training sessions. They have indeed taken advantage of these opportunities. Staff is encouraged to emphasize the need for timely input for requests, and continuously keep the parties inform of the progress of the requests.

6. Please identify activities that have been implemented or are planned to encourage and recognize staff that provide quality service.

Faculty and Department Chair send their compliments to staff members who has performed quality services. ECE faculty members collectively donate money for gifts during the year-end holidays. The Chairs distribute the gifts, based on the quality of service, to staffs during department holiday luncheon.

7. Overall, do the staff and facilities provide an appropriate environment for the unit's educational, research and/or service functions?

Our staff members have tried their best to support the unit's functions, and our facilities meet the current needs of the unit. But better service is needed to provide timely accounting information on research grants. More lab and office space is needed to support the expansion of the Department's functions.

Section 7. Summary

1. Indicate what appear to be the major strengths of the undergraduate and the graduate programs. What is needed to make them better?

The strength of our undergraduate program is the ability to accommodate part-time students as shown in the table below. The department supports the urban mission of the university. To accommodate working students to continue their undergraduate education at a reasonable time frame, many of our courses are offered every semester and after 5PM. Also, our Capstone design course provides seniors a real design experience working as a team. The course requires students ability to integrate all their learned knowledge in electrical and computer engineering to complete a functional project to satisfy a design parameters, students working together to achieve a common goal.

ECE undergraduate enrollment:

	1998	1999	2000	2001	2002	2003
FT	227	232	233	307	115	238
PT	138	133	127	122	116	136
TOT	365	365	360	429	231	309

The strength of our graduate is shown in our large graduate enrollment, table below. In particular, our Ph.D enrollment has steadily increases from 38 to 61 within a period of 6 years. This is due to a niche multidisciplinary program in smart sensors technology developed as part of the NSF supported IGERT program. In Fall 2004, ECE6570 (Smart Sensor Technology I) is cross-listed as BME 6470 and PHY6570. We have 15 students from Biomedical Engineering and 1 student from Physics. In addition, with Delphi (the world's largest volume producer of MEMS-based sensor systems) advanced clean-room facility moving to our department and providing research personnel to conduct collaborate research with the existing SIM lab personnel and Ph.D. students has created a state of the art facility and environment in conducting research in applications of MEM, nano-technology, sensor materials and VLSI to medical or health related fields, as well as in automotive, aerospace, and military. The department has attracted many Ph.D. students working on multi-disciplinary type of thesis topics crossing between medicines and engineering. Two domestic/local students supported by TARDEC are pursuing Ph.D. in smart sensors area.

ECE MS enrollment:

	1998	1999	2000	2001	2002	2003
FT	214	252	249	269	252	127
PT	167	174	172	142	110	89
TOT	381	426	421	411	362	116

ECE PhD enrollment:

	1998	1999	2000	2001	2002	2003
FT	23	27	24	29	35	47
PT	15	17	18	14	17	14
TOT	38	44	42	43	52	61

However, our MS enrollment has been declining. Visa restrictions has been a major reason for the decline of FT international students. We would like to do more on recruiting of domestic and international graduate students.

2. What are the major weaknesses of each program? How can they be remedied or improved?

Major weaknesses of our undergraduate program are: (1) the lack of design experiences with industry sponsored projects, (2) undesired number of undergraduate lecture courses are being taught by part-time faculty, (3) need to continuously improve on undergraduate labs.

Major weakness of our graduate program in electrical and computer engineering is the small size (19) of our faculty to support a vast number of specializations. The department in year 2001 has six areas in electrical engineering and 3 areas in computer engineering. The department inability to support numerous course offering was force to cut down on areas of specializations to two in electrical engineering and one in computer engineering. Combining areas or relaxing the meaning of concentration areas achieves this.

Adding more faculty lines can solve both weaknesses and we are currently recruiting new faculty members.

3. What changes does the department plan to make in the undergraduate and graduate programs in the next 7 years within existing resources? In order of priority, what changes would be made if additional resources were to become available?

In the next 7 years, the department would like to increase domestic/local student's enrollment to the graduate program. The department has recently made a change in our Master thesis option curriculum to attract domestic/local students who are employed and will be pursuing their graduate studies on part-time basis. U.S. Army TARDEC is one of the few local employers who support continuing education for their employees. On May 2004, Dr. Y. Zhao, ECE Chair, made a presentation of our new MS curriculum to a group of potential students at TARDEC, with faculty members of different research areas on hand to entertain student's questions on research possibilities. Currently, there are two TARDEC supported Ph.D. students in our program. We will also recruit students from other universities by giving presentations to top undergraduates.

The table below shows the comparison between our department with that of MSU, the university we aspire to:

CAT(2003)	WSU	MSU
Fellowship	2	22
GTA	17	24
GRA	15	103
Enrollment	202	186
%Supported	16.8%	80%
Faculty Size	19	34
Research Exp	4.967M	6.129M
Research Exp/Faculty	261K	180K

This table shows that our faculty members are very productive with limited resource available to us. It is clear from the table above that our department has significantly less faculty, less fellowships, and less GTAs, but more students, and more productive per faculty. We plan to recruit new faculty members in the emerging areas of nano-technology, MEMS, smart sensors, and communication. We want to provide more support for graduate students from the current 16.8% to at least 50% to attract high quality graduate students. We plan to work with industry: Next Energy, DTE, Auto Industry. We plan to establish a national center sponsored by Federal funding agency.

APPENDIX A
Faculty CVs

Professional Record

Name: Gregory W. Auner
Office Address: 3123 Engineering Bldg.
Wayne State University, Detroit, MI
Telephone No.: (313)577-3904
e-mail: gauner@ece.eng.wayne.edu
Web: ece.eng.wayne.edu/ssim

Date Prepared: September 22, 2004
Home Address: 16284 Aldrich Ct.
Livonia, MI 48154
Telephone No.: (734)464-2687

Department/College:

Electrical and Computer Engineering

Present Rank & Date of Rank:

Professor, August, 1999

WSU Appointment History:

Year Appointed/Rank:

February 1990, Research Associate

September 1990, Assistant Professor Dept. Electrical and Computer Engineering

August 1995, Associate Professor (with Tenure), Electrical and Computer Engineering, also 1997, Associate Professor (Dept. of Materials Science and Engineering)

August 1999, Professor, Electrical and Computer Engineering, Materials Science , Biomedical Engineering, Physics

Education:

Ph.D., Physics; Wayne State University, January 1990
Dissertation entitled "Anisotropic Transport in Energetic Collision Cascades"

Master of Science, Physics; Wayne State University, 1985
Masters thesis entitled "Modification in Mechanical Properties of Nitride Films by Ion Bombardment"

Bachelor of Science, Physics; Wayne State University, 1983

Bachelor of Science, Biology; Wayne State University, 1983

Professional Experience:

Professor: 1999-present, Department of Electrical and Computer Engineering, Biomedical Engineering, Wayne State University, Detroit, MI.

Other Appointments: Professor, Dept. of Physics and Dept. of Materials Science, Wayne State University

Associate Professor: 1995-1999, Department of Electrical and Computer Engineering, Wayne State University, Detroit, MI.

Associate Professor: Department of Materials Science and Bioengineering, Wayne State University, Detroit, MI.

Visiting Scholar, Nanjng University, Nanjing China, Summer 1997.

Visiting Scholar, Polytechnical Institute, St. Petersburg Russia. Summer 1996.

Assistant Professor: September 1990-1995, Department of Electrical and Computer Engineering, Wayne State University, Detroit, MI.

Research Associate: January 1990-September 1990, Department of Physics and Astronomy, Wayne State University, Detroit, MI.

Senior Research Scientist : 1988-90, General Motors Research Laboratories.

Graduate Research Assistant: 1985-1989, Wayne State University, Detroit, MI.

Visiting Research Scientist: 1984-86, University of Auhus, Auhus Denmark.

Research Assistant: 1983, Wayne State University, Department of Physics, Detroit, MI.

Biomedical Researcher: 1981-1982, Wayne County General Hospital.

Faculty Appointments at Other Institutions (Years and Rank):
None

Professional Society Memberships:

Member of IEEE (1992 to present)

Member of ASEE (1996 to present)

Member of the American Physical Society (1985 to present)

Member of the American Vacuum Society (Former Chair of the Michigan chapter) (1985 to present)

Member of the Materials Research Society (1986 to present)

Honors/Awards:

Appointed National Academies (Board on Manufacturing and Engineering Design)

Arthur R. Carr Professor Award for Outstanding Achievements in Engineering, 2003
Tau Beta Pi Distinguished High Attainments in Engineering and Scientific Knowledge, 2002

Outstanding Contribution to the Advancement of Knowledge, American Society for Reproductive Medicine, 2002.

Wilson Scholar Award, R. Wilson Foundation, 2002

WSU Gold Medal for Outstanding Service (Research) Award, 2001

Career Chair Award, Wayne State University, 1998

Research Excellence Award, Wayne State University, 1997

Outstanding Faculty Teaching Award , Wayne State University College of Engineering ECE, 1996

Elected Chair, Michigan Chapter American Vacuum Society, 1994-1995

Faculty Research Award, Wayne State University, 1993

Educational Development Grant Award, Wayne State University, 1993

Outstanding Faculty Teaching Award , Wayne State University College of Engineering ECE, 1992

17th American Vacuum Society MI Chapter Annual Symposium. Best presentation award, 1990

Research Internship (Senior Research Scientist), General Motors Research Labs, 1988-90

Biographical Citations (National/Regional or Professional Directories):
American Men and Women in Science

I. TEACHING

Years at Wayne State:
13 Years

Years at Other Colleges/Universities:

None

Courses Taught at Wayne State In Last Five Years:

Undergraduate

ECE 357: Electronics I. Winter 1991, Fall 1991, Winter 1992 (70 students), Fall 93 (25 students).

ECE 358: Faculty in Charge, Electronics Laboratory Course (1991-present).

ECE 457: Electronics II. Taught course. Fall 91 (80 Students), Fall 1992 (45 Students), and Summer 94 (35 students), Fall 95 (20 students), Summer 97, Fall 97,
Spring/Summer 98 (30 students), Winter 2000 (45 Students).

ECE 490: Taught course on the fundamentals of optical data storage technology. Summer 1991 (5 students).

ECE 490: Solid State Materials and Devices, Direct study. Fall 1991 (5 students),Winter 1992 (14 students), Spring/Summer 1995 (6 students), Spring/Summer 98, Fall 98.

Graduate

ECE 550: Developed new course "Electronic and Photonic Materials Technology". Fall 93, Fall 94. Fall 99.

ECE 551: Developed new course "Electronic and Photonic Materials Technology Laboratory". Developed laboratory manual. Winter 94, Winter 95, Winter 96.

ECE 590: Direct study of plasma deposition process for semiconductor development, Biosensor development (Masters Level). Fall 1991-1999, Winter 1992-2000.

ECE 6560 Smart Sensors and Integrated Devices I, Fall 1999.

ECE 7560 Smart Sensors and Integrated Devices II, Winter 2000

ECE 796: Research on the development of an advanced magneto-optical ellipsometry characterization system (Ph.D. Level). Summer 1992-00.

ECE 595/795 "Smart Sensors I", course sequence under development team taught with
P. Siy . Fall 1995 (15 students), 1996 (10 students), 1997 (21 students),
1998 (35 students).

ECE 595/795 "Smart Sensors II", course sequence under development team taught with P. Siy and R. Naik. Winter 1996 (10 students), Winter 97 (10 Students), Winter 98 (20 Students), Winter 1999 (10 students).

Courses or Curriculum Developed:

Developed ECE 550, 1993: Microelectronic and Photonic Materials Technology.

Developed ECE 551, 1993: Microelectronic and Photonic Materials Laboratory.

ECE 595 "Smart Sensors *I*", New course sequence team taught with P. Siy & R. Naik. Fall 1994-1998.

ECE 595 "Smart Sensors II", New course sequence team taught with P. Siy and R. Naik. Winter 1995-1998.

Developing Smart Sensors and Integrated Devices graduate curriculum.
This involves the development of a comprehensive curriculum with the development of several cross-college interdisciplinary courses for a new masters/Ph.D. program in smart sensors and integrated devices. This includes the development of hand-on advanced laboratory and design courses that is integrated with our smart sensors and integrated devices research program. (Developed with P. Siy, R. Naik, L. Wenger, and G. Liu.)

Course Materials Developed:

Developed lecture notes and course extensive handouts for ECE 357 Electronics I. Developed course handouts on: (i) Semiconductors, (ii) pn Junctions and Diodes, (iii) Bipolar Junction Transistors, and (iv) Differential Amplifiers.

Developed course notes and extensive handouts for ECE 550. Currently developing a textbook for course with V. Mitin and Y. Zhao.

Developed entire teaching laboratory and associated laboratory manual for ECE 551.

Development of course notes and extensive handouts for the new Smart Sensor I and Smart Sensor II course sequence.

Theses/Dissertations directed/directing:

Ph.D.'s Graduated

1. Abolash Pandya (Graduated Ph.D.), Robotic Surgery, February 2004

2. Haddad, Daad- (Graduated Ph.D.), Wide Bandgap Semiconductor Photonic Crystals, May 2003

3. Feng, Zhong- dissertation (Graduated Ph.D.), "Acoustic Wave Sensors" (Winter 2002).

4. Thompson, Margarita- dissertation (Graduated Ph.D.) topic, "Growth mechanisms of Wide Bandgap Semiconductors grown by PSMBE and Laser Ablation", March 16, 2000.

5. Jin, Feng- dissertation (Graduated Ph.D.), "Development of Graded Pyroelectric Materials for Sensitive Room Temperature IR Imaging Sensors", May 1998. Currently working for General Electric Research and Development.

6. Mohammed, Majed- dissertation (Graduated Ph.D.) topic, "Development of Graded Pyroelectric Materials by MOD Deposition", February 1998. Currently working at General Motors Research and Development Laboratory.

7. Samman, Amer M.- dissertation (Graduated Ph.D.) topic on the "SiC and Related Materials for Automotive High Temperature Electronics Applications", Dec. 1997. Currently working at Ford Motor Research Laboratories.

Masters Graduated

1. Prakasam, Haripriya- (Graduated Masters)- Development of a Hydrogen Sensor, Winter

2. Zatyko, Paul- thesis (Graduated Masters) topic, "Development of a Plasma Source Molecular Beam Epitaxy System for Wide Bandgap Nitride Semiconductors". May 1998. Currently working at SSI Technologies in sensor research

3. Lenane, Tim- thesis (Graduated Masters) topic, "Deposition of a Pulsed R.F. Magnetron Sputtering System with Activated/Dissociated Nitrogen Bombardment for the Growth of III-V Nitride Heterostructures", May 1993. Currently working at Chrysler Corporation Sensor Research.

4. Daley, Tom- (Graduated MS) topic ,"Novel Biomedical SAW Sensors" (May 2000).

    Lukitsch, Michael- current dissertation (Ph.D.) topic, "Development of graded wide bandgap semiconductors for novel device applications", Fall 2003.

    Zhao, Qiang- current (Ph.D.) topic, Nano and Micromachining of biosystem structures.

    Safadi, Mona- current Ph.D. project, Micro fluidic Devices for Retina and Cortical Implants.

    Danylyuk, Yuriy- curent dissertation (Ph.D.) Optical Properties of Wide Bandgap Semiconductor Alloys and Nanostructures, (Fall 2003).

    Hughes, Chantelle N., current Ph.D. project, Ultra sensitive Acoustic Microsensor arrays for Biomedical and Environmental Monitoring.

    Xu, Jianzeng- (Current Ph.D. Topic) Real time biosensing system integration

    Scott, Andy (TACOM)- (Current Ph.D. Topic)- Bio-, Chem-, Rad- Integrated System for Robotics

    Wang, Qianghua- (Current Ph.D. Topic)- Wide Bandgap Semiconductor Acoustic Array for Medical diagnosis

    Manda, Prasad- (Current Ph.D. Topic)- Integrated RAMAN Spectroscopy for Biomedical Diagnosis.

    Jose (TACOM)- (Current Ph.D. Topic)- Robotic Surgery System Control

    Iezzi, Raymond, MD- (Current Ph.D. Topic)- Retina Implant using caged- molecule drug delivery

    Jaboro, Claudine- (Current Ph.D. Topic)- Biocompatibility of bio-implant systems

    Thanawala, Sachin- (Current Ph.D. Topic)- Development of nano- biological structures for neurological implants.

    Reddy, Sumitha- (Current Ph.D. Topic)- Visual front end for retina and Visual Cortex implants.

    Khemani, Ashwin- (Current Ph.D. Topic)-Development of Cortical neural implant electrodes

Rahman, Habibur- (Current Ph.D. Topic)- Development of catalytic chemical sensing systems

Rodrigues, James- current (Masters) thesis topic, "Development of a Spectroscopic Variable Angle Magneto Optical Ellipsometer for Electronic and Photonic Materials Characterization", due Dec 9,2003. Currently working as Technical manager at Osmic Corporation.

Ph.D. Dissertation Committees:

Salman Saib Abdulaziz, Ph.D. Electrical & Computer Engineering, "1.00 MeV Proton Radiation Resistance of Amorphous Silicon Based Alloy Solar Cells", 1992.

Mrunalini Karmarkar, Ph.D. Physics, "Epitaxial Growth of Iron on Silicon(111)", 1993.

Rimvydas V. Mickevicius, Ph.D. Electrical & Computer Engineering, "Hot Electron Scattering, Transport, and Noise in Quasi-One-Dimensional Semiconductor Structures", 1993.

Yang Li, Ph.D. Electrical & Computer Engineering, "Hydrogen Solubility and Diffusion in Amorphous and Crystalline Metal Hydride Thin Film Electrodes", 1994.

Ping Chen, Ph.D. Physics, Photothermal Detection, 1994..

Salman Abdulaziz, Ph.D. Electrical & Computer Engineering, "1.00 MeV Proton Radiation Resistance Studies of Amorphous Silicon Based Alloy Solar Cells", 1994.

Kent Jin Hoon Chang, Ph.D. Physics, 1994.

Yuri Sirenko, Ph.D. Electrical & Computer Engineering, "Microscopic Model for Computer-Aided Design of Semiconductor Devices with Low-Dimensional Electron Gas", 1994.

Nikolai A. Bannov, Ph.D. Electrical and Computer Engineering, "Electron Scattering, Transport, and Noise in Two-Dimensional Semiconductor Structures",1994.

Qingfeng Tang, Ph.D. Electrical and Computer Engineering. 1994

Beijing Wang, Ph.D. Electrical and Computer Engineering, "Optimal Design of Magneto-Optic Recording Media for High Density Erasable Optical Data Storage at Blue Wavelengths".

Praveen Kolli, Masters Electrical and Computer Engineering, "Digital CMOS IC Design Using Mentor Falcon Framework", 1995.

Robert Shaver, Masters Mechanical Engineering, "Random Simulation of Regenerative Effect in Machine Tool Dynamics", 1995.

David Kubinski, Ph.D. Physics, "Dependence of Giant Magnetoresistance on the size and

Composition of Ferromagnetic 3d Transition Metal Precipitates in an Ag Matrix", 1995.

Vadim Aristov, Maters Electrical and Computer Engineering, "Computer Simulation of Electron Scattering and Conductivity in Low Dimensional Structures", 1995

Guy Wicker, Ph.D. Electrical & Computer Engineering, "A Comprehensive Model of Submicron Chalcogenide Switching Devices", 1996.

Pankaj Shah, Ph.D. Electrical and Computer Engineering, "Numerical Simulation Models and Techniques for Optimizing Semiconductor Light Emitters Based on the Visible to Ultraviolet Light Emitting AlGaN Material System, and Novel Miltiterminal GaAs thyristor Based Light Emitters", 1996.

Rosa Lukaszew, Ph.D. Physics, "Magnetic Anisotropy Studies of Epitaxial Ni-Cu(100), Co-Cu(100) and Co-Ni(100) Multilayered Thin Films", 1996.

Gaska Remigijus, Ph.D. Electrical and Computer Engineering, "Microscopic Models for Simulation of Quasi-One-Dimensional Semiconductor Devices, 1996.

David Reimann, Ph.D. Computer Science, "Parallel Computational Methods for Real Time Cone Beam X-Ray Computed Tomography", 1996.

Feng Bin, Ph.D. Materials Science and Engineering, "Scuffing Resistance of Aluminum Based Metal Matrix Composites", 1997.

Eddie Awad, Ph.D. Electrical and Computer Engineering, "Quantum Coherence and Interface Effects in Doped Crystals and Semiconductor Quantum Wells for Reduced Absorption and Lasting Without Population Inversion, 1997.

Pankaj Shah, Ph.D. Electrical & Computer Engineering. 1997

Nader Rabadi, Masters Electrical and Computer Engineering, "VHDL Test Bench Creation and Simulation for Synthesized VLSI Design", 1998.

Valeri Korobov, Ph.D. Electrical and Computer Engineering, "Numerical simulation of Multilayered Thyristor-Like Semiconductor Devices", 1998.

Rus Clark, Ph.D. Electrical and Computer Engineering, 1998.

Irinia Gordion, Ph.D., "Switching Waves in Asymmetric Gate Controlled Thyristor-Like Structures", 1998.

Waruna Kiridena, Ph.D. Chemistry, "Application of a Structure-Driven Retention Model for Method Development in Liquid and Thin Layer Chromatography", 1998.

Gediminas Paulvicius, Ph.D. Electrical and Computer Engineering, "Nonequilibrium Optical-Phonon Effects in Nanoscale n-GaAs Devices and Structures", 1998.

Guy Wicker, Ph.D. Electrical & Computer Engineering, 1998.

Waruna Kiridena, Ph.D. in Chemistry, 1998.

II RESEARCH

Laboratory Development:

The emerging area of micro- and nano- science and engineering is leading to an unprecedented comprehension of the fundamental building blocks of nature. This technology will most profoundly affect the nature of science, engineering and medicine in the 21st century. Thus, in order to obtain the most revolutionary and fundamental gains in science and engineering, a significant investment in new technology and scientific methodology must be achieved. In contrast to current technological areas in silicon device MEMS and traditional engineering initiatives and existing centers on bio nano structures, our focus is on research and development in novel and emerging materials, micromachining, devices, novel integration schemes for nano and micro devices, and their translational applications. The mission of the center is to facilitate (i) *Cutting-Edge Research in Smart Hybrid Sensors and Microsystems*, (ii) *Develop Future Industrial, Government Lab and University Leaders in Advanced Sensor Technology Prototypes and Products, and (iii) Disseminate and Commercialize New Products and Technology Through Strong Partnership with Industry and New Business Creation.*

The smart sensors and integrated Microsystems (SSIM) program has had a long and productive research collaboration with General Motors research and development Lab- now Delphi Automotive Systems R&D. Delphi is the largest producer of MEMS based sensor systems in the world and thus represents an organization of highly significant research and high impact technology in the area of Sensor and Actuator devices. At the heart of this program is the Delphi research Lab featuring a 5500 Sq. foot clean room with state-of-the-art microelectronics and micro electro mechanical systems (MEMS) research and processing facilities. *This multimillion dollar facility will merge with the Center for Smart Sensors and Integrated Microsystems at Wayne State University to form a 10,000 sq. foot laboratory complex with over 6000 sq. feet of clean room facilities and one of the most advanced non-silicon based emerging technology program available.* Over $7,100,000 worth of MEMS processing facilities combined with an enormous amount of technical processing capability and a core of Delphi personnel will move to the SSIM center to form a comprehensive multidisciplinary team in the area of micro- and nanosystems research. The center will be the intellectual, educational, and research focal point for a consortium of partners including WSU Colleges of Engineering and Science, the WSU School of Medicine, the Ligon Center for Vision, the Karmanos Cancer Institute (ranked in top 8 for breast, lung and prostate cancer researcha nd treatment in USA), Children's Hospital of Michigan (ranked in top 6 in USA), Delphi Automotive, Ford Motor Company, the University of Michigan, Johns Hopkins University,and the University of New Mexico.

External Research Funding:

Title: "Real-Time Bisensor Water Monitoring System", Principal Investigator
Agency: DOD
Period: 9/29/03 - 3/30/05
Amount: Approx. $2,500,000

Title: "Blood Analysis System for Radiation Exposure", Co- Investigator (PI: Dr. Jim Tucker, WSU)
Agency: DTRA
Period: September 2004 - September 2006
Amount: Approx. $2,000,000

Title: "Real-time Augmented Reality Development and Human Factors

Assessment for the Special Purpose Dexterous Manipulator" Co- Investigator (PI: Dr. Abhilash Pandya, WSU)

Agency: NASA
Period: 4/01/04- 3/31/07
Amount: Approx. $900,000

Title: "Novel Dual Mode biosensor Arrays for bacteria detection ", Principal Investigator (with, G. Shreve, S. Palchaudhuri, and H. Ying co-investigators)
Agency: NIH
Period: October 1, 2002 -2007
Amount: Approx. $3,800,000

Title: "Development of Advaced Drug Delivery ", Principal Investigator (with, S. Ng, G. Newaz, J. McAllister, co-investigators)
Agency: MLSC
Period: October 1, 2002 -2005
Amount: Approx. $2,640,000

Title: "From Atoms to Space", Principal Investigator (with 7 co-investigators)
Agency: NASA
Period: July 1, 2002 -2003
Amount: Approx. $1,900,000

Title: "Smart Sensors and Integrated Devices", Principal Investigator (with P. Siy and R. Naik)
Agency: National Science Foundation
Period: June 1, 2001 - June 1, 2004
Amount: $290,000

Title: "Development of a Bioelectric Microarray Sensing System for Breast Cancer Detection", Principal Investigator
Agency: Karmanos Cancer Institute
Period: January 1, 2000 -2001
Amount: Approx. $135,000

Title: "Development of Retinal and Neuro-Cortical Microsystem Array Implants for Vision", Principal Investigator
Agency: Ligon Center for Vision
Period: January 1 – Open ended
Amount: Approx. $197,000/year

Title: "ITT Smart sensors for Biomedical Implant Applications" Co PI (with L. Schweibert (PI) and R. Iezzi)
Agency: National Science Foundation
Period: September, 2000 - September, 2004
Amount: $1,600,000

Title: "Environmental Sensors" (with G. Shreve and L. Schweibert)
Agency: National Science Foundation

Period: August 15, 2000 - August 14, 2002
Amount: $180,000

Title: "Smart Sensors and Integrated Devices", Principal Investigator and Program Director, oversight of infrastructure development (with P. Siy, R. Naik, L. Wenger, and G.Y. Liu)
Agency: National Science Foundation
Period: August 1, 1998 - September 1, 2003
Amount: $2,625,000

Title: "Development and Characterization of BST MEMS Structures "
Agency: Delphi Automotive
Period: June 2000 - January 2004
Amount $300,000

Title: "Smart Sensors and Integrated Devices", Principal Investigator
Agency: WSU Research Excellence Award Princiapal Investigtor
Period: October 1, 1997 - September 1, 2002
Amount: $1,600,000

Title: "Development of Optical Coatings for Devices", Principal Investigator
Agency: EXCEL Industries (currently Dura Industries)
Period: January 1, 1999- December 31, 1999
Amount: $97,747

Title: "Smart Sensors and Integrated Devices", Co-Principal Investigator (with S. Liu)
Agency: National Science Foundation
Period: Septemer 1, 1999 - September 1, 2001
Amount: $210,000

Title: "Smart Sensors and Integrated Devices", Principal Investigator (with P. Siy and R. Naik)
Agency: National Science Foundation
Period: June 1, 1998 - September 1, 2000
Amount: $225,000

Title: "Integrated Technology in Microelectronic Materials and Smart Devices", Principal Investigator (with P. Siy and R. Naik)
Agency: National Science Foundation
Period: September 1, 1994 - September 1, 1997
Amount: $311,284

Title: "Development and Characterization of Graded BST Structures by MOD Deposition"
Agency: General Motors
Period: August 1996 - August 1997
Amount $35,000

Title: "High temperature Sensors for Automotive Applications"
             Principal Investigator (100% effort)
Agency: Ford Motor Company
Period: January 1, 1997 - January 1, 1998

Amount: $25,000

Title: "REU Supplement for Integrated Technology in Microelectronic Materials and Smart Devices", Principal Investigator and program Director
Agency: National Science Foundation
Period: September 1, 1996 - September 1, 1997
Amount: $5,000

Title: "SVT Activities at Wayne State University",
           Co-Principal Investigator (with R. Bellwied and P. Siy)
Agency: Brookhaven National Laboratory
Period: May 25, 1995 – September 30, 1996
Amount: $34,151

Title: "Development of an ASIC device for the Solenoidal Tracker at RHIC",
           Co-Principal Investigator (with P. Siy and R. Bellwied),
Agency: Brookhaven National Lab (DOE)
Period: November 1, 1994 - November 1, 1995
Amount: $136,000

Title: "Magnetic- Resonance of Layered Films", Co-Principal Investigator
           (with 2 co-PI's)
Agency: National Science Foundation
Period: July 15, 1994 - July 15, 1997
Amount: $255,000

Title: "REU Supplement for Magnetic- Resonance of Layered Films Project", Co-Principal
           Investigator (with J. Dunifer and R. Naik)
Agency: National Science Foundation
Period: May 15, 1995 - May 15, 1996
Amount: $4,000

Title: "Emerging Electronic and Photonic Materials Synthesis and Processing Technology",
           Principal Investigator (50% effort) ,(with V. Mitin and Y. Zhao 25%)
Agency: National Science Foundation
Period: October 1992 - September 1995
Amount: $300,000

Title: URE Grant, "Development of Wide Bandgap Nitride Semiconductors", Principal
           Investigator (100% effort)
Agency: National Science Foundation
Period: 1994
Amount: $10,000

Title: "Study of Low Dimensional Structures" Principal Investigator (100% effort)
Agency   National Research Council
Period: October 15, 1993 - April 15, 1993
Amount: $11,100

Title: "Development of Tantalum-Iridium Oxide Anode Coatings by Magnetron Sputtering"
            Princapal Investicator (100% effort)
Agency: National Steel Corporation
Period: August 1, 1992 - July 31, 1993
Amount: $38,000

Title: "Development of Standard Samples"
Agency: National Steel Corporation
Period: 1992
Amount $2,500

Title: "Development of Magnetostrictive Torque Sensors",
            Co-Principal Investigator (with R. Naik)
Agency: RS Technologies
Period: September 1992 - August 1993
Amount: $15,000

Title: "Coating and Analysis Service Using Plasma Deposition Techniques"
            Princapal Investigator
Agency: General Motors
Period: 1992
Amount: $7,500

Gifts/Donations (In kind Funding):

Donation: from Ford Motor Company:
 1. Cambridge Instruments Sterioscan 250 SEM system
 2. ORIEL Photomask Printer,
 3. Philtec Instruments Groove and Stain System,
 4. Omni Chuck Wafer Scrubber
 5. (2) Microvoid Air Control Wet Bench/Hood/ c-Frame
 6. Clean Room Supplies
 7. New Oriel Deep UV exposure system
 8. Lambda Physik 200I EXCIMER Laser
Approximate value of $200,000 (replacement value of approximately $500,000).

Donation: from General Motors Corporation,

1.   Perkin Elmer Multitarget Sputtering System with r.f. Power Supply
2.   (2) RCA Clean Room Wet Benches
3.   Hewlett Packard Universal Counter
4.   3 wheel Tripod
5.   Electrometer, Model 610A
6.   (2) HV power supply (0-6kV), Model 408B
7.   HV Power Supply (o-3kV), Model 316
8.   Volt Potentiometer
9.   HV Power Supply (0-1.5kV), Model 312
10. Detector Bias Power Supply
11. Precision Pulsed Generator, Model 419
12. Amplifier Pulse (Height Analyzer), Model 486

Approximate value of $300,000 (replacement value of approximately $550,000)

Donation: from National Steel Corporation,
 1. 3M SIMS/ISS system

Value approximately $25,000 (replacement value of $150,000).

Donation: from Kent State University
1. Perkin Elmer Projection Mask Aliened
2. automatic I-V Probe Tester
3. micro lithography spin coater/developer system,
4. Value approximately $80,000 (replacement value of $300,000).

Donation: from MKS Instruments Inc.
1. New mass flow equipment, value approximately $5,000.

Other Research Funding (Institutional or Internal):

Graduate Research Assistantship award 2000/01

Graduate Research Assistantship award 1999/00

Graduate Research Assistantship award 1998/99.

Graduate Research Assistantship award 1997/98.

Graduate Research Assistantship award 1995/96.

Research Equipment Award, Wayne State University, $45,000
($25,000 ORSP, $10,000 IMR, $8,000 ECE, $2,000 NSF).

Development of Wide Bandgap Semiconductors by Plasma Enhanced Atomic Layer Epitaxy, Institute for Manufacturing Research (IMR) (Graduate Student and equipment, 1991-present), $60,000.

Magneto-optical ellipsometer equipment, Institute of Manufacturing Research, $27,100 (G. Auner/R. Naik).

Rutherford Backscattering Equipment Award, Institute of Manufacturing Research, $3,500.

Confocal Microscope Research using clean room facilities, Institute of Manufacturing Research, $5,000.

Research Equipment Award, Wayne State University, $38,000
($18,000 ORSP, $10,000 IMR, $6,000 ECE, $2,000 Physics).

Research Equipment Award, Wayne State University, $30,000
($15,000 ORSP, $5,000 IMR).

Educational Development Grant Award, Wayne State University, $3,000.

Faculty Research Award, Wayne State University, $7,000.

Interdisciplinary Research Award, Wayne State University, $10,000 (V.Mitin, G.Auner, and S.Ng).

Proposals pending:

A novel tactile sensory system for minimally invasive surgery , NSF, 100K/year 2 years. PI Yong Xu, CO-I's Drs. Ellis Auner Klein.

Human Factors Optimization of Motion Scaling/ Movement time Parameters for Surgical Robotics. PI Darin Ellis, Co-I's Drs Auner Klein 100K/year 3 years

Development of a Micro-Raman Probe for Real-time Cancer Detection during Image Guided Surgery, MTTC, PI: Ratana Naik, Co-I's Abhilash Pandya, Daad Haddad, Greg Auner, Vaman Naik, Michael Klein., Dr. Moin Dr. Ying, Dr. Xu , $2.1M 3 years.

Journal and proceeding Papers (refereed):

1. Ivan Avrutsky, Daniel G. Georgiev, Dmitry Frankstein, Gregory Auner, Golam Newaz, "Superresolution in laser annealing and ablation," Applied Physics Letters, 84 (13), 2391-2393 (2004).

2. Daniel G. Georgiev, R.J. Baird, Ivan Avrutsky, Gregory Auner, Golam Newaz, "Controllable Excimer-Laser Fabrication of Conical Nano-Tips on Silicon Thin Films," submitted to Applied Physics Letters (2004).

3. J. Xu, J. S. Thakur, F. Zhong, H. Ying, and G. W. Auner, "Propagation of a Shear-Horizontal Surface Acoustic Mode in a Periodically Grooved AlN/Al2O3 Microstructure," Journal of

Applied Physics, in press.

4.   Lorincz, D. Haddad, R. Naik, V. Naik, A. Fung, A. Cao, P. Manda, A. Pandya, G. Auner, R. Rabah, S.E. Langenburg, M.D. Klein, "Raman Spectroscopy for Neoplastic Tissue Differentiation: A Pilot Study.", Journal of Pediatric Surgery (2004). (Accepted, in press).

5.   D.G. Georgiev, G. Newaz, G. Auner, H. J. Herfurth, R. Witte, "XPS Study of Laser-Fabricated Ti/Polyimide interfaces", Appl.Surf.Sci., accepted, manuscript # ROW-20031117/1-G

6.   Pandya A.K. , M. Siadat, G. Auner. Design, Implementation and Accuracy of a Prototype for Medical Robotic Vision Augmentation. Computer Aided Surgery Vol. 9. (2004) , (Accepted, in press)

7.   J.Xu, D.P.Durisin, and G.W.Auner, "Stoichiometric and Structural Properties of Pulsed-Laser Deposited BaTiO3 Thin Films on Silicon", Proceeding of SPIE, (2004) (in press).

8.   Avrutsky, D. G. Georgiev, D. Frankstein, G. Auner, and G. Newaz, Super-resolution in laser annealing and ablation, Appl. Phys. Lett. 84, 2391-2393 (2004).

9.   Bauer, U.-A. Russek, H.J. Herfurth, R. Witte, S. Heinemann, G. Newaz, A. Mian, D. Georgiev, G. Auner, "Laser Micro-Joining of Dissimilar and Biocompatible Materials", presented at Photonics West LASE 2004: Lasers and Applications in Science and Engineering, 24-29 January 2004, San Jose, CA, accepted in the Proceedings of the Conference

10. *Xu, J. S. Thakur[a), F. Zhong, H. Ying, G. W. Aune,r* Propagation of a shear-horizontal surface acoustic mode in a periodically grooved AlN/Al_2O_3 microstructure, J. Appl. Phys.

11. Xu, Jie Durisin, P. Auner, Gregory W., Stoichiometric and structural properties of pulsed-laser depositon BaTiO3 thin films on silicon, SPIE

12. 'An XPS Study of Laser-Fabricated Polyimide/Titanium Interfaces 'McAllister, J.P., Li, J., Deren K., Finlayson, P.G., Jaboro, C., Auner, G.W., Baird, R., Lagman, A., Iezzi, R., Abrams, G.W. Chronic *in vivo* biocompatibility testing of materials used for visual prostheses, *Invest Ophthalmol.Vis.Sci.*, 2004.

13. Pandya A.K., Siadat M, Auner G., Kalash M., Ellis R.D, "Development and Human Factors Analysis of Neuronavigation vs. Augmented Reality," in Medicine Meets Virtual Reality, vol. 98. Newport Beach, California, 2004, pp. 291-297.

14. Kalash M., Pandya A., Bedford R., Ellis D., Auner G., "Development And Human Factors Analysis Of Pressure Sensory Substitution In Robotic Surgery", at the International Conference on Computing, Communications and Control Technologies (CCCT 2004),Austin (Texas), USA, on August 14-17, 2004.(Accepted)

15. Ellis RD, Pandya A, Cao A, Composto A, Chacko M, Klein MD , Auner G (2004). Optimizing the surgeon-robot interface: the effect of control-display gain and zoom level on movement time. Submission accepted as poster at the 48th Annual Meeting of the Human Factors and Ergonomics Society, New Orleans LA, September 20-24, 2004.

16. Cao A, Ellis RD, Composto A, Pandya A, Klein MD, Auner G.(2004). Optimizing the surgeon-robot interface: the effect of index of difficulty and control-display gain on movement time. Submission accepted as presentation at the 2nd International Conference on Computing, Communication and Control Technologies: CCCT '04, Austin, TX, August 14-17, 2004.

17. Andrew J. Scott, Jose R. Mabesa, Jr., Chantelle Hughes, David J. Gorsich, Gregory W. Auner, Equipping small robotic platforms with highly sensitive, more accurate Nuclear, Biological, Chemical (NBC) detection systems, SPIE 2003 (PROCEEDING PUBLICATION - Aerosense Paper).

18. G. Newaz, A. Mian, J. Vendra, D.G. Georgiev, T. Mahmood, G. Auner, R. Witte, and H. Herfurth, "Mechanical Characterization of Laser Micro-Joints for Bioencapsulation", Materials Science and Nanotechnologies, Brussels, Belgium, October 2003, to in press the Proceedings of the Congress

19. Langenburg SE, Kabeer M, Knight CG, Fleischmann L, Auner G, Lyman W, Klein MD. Surgical robotics: Creating a new program. Pediatric Endosurgery & Innovative Techniques. 2003 7(4): 415-19.

20. G.W. Auner, G. Shreve, H. Ying, G. Newaz, C. Hughes, and J. Xu, "Dual-Mode Acoustic Wave Biosensor Microarrays," Proceedings of SPIE, Bioengineered and Bioinspired Systems, vol. 5119, 129-139, 2003.

21. Ye[i] Z, Auner GW, "Haptic Interface Prototype for Feedback Control on Robotic Integration of Smart Sensors", Proceedings of 2003 IEEE International Conference on Control Applications, pp. 995-1000, June 23-25, 2003, Istanbul, Turkey

22. Ye[i] Z, Auner GW, and Manda P, "Raman Spectra Calibration, Extraction and Neural Network Based Training for Sample Identification", Proceedings of 2003 IEEE International Joint Conference on Neural Networks, pp.622-626, July 20-24, 2003, Portland, Oregon, USA

23. Ye[i] Z, Auner GW, "Linear Filtering and Nonlinear Fuzzy Logic Filtering for Sample Identification with Raman Spectroscopy", Proceedings of 2003 IEEE International Conference on Systems, Man & Cybernetics,October 5–8, 2003, Washington, D.C., US

24. Raza,T.M., Iezzi,R., Auner,G.W., Siy,P., McAllister, J.P., Cottaris,N.P., Elfar,S.D., and Abrams,G.W. Design of a High-channel-count Current Source for Use in Retinal and Cortical Visual Prostheses, *Invest Ophthalmol.Vis.Sci*. 44[5]: 5086, 2003.

25. Iezzi,R., Cottaris,N.P., Elfar,S.D., Walraven,T.L., Raza,T.M., Moncrieff,R., McAllister, J.P., Auner,G.W., Johnson,R.R., and Abrams,G.W. Neurotransmitter-Based Retinal Prosthesis Modulation of Retinal Ganglion Cell Responses *In-Vivo, Investigative Ophthalmology and Visual Science* 44[5]: 5083, 2003.

Safadi, M.R., Washko, F., Lagman, A., Jaboro, C., Auner, G.W., Iezzi, R., McAllister, J.P., and Abrams,G. Development of a Microfluidic Drug Delivery Neural Stimulating Device for Vision, *Investigative Ophthalmology and Visual Science* 44[5]: 5082, 2003.

26. Gasperini,J.L., Walraven,T.L., McAllister, J.P., Auner,G., Abrams,G., Givens,R. and Iezzi,R., The Neuroprotective Effects of Aspirin and MK-801 Against Un-Caged Caged-Glutamate for Use in a Visual Prosthetic Device, *Investigative Ophthalmology and Visual*

Science 44[5]: 5078, 2003.

27. Walraven,T.L., Iezzi,R., McAllister, J.P., Auner,G., Abrams,G., and Givens,R., The Effects of Dextromethorphan Against the Toxicity of Photoactivated Caged Glutamate *In Vitro, Invest Ophthalmol.Vis.Sci.* 44[5]: 5066, 2003.

28. Pandya AK, Siadat M, Maida J, Auner GW, Zamorano L. Robotic Vision Registration and Live-Video Augmentation-- A Prototype for Medical and Space Station Robots. Bioastronautics Investigators Workshop. Galveston, Texas: NASA/USRA, 2003:27.

29. Pandya AK, Siadat M, Ye Z, Manda P, Auner GW, Zamorano L, Klein MD. Medical Robot Vision Augmentation--A Prototype. Medicine Meets Virtual Reality. Newport Beach, California: Aligned Management Associates, Inc, 2003:85.

30. Thompson MP, You R, Chang SC, Auner GW, Mantese JV. Delineation of platinum thin films, requiring high-temperature deposition. Source: Sensors and actuators. A, Physical. 101, no. 3, (2003): 358.

31. Ye[i] Z, Auner GW, "Haptic Interface Prototype for Feedback Control on Robotic Integration of Smart Sensors", Proceedings of 2003 IEEE International Conference on Control Applications, pp. 995-1000, June 23-25, 2003, Istanbul, Turkey

32. Pandya AK, Siadat M, Auner GW (Invited Speaker). 2003a Augmented Reality vs. Neuronavigation a Comparison of Surgeon Performance.In: Biomedical Engineering Symposium 2003, Wayne State University.

33. Pandya AK, Siadat M, Auner GW (Invited Speaker). 2003b Novel Imaging Methods for Image Guided Surgery.In: Imaging Retreat, Wayne State University.

34. Lorincz A, P. M., Klein MD, Pandya AK, Auner GW, Haddad D, Naik R, Naik V. Nov. 2003 Raman Spectroscopy for Neoplastic Tissue Differentiation: A Pilot Study.In: American association of Peadiatrics.

35. Pandya AK, Siadat M, Auner GW. Design, Implementation and Accuracy of a Prototype for Medical Robotic Vision Augmentation. Computer Aided Surgery; (Submitted).

36. Pandya AK, Siadat M, Ye Z, Manda P, Auner GW, Zamorano L, Klein MD. 2003c Medical Robot Vision Augmentation--A Prototype.In: Medicine Meets Virtual Reality, Newport Beach, California, 85.

37. Langenburg S, Kabeer M, Auner GW, Lyman W, Klein MD. 2003. Surgical Robotics: Creating a New Program. Pediatric Endosurgery & Innovative Techniques; 7(4).

38. Auner, G.W.; Shreve, G.; Hao Ying; Newaz, G.; Hughes, C.; Jianzeng Xu, Dual-mode acoustic wave biosensors microarrays, Proc. SPIE - Int. Soc. Opt. Eng. (USA), Bioengineered and Bioinspired Systems,5119, 129 (2003).

39. McCullen, E.F.; Prakasam, H.E.; Wenjun Mo; Naik, R.; Ng, K.Y.S.; Rimai, L.; Auner, G.W., Electrical characterization of metal/AlN/Si thin film hydrogen sensors with Pd and Al gates, J. Appl. Phys., **93**, 5757 (2003)

40. Yuri Danylyuk, Dmitri Romanov, Eric McCullen, Daad Haddad, Ratna Naik, and Gregory Auner Optical Properties of Controllable Self-Assembled Lateral Nanostructures on InN, InAlN, and AlN Thin Films. MRS Proceeding V 640 I6.29 (2003).

41. Zhengmao Ye[i], Gregory Auner, "Haptic Interface Prototype for Feedback Control on Robotic Integration of Smart Sensors", Proceedings of 2003 IEEE International Conference on Control Applications, pp. 995-1000, June 23-25, 2003, Istanbul, Turkey

42. Zhengmao Ye[i], Gregory Auner and Prasad Manda, "Raman Spectra Calibration, Extraction and Neural Network Based Training for Sample Identification", Proceedings of 2003 IEEE International Joint Conference on Neural Networks, pp.622-626, July 20-24, 2003, Portland, Oregon, USA

43. Zhengmao Ye[i], Gregory Auner, "Linear Filtering and Nonlinear Fuzzy Logic Filtering for Sample Identification with Raman Spectroscopy", Proceedings of 2003 IEEE International Conference on Systems, Man & Cybernetics,October 5–8, 2003, Washington, D.C., USA

44. Thompson, Margarita P[b] ; You, Ren[b] ; Chang, Shih-Chia ; Auner, Gregory W ; Mantese, Joseph V, Delineation of platinum thin films, requiring high-temperature deposition Source: Sensors and actuators. A, Physical. 101, no. 3, (2003): 358.

45. J.Xu, D.P.Durisin, and G.W.Auner: "Mechanical Properties and Morphology of Pulsed-Laser Deposited BaTiO3 Thin Films". MRS Proceeding Vol.780,Y3.5.1-Y3.5.6 (2003)

46. V.M. Naik, D. Haddad, R. Naik, J. Mantese, N.W. Schubring, A.L. Micheli, and G.W. Auner, "Phase transition studies of polycrystalline Pb0.4Sr0.6TiO3 films using Raman scattering, J. Appl. Physics, **93**, 1731(2003).

47. J.Xu, D.P.Durisin, and G.W.Auner, "Mechanical Properties and Morphology of Pulsed-Laser Deposited BaTiO3 Thin Films", MRS proceeding, Vol.780,Y3.5.1(2003).

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49. J. Xu, H. Ying, and G.W. Auner, "Development of Aluminum Nitride-Based Acoustic Wave Sensors," Proceedings of 2002 IEEE EMBS/BMES Conference, Vol. 2, 1716-1717, Houston, TX, October 23-26, 2002.

50. Jianzeng Xu; Hao Ying; Auner, G, Development of aluminum nitride-based acoustic wave sensors.; Engineering in Medicine and Biology, 2002. 24th Annual Conference and the Annual Fall Meeting of the Biomedical Engineering Society] EMBS/BMES Conference, 2002. Proceedings of the Second Joint , Volume: 2 , 23-26 Oct. 2002

51. Yuri Danylyuk, Dmitri Romanov and Gregory Auner Nanobumps in $In_xAl_{1-x}N$/AlN/Saphire System: A New Kind of Quantum Dots? MRS Proceeding V 639 I6.29 (2002)

52. J. Mantese, N. W. Schubring, A. L. Micheli, M. P. Thompson, R. Naik, G. W. Auner, I. Burc Misirlioglu and S. Pamir Alpay, "Stress Induced Polarization-Graded Ferroelectrics", *Applied Physics Letters*, **81**, 1068 (2002)

53. J.Xu, D.P.Durisin, Q.Zhao, and G.W.Auner: "Characterization of Pulsed-Laser Deposited BaTiO3 Thin films". Proceeding of SPIE Vol.4647,87-94(2002)

54. Feng, B.; Newaz, G.; Auner, G.W.; Akbar, S.A.; Merhaba, Nondestructive evaluation of bonding characteristics of TiO/sub 2/-Al/sub 2/O/sub 3/ gas sensor, Proc. SPIE - Int. Soc. Opt. Eng., Nondestructive Evaluation and Reliability of Micro- and Nanomaterial Systems, **4703**, 31,(2002)

55. JV Mantese, NW Schubring, AL Micheli, MP Thompson, R. Naik, G.W. Auner, I.B. Misirlioglu, S.P. Alpay. Stress Induced Polarization-Graded Ferroeceltrics. Appl. Phys. 81 (6) 2002 Aug.

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59. G.W. Auner, M.R. Safadi, P. Siy, R. Iezzi, G.W. Abrams, P. Mcallister. Nano- and Micro-System Neuro Interfacing Electrode Arrays for the Retina,. Invest. Opthalmol. Vis. Sci. 2001 Mar;42(4):pg S815.

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1. "Isotope Effect on Hydrogen Incorporation in Diamond", I.P. Ipatova, V.L. Dostov, and G.W. Auner, Accepted for publication (with revisions) in Physical Review B,

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3. "Irradiation Induced Atomic Transport Mechanisms: Ballistic vs. Thermal Spike Diffusion", G.W. Auner and Y.-T. Cheng, Submitted to Journal of Applied Physics.

4. "Graded Ferroelectric Devices: The Dielectric Analogues of Semiconductor Diode Junctions", N.W. Schubring, J.V. Mantese, A.L. Micheli, A.B. Catalan, M.S. Mohammed, R. Naik, G. W. Auner, Submitted to Nature.

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2. Yuriy Danylyuk, Ivan Avrutsky, Gregory Auner, Ratna Naik, Vaman Naik, "Nonequilibrium beta-AlN on c-plane Al2O3 grown by plasma source MBE," paper N10-10, American Physical Society, March Meeting 2004, Montreal, Canada, March 22-26, 2004.

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5. *(Nominated Outstanding Presentation Award)* L. Rimai, M.H. Rahman, E.F. McCullen, Y. Danylyuk, G. Newaz, K.Y.S. Ng, R. Naik, R.J. Baird, and G. Auner, The Electrical Behavior of Pd/AlN/Semiconductor Thin Film Hydrogen Sensing Structures, MRS Spring Meeting, April, 2004.

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129.   "The Effect of Interfacial Roughness and Strain on Magnetic Anisotropies of FCC Co(100) Thin Films", R. Lukaszew, R. Naik, V. Naik, D. Yang, G.W. Auner, and G.L. Dunifer, Materials Research Society Symposium, Boston, MA, Nov. 1996.

130.   "A Study of Si(111), Si(100), Al2O3(1102), and Al2O3(0001) Substrate Etching by Atomic Force Microscopy", T. Daley, G.W. Auner, G.Y. Liu, R. Naik, and V. Naik, Materials Research Society Symposium, Boston, MA ,Nov. 1996.

131.   *Invited Presentation* Development of Plasma Source Molecular Beam Epitaxy Technology, University of Nanjing, Nanjing, China, May 1996.

132.   *Invited Presentation* Graded Ferroelectric Materials for IR Imaging Technology, University of Nanjing, Nanjing, China, May 1996.

133.   *Invited Presentation* Development of Plasma Source Molecular Beam Epitaxy Technology, Chinese Academy of Science, Beijing, China, May 1996.

134.   "Microstructure and Ferroelectric Properties of Fine-grained BaxSr1-xTiO3 Thin Films Prepared by Metalorganic Decomposition", M.S. Mohammed, R. Naik, G.W. Auner, J.V. Mantese, N.W. Schubring, A.L. Micheli, and A.B. Catalan, American Physical Society, St. Louis, MO, March 1996.

135.   "Growth Morphology of III-V Semiconductors grown by Plasma Source Molecular Beam Epitaxy", G.W. Auner, U. Rao, P. Zatyko, R. Naik, Gang-Yu Liu, W. Kirena, and K.W. Mesthrige, American Physical Society, St. Louis, MO, March 1996.

136.   "Surface Morphology and Microstructure of Epitaxial Thin Films Grown on Hydrogen Terminated SI Surfaces", V. Naik, A. Lukaszew, S. Gebremariam, B.U.M. Rao, G.W. Auner, R. Naik, and B. Demczyk, American Physical Society, St. Louis, MO, March 1996.

137.	"Structure and Magnetic Studies of Epitaxial FCC Co(100) Films Grown on Ni(100)/Cu(100)/Si(100) Substrates", R.A. Lukaszew, B.U.M. Rao, G.W. Auner, and R. Naik, American Physical Society, St. Louis, MO, March 1996.

138.	"Microstructure and Ferroelectric Properties of Fine-grained BaxSr1-xTiO3 Thin Films Prepared by Metalorganic Decomposition", M.S. Mohammed, R. Naik, G.W. Auner, J.V. Mantese, N.W. Schubring, A.L. Micheli, and A.B. Catalan, American Physical Society, St. Louis, MO, March 1996.

139. "Magneto-optical and Magnetic Anisotropy properties of Ni(100)-Cu(100) Layered Structures Grown on Cu(100)/Cu(100)", R. Naik, G.W. Auner, G.L. Dunifer, J. Rodriguez, A. Lukaszew, A. Poli, Y.Z. Miao, and H. Zhai, Bulletin of APS, **40**, 595, 1995.

140.	"Growth Evolution of Wide Bandgap Nitride Semiconductors by Plasma Source Molecular Beam Epitaxy on Hydrogen Terminated Silicon", G.W. Auner, R. Krupitskaya P. Zatyko, G. Lui, W. Kiridena, K. Mesphrige, R. Naik, and P.K. Kuo, Materials Research Society, Boston, MA, 1995.

141.	*Invited Presentation* "Emerging Microelectronic and Photonic materials Technology", Materials Research Society Materials Education Workshop, Materials Society Symposium, Boston, MA, 1995.

142.	*Invited Presentation* "Smart Sensor Technology for Automotive Applications", University of Toledo, Engineering Symposium, November 1995

143.	"Surface Morphology and Interface Structure of (Co, Fe, Ni)/Cu/Si Bilayer Thin Films", B. Demczyk, R. Naik, A. Lukasew, G.W. Auner, and V. Naik, Materials Research Society, Boston, MA, 1995.

144.	"Smart Sensor Technology", G.W. Auner, P. Siy, and R. Naik, American Association of Engineering Educators Symposium, Anaheim, CA, July 1995.

145.	"Magneto-optical and Magnetic Anisotropy Properties of Ni(100)-Cu(100) Layered Structures Grown on Cu(100)/Si(100)", R. Naik, G.W. Auner, G.L. Dunifer, J. Rodrigues, A. Lukaszew, and A. Poli, American Physical Society, San Jose, CA, March 1995.

146.	"Epitaxial Growth of Wide Bandgap Semiconductors by Plasma Source Molecular Beam Epitaxy", G.W. Auner, R. Naik, and P.K. Kuo, American Physical Society, San Jose, CA, March 1995.

147.	"Aluminum Nitride (AlN) Thin Films for SAW Sensors", G.W. Auner, F. Ahmad, and T.D. Lenane, Materials Research Society, Boston, MA, 1994.

148.	"Epitaxial Growth of AlN by Plasma Source Molecular Beam Epitaxy", G.W. Auner, T. D. Lenane, F. Ahmad, R. Naik, P.K. Kuo, Z.L. Wu, and Y.S. Lu, Materials Research Society, Boston, MA, 1994.

149.	"Atomic Force and Transmission Electron Microscopies of Epitaxial Metal Thin Films Grown on Hydrogen Terminated Silicon Surfaces", R. Naik, G.W. Auner,

150.	S. Gebremariam, T. Tatham, U. Rao, Y.S. Lu, P.K. Kuo, and B.G. Demczyk, Materials Research Society, Boston, MA, 1994.

151.   "Growth of Epitaxial Aluminum Nitride Films on Hydrogen Terminated Si(111)", G.W. Auner, F. Ahmad, T.D. Lenane, and R. Naik, American Vacuum Society Conference, Denver, CO, October 1994.

152.   "Interfacial and Microstructural Study of Epitaxial Aluminum Nitride Films using Atomic Force Microscopy and Transmission Electron Microscopy", G.W. Auner, T.D. Lenane, F. Ahmad and R. Naik, American Vacuum Society Conference, Denver, CO, October 1994.

153.   *Invited Presentation* "Growth of Wide Bandgap Nitride Semiconductors by Plasma Source Molecular Beam Epitaxy". CECAM International Workshop, Lyon, France, May 1994.

154.   *Invited Presentation* "Epitaxial Growth of AlN by Plasma Source Molecular Beam Epitaxy", NATO Advanced Workshop on Wide Bandgap Electronic Materials and the Second International Symposium on Diamond Films, Minsk, Belaraus, May 1994.

1.   *Invited Presentation* "Wide Bandgap Semiconductors for Microelectronic and Photonic Devices", University of Michigan, EE Colloquium, October 1994.

2.   *Invited Presentation* "Wide Bandgap Semiconductor Technology", Department of Physics and Astronomy, Wayne State University, Solid State Colloquium, 1994.

3.   *Invited Presentation* "Wide Bandgap Semiconductor Technology", IEEE Symposium, WSU, 1994.

4.   "Study of Epitaxial Growth of Ag on Hydrogen Terminated Si (100) and Si (111) Surfaces", R. Naik, C. Kota, U. Rao, and G.W. Auner, American Vacuum Society Conference, Orlando, FL, October 1993.

5.   "Epitaxial Growth of AlN and InN by Hollow Cathode Off-Axis Magnetron Sputtering", T.D. Lenane, F. Ahmad, and G.W. Auner, American Vacuum Society Conference, Orlando, FL, October 1993.

6.   *Invited Presentation* National Science Foundation Workshop (Invited Speaker and Panel Member) at the Materials Science Education at the Materials Society Symposium, Boston, MA, 1993.

7.   "Growth of Wide Bandgap Nitride Semiconductors by an Integrated ECR-Sputtering Source", G.W. Auner, T. Lenane, and F. Ahmad, and R. Naik, Materials Research Society, Boston, MA, 1993.

8.   "Magnetic and Magneto-optic Properties of Magnetron Sputtered CoCr/Al Multilayers", G.W. Auner, R. Naik, U.M. Rao, Y. Zhoa, and B. Wang, Materials Research Society, San Francisco, CA, 1993.

9.   "Development of a Plasma Enhanced Atomic Layer Epitaxy System for cBN/Diamond Heterostructures", G.W. Auner, T.D. Lenane, and F. Ahmad, 3rd Annual Diamond Technology Workshop, Detroit, MI, March, 1992.

10. *Invited Presentation* "Plasma Deposition Technology", Nation Steel Technical Laboratory,

1992.

11. "A Dual-Wavelength Method for High Density Magneto-optic Data Storage at Blue   Wavelengths", B. Wang, Y. Zhoa, and G.W. Auner, CLEO, 1992.

12. "Polarization Matrix for Round-Trip Wave Propagation in Magneto-Optic Media", Y. Zhoa, B. Wang, and G. Auner, Optical Society of America Annual Meeting, San Jose, CA, 1991.

13. *Invited Presentation* "Atomic Transport in Ion-Solid Interactions", Oakland University, February 1991.

14. "Cohesive Energy Effects on Anisotropic Transport in Ion Mixing", G.W. Auner, Y.-T. Cheng, M. Karmarker, M.H. Alkaisi, and K.R. Padmanabhan, IBMM, 1990.

15. "Thermodynamic and Ballistic Aspects of Ion Mixing", Y.-T. Cheng, G.W. Auner, K.R. Padmanabhan, and E.-H. Cirlin, IBMM ,1990.

16. *Invited Presentation* "Anisotropic Transport in Ion Mixing", Los Alamos National Laboratory , July 1990.

17. *Invited Presentation* "Anisotropic Transport in Collision Cascades", IBM Thomas J. Watson Research Center, May 1990.

18. "A Study of the Dominant Moving Species in Ion Beam Mixing I: Effect of Sample Geometry and Atomic Mass", G.W. Auner, Y.-T. Cheng, M.H. Alkaisi, and K.R. Padmanabhan, Mat. Res. Soc. Symp. Boston, MA, November 1989.

19. "Comparison Between d.c. and r.f. Biasing in the Preparation of Nitride Films", G.W. Auner and K.R. Padmanabhan, Proc. 6th International Conference on Thin Films, Stockholm, Sweden, August 1984.

20. "Anisotropic Transport in Ion Mixing", G.W. Auner, Y.-T. Cheng, 17th American Vacuum Society Michigan Chapter Annual Symposium, 1990.

21. "Ion Implantation during Sputter Deposition of Metal Films", G.W. Auner, K.R. Padmanabhan, J. Chevallier, and G. Sorensen, Proc. 6th International Conference on Thin Films, Stockholm, Sweden, August 1984.

22. "Effect of Magnetic Field and Bias Potential on the Distribution of Plasma Luminosity during r.f. Sputtering", G.W. Auner, Y.F. Hsieh, and K.R. Padmanabhan, American Vacuum Society Conference, 1983.

III SERVICES:

Administrative Appointments at Wayne State University in Last Five Years

> None

Department Committees:

ECE Faculty Search Committee, 1997-present
ECE Tenure and Promotion Committee (98-present)
ECE Chair Search Committee (95-96/97, 99/00)
Undergraduate Committee (Chair) 1995- Fall1998
Undergraduate Committee (co-chair) 1994
Undergraduate Laboratory Committee
Graduate Committee (96-Present)
Tenure Salary and Promotion Committee (1996-1997)

College Committees:

College of Engineering Research Committee(1996 to present)
MET 130 Educational Committee (1995)
Research Enhancement and Teaming Committee (1996)
Tenure Salary and Promotion Committee (95/96, alternate 97, 2002, 2003)
College of Engineering Dean Research Committee (96/97)
Engineering College AOC Committee 1997

University Committees:

Bioengineering Taskforce for the Research Science Corridor (99/00)
Tenure and Promotion Committee (99/00)
Retina Implant Center (Kresge Eye Institute) Search Committee
Retina Implant Center (Kresge Eye Institute) Advisory Board
Dean (Engineering) Search Committee
Educational Development Committee
QUEST Advisory Committee on Research Contracts
Scholarship Review Committee

Other Services:

Chair, State Bioengineering Taskforce for the Research Science Corridor (2000)
Solid State Ph.D. Qualifying Exam Committee

Positions held in Professional Associations:

Chair, MI American Vacuum Society (1994-95).

Vice President, MI American Vacuum Society
(Symposium Chairman 1993-94).

Education Committee Chair, MI American Vacuum Society (1993-97).

Short course Committee Chair, Michigan Chapter of the American Vacuum Society (1993).

Board Member, MI American Vacuum Society (1992-present)
Member of American Vacuum Society organizing committee for the 14th Symposium on Applied Surface Analysis, Ann Arbor, MI (1992).

Professional Consulting:

Karmanos Cancer Institute (99-2000)

General Motors Corp. (1997-99)

Delphi Automotive Systems (1999)

Ford Motor Company (1996-98)

Research Consultant, Ti-coating Inc., Mt. Clemens, Michigan,
Designed and developed a plasma assisted deposition system (1986-87, 95).

Other Professionally Related Service:

Organizing committee and co-sponsor for the 26th Annual Symposium for the MI American Vacuum Society on Sensor technology. To be held at Wayne State University, May 1999.

Organizing committee for the 24th Annual Symposium for the MI American Vacuum Society. Wayne State University, May 1997.

Organized the 21st Annual Symposium for the MI American Vacuum Society. This was a conference on Sensor Technology with over 100 participants.

Currently organizing dinner meetings with (national) invited speakers for the American Vacuum Society.

Reviewing:

Journals

Applied Physics Letters
Journal of Applied Physics
Journal of Sensors and Actuators
Nuclear Instruments and Methods Journal
Material Research Society
Journal of Vacuum Science and Technology

Proposals

National Science Foundation
National Academy of Sciences

Ivan Avrutsky
Department of Electrical and Computer Engineering, Wayne State University
Detroit, MI 48202
avrutsky@eng.wayne.edu

RESEARCH EXPERIENCE:

Visiting Assistant Professor, Assistant Professor, Associate Professor - Electrical and Computer Engineering, Wayne State University, 1998-preset.

Post Doctoral Fellow – Nortel Institute for Emerging Technologies, University of Toronto, 1996-1997.

Senior Research Fellow - Fiber Optics Research Center at General Physics Institute, Russian Academy of Sciences, Moscow, Russia, 1992-1996.

Research Fellow - General Physics Institute, Russian Academy of Sciences, Moscow, Russia, 1989-1991.

EDUCATION:

Ph.D, Physics and Mathematics, with emphasis on Physical and Quantum Electronics, General Physics Institute, Moscow, Russia, 1988.

Diploma (MSc, Laser Physics), with honor, Moscow Institute of Physics and Technology, Dolgoprudny, Moscow region, Russia, 1986.

Certificate (Pre-college), with honor, Phys.-Math. School at Kyiv State University, Kyiv, Ukraine, 1980.

RESEARCH INTERESTS:

Dr. Ivan Avrutsky is interested in optoelectronics, integrated optics, and laser physics. Subjects of particular interest are optical devices employing resonant phenomena in waveguide gratings, nanoscale photonics, and nanomanufacturing technologies.

SCHOLARSHIP:

- Research projects at Wayne State supported by NSF, ARO/TACOM, PTAP (NSF/DARPA), Federal Highway Administration, high-tech industry, 1998-present.

- Research projects accomplished using National Nanofabrication Facility at Cornell.

- A patent licensed to Nortel Networks, 1998; two other patents pending.

- Coordinating a multi-institutional project on development of aluminum-free technology for high power semiconductor lasers, Russian Academy of Sciences, Moscow, 1992-1996.

- The first place Young Investigator Award, General Physics Institute, Russian Academy of Sciences, Moscow, Russia, 1990.

- Over sixty technical papers, thirty conference presentations, one book chapter, invited presentations at SPIE-2000 and Diffractive Optics and Micro-Optics 2002.

Publications related to the project:

1. Ivan Avrutsky, "Surface plasmons at nanoscale relief gratings between a metal and dielectric medium with optical gain," **Physical Review B**, 70 (15), Art. No. 155416 (2004).

2. Ivan Avrutsky, Daniel G. Georgiev, Dmitry Frankstein, Gregory Auner, Golam Newaz, "Superresolution in laser annealing and ablation," **Applied Physics Letters**, 84 (13), 2391-2393 (2004).

3. D. G. Georgiev, R. J. Baird, I. Avrutsky, G. Newaz, G. Auner, "Controllable Excimer-Laser Fabrication of Conical Nano-Tips on Silicon Thin Films," **Applied Physics Letters**, 84 (24), 4881-4883 (2004).

4. Rabi Rabady and Ivan Avrutsky, "Experimental characterization of simultaneous spatial and spectral filtering by an optical resonant filter," **Optics Letters**, 29 (6), 605-607 (2004).

5. Ivan Avrutsky and Vladimir Kochergin "Optical filtering by leaky guided modes in macroporous silicon," **Applied Physics Letters**, 82(21), 3590-3592 (2003).

Other recent publications:

1. I. Avrutsky, "Guided modes in a uniaxial multilayer," **J. Optical Society of America (JOSA) A**, 20 (3), 548-556 (2003).

2. Ivan Avrutsky and Rabi Rabady, "Waveguide grating mirror for large-area semiconductor lasers," **Optics letters**, vol. 26(13), 989-991 (2001).

3. Ivan Avrutsky, Vladimir Kochergin, Yang Zhao, "Optical demultiplexing in a planar waveguide with colloidal crystal," **IEEE Photonics Technology Letters**, 12 (12), 1647-1649 (2000).

4. I. Avrutsky, B. Li, Y. Zhao, "Characterization of two-dimentional colloidal polycrystalline materials using optical diffraction." **J. Optical Society of America B**, 17(6), 904-909 (2000).

5. Ivan Avrutsky, Yang Zhao, and Vladimir Kochergin, "Surface plasmon assisted resonant tunneling of light trough periodically corrugated thin metal film," **Optics letters**, vol. 25(9), 595-597 (2000).

PhD advisor: Prof. Vladimir A. Sychugov, General Physics Institute, Russian Academy of Sciences, Moscow, Russia.

Former Students (over last five years)**:**
Vladimir Kochergin, research staff, Lakeshore Cryotronics, Columbus, Ohio (2001).
Kirill Zinoviev, research staff, National Microelectronics Center, Barcelona, Spain (2002).
Michael Krause, electronics design, Motorola, Chicago, Illinois (2003).
Rabi Rabady, faculty, Yarmouk University, Jordan (2004).

Current Students
Postdoctoral fellow: Ildar Salakhutdinov
PhD students: Julia Eisenkop, Kalyani Chaganti
Graduate students: Dmitry Frankstein, Narayanan Byravasubramanian, Xin Li
Undergraduate student: Gilbert Poisson

Name	Position Title
Qiang Cheng	Assistant Professor of Electrical and Computer Engineering

Education/Training			
Institution and Location	Degree	Year	Field of Study
Peking University, Beijing, China Peking University, Beijing, China University of Illinois at Urbana-Champaign, Urbana, Illinois	*B.S.* *M.S.* *Ph.D.*	1994 1996 2002	Computer Science & Information Engineering Computer Science & Information Engineering Electrical and Computer Engineering

Research and Professional Experience

- Visiting Researcher, Institute of Information Science and Technology, National Key Laboratory, Peking University, China (Jan. 1994 - Sept. 1994)
- Guanghua University Fellow, Research Assistant, and Teaching Assistant, Dept. of Computer Science and Information Engineering, and Institute of Information Science and Technology, Peking University, China (Sept. 1994 - 1996)
- Graduate Fellow, Research Assistant, and Teaching Assistant, Coordinated Science Laboratory, University of Illinois at Urbana-Champaign (1996 - 1997)
- Research Assistant, Beckman Institute for Advanced Science and Technology, Coordinated Science Laboratory, and Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign (1998 - 2002)
- Summer Intern, Department of Human Language Technology, IBM T. J. Watson Research Center, Yorktown Heights, NY (May 2000 - Aug. 2000)
- Assistant Professor, Electrical and Computer Engineering Department, Wayne State University (2002 - present). Teaching Analog and digital communications circuits, Digital signal processing, Advanced communications theory.

Program Committee member, *Int. Conf. on Image and Video Retrieval (CIVR03),* Urbana, IL, July 2003, *Int. Conf. on Pattern Recognition (ICPR04)*, Cambridge, England, Aug. 2004.

Member of Profession Society: IEEE Signal Processing Society, IEEE Information Theory Society, IEEE Biomedical Engineering Society.

Referee for *IEEE Transactions on CAS II, on Signal Processing, on Multimedia, on Image Processing*, *on Acoustics and Speech Processing*, *on Biomedical Engineering, IEEE Signal Processing Letter, Journal of Electronic Imaging, Journal of Signal Processing: Image Communications,* and for various international conferences such as Int. Conf. on Computer Vision (ICCV), IEEE Computer Vision and Pattern Recognition (CVPR), Visual Comm. and Image Processing (VCIP), Int. Conf. on Automatic Face and Gesture Recognition.

Expertise Summary

Qiang Cheng has conducted research in multimedia computing and communications, digital watermarking for secure content delivery and data management, information and network security, and pattern recognition. He has developed exact-rate asymptotic performance analyses to identify fundamental watermarking performance limits. He has created a family of optimum robust receivers for multiplicative watermarks for large natural imagery, and combined secure audio and video system. These and other results led to filed patents and disclosures at the University of Illinois

at Urbana-Champaign (UIUC), Urbana, Illinois. He has invented a spread spectrum speech technique for secure data transmission through voice at IBM T.J. Watson Research Center, Yorktown Heights, with a patent filed with IBM in 2001. He has been developing algorithms to combine information embedding with cryptography, multimedia communications, and networking. Security-assurance of media-rich content is built for ubiquitous access and communication security in mobile and distributed computing. Large-scale systems and national security are addressed by this research, which is particularly useful for homeland security, commerce, defense, and information technology. He has extensive research experience in information processing and communications, multimedia data management, pattern recognition and machine learning, etc. He has done projects on image and video indexing and retrieval, automatic word classification methods for large corpus using machine learning, and automatic face recognition. His experience on unsupervised learning and probabilistic graphical models has been applied to image segmentation and indexing, to searching for a universal learning machine with the tight approximation and estimation bounds and optimal rates, and to video interaction and mining.

Honors and Awards

- Guanghua University Fellowship, Peking University, China, 1995-1996.
- Antai Academic Excellence Award, Peking University, China, June 1996.
- University Graduate Fellowship, University of Illinois at Urbana-Champaign, 1997-1998.
- Invention Achievement Award, IBM T. J. Watson Center, Yorktown Heights, New York, 2001.
- Included in Who's Who Among America's Teachers, 8th Ed., 2004.

Selected Professional Publications (from more than 40 peer-reviewed papers)

- "SNR analysis for phased-array MR image reconstruction," Y. Wang, Q. Cheng, and J. Cheng, accepted by *IEEE Int. Conf. on Acoustic, Speech, and Signal Processing (ICASSP '05)*, Philadelphia, March 2005.
- "Unconfined e-healthcare system using UMTS-WLAN," H. Qu, Q. Cheng, and E. Yaprek, accepted by *Int. Journal of Modeling and Simulation*.
- "Utilizing the IEEE 802.16 standard for homeland security applications," B. Rathgeb and Q. Cheng, accepted by *SPIE Defense and Security Symposium: Technologies for Homeland Security and Law Enforcement*, Orlando, FL, March 2005.
- "Toward defending from Denial of Service attacks in wireless networks,'' Q. Hu and Q. Cheng, accepted by *SPIE Defense and Security Symposium: Technologies for Homeland Security and Law Enforcement*, Orlando, FL, March 2005.
- "Data mining for E-Commerce," J. Cheng, Q. Cheng, et al. to appear in *Encyclopedia of E-Commerce, E-Government, and M-Commerce*, Ed. Mehdi Khosrow-Pour.
- "E-health security and privacy: critical issues and challenges," Y. Wang, Q. Cheng, et al., to appear, *Encyclopedia of E-Commerce, E-Government, and M-Commerce*, Ed. Mehdi Khosrow-Pour.
- "Digital rights management for e-technologies: concepts, trends, and challeges," Q. Cheng, et al., to appear, *Encyclopedia of E-Commerce, E-Government, and M-Commerce*, Ed. Mehdi Khosrow-Pour.
- "Performance analysis and error exponents of asymmetric watermarking systems," Qiang Cheng, Yingge Wang, and Tomas S. Huang, *Signal Processing*, vol. 84, no. 8, pp. 1429-1445, Aug. 2004.
- "MV-MAP: Multiresolution video visualization and summarization on MAPs," Yingge Wang, Qiang Cheng, Jie Cheng, and Thomas S. Huang, *Proc. Int. Conf. Pattern Recognition,* Cambridge, England, Aug. 2004.
- "Integrated selective encryption and data embedding for medical images," Qiang Cheng, Yingge Wang, and Joseph Tan, *E-Health Paradigm Shift: Perspectives, Domains and Cases*, Wiley, 2004.
- "Unconfined mobile Bluetooth telemedicine for empowered healthcare," Qiang Cheng, Huyu Qu, Yingge Wang, and Joseph Tan, *E-Health Paradigm Shift: Perspectives, Domains and Cases*, Wiley,

2004.

- "Enhancing IEEE 802.11 wireless security with packet marking," H. Qu and Q. Cheng, *IFIP and IEEE Conf. Comm.,* June, 2004.
- "Apply face identification to detecting hijack of airplane," Xuanwen Luo and Qiang Cheng, *Proc. SPIE Defense and Security Symposium: Technologies for Homeland Security and Law Enforcement*, Orlando, FL, Apr. 2004.
- "VMAP: Video visualization and summarization on embedded manifold articulation primitives," Yingge Wang, Qiang Cheng, Jie Cheng, and Thomas S. Huang, *Proc. Int. Wkp on Image Analysis for Multimedia Interactive Services*, Lisbon, Portugal, April 2004.
- "Distant mobile Bluetooth nursing and daily data collection," Xuanwen Luo and Qiang Cheng, *Proc. IEEE Consumer Communications and Networking Conf. (CCNC '04)*, Las Vegas, Nevada, Jan. 2004.
- "Health information integrating and size reducing," Xuanwen Luo and Qiang Cheng, *Proc. IEEE Nuclear Science Symposium and Medical Imaging Conference (MIC '03)*, Portland, OR, Oct. 2003.
- "A lossless data embedding scheme for medical images in application of e-diagnosis," Xuanwen Luo, Qiang Cheng, and Joseph Tan, *Proc. Int. Conf. of IEEE Engineering in Medicine and Biology Society (EMBS '03)*, Cancun, Mexico, Sept. 2003.
- "Maximizing efficacy for efficient watermarking systems," Qiang Cheng, Yingge Wang, and Thomas S. Huang, *Proc. Int. Conf. on Image Processing (ICIP '03)*, Barcelona, Spain, Sept. 2003.
- "'How to design efficient watermarks?' In search of better systems," Qiang Cheng, Yingge Wang, and Thomas S. Huang, *Proc. Int. Conf. on Acoustic, Speech, and Signal Processing (ICASSP '03)*, Hong Kong, April 2003.
- "Robust optimum detection of transform-domain multiplicative watermarks," Qiang Cheng and Thomas S. Huang, *IEEE Transactions on Signal Processing --Special Issue on Signal Processing for Data Hiding in Digital Media and Secure Content Delivery*, vol. 51, no. 4, pp. 906-924, April 2003.
- "Optimum detection and decoding of DFT domain watermarking," Qiang Cheng and Thomas S. Huang*, Proc. Int. Conf. on Acoustic, Speech, and Signal Processing (ICASSP '02)*, Orlando, FL, May 2002.
- "A framework for blind digital video watermarking with dual watermarks," Qiang Cheng and Thomas S. Huang, *Proc. Visual Communication and Image Processing (VCIP '02),* San Jose, CA, Jan. 2002.
- "Optimum detection of perceptual-model-based image adaptive watermarks," Qiang Cheng and Thomas S. Huang, *Proc. International Conference on Image Processing (ICIP '01)*, Thessaloniki, Greece, Oct. 8, 2001.
- "An image watermarking technique using pyramid transform," Qiang Cheng and Thomas S. Huang, *Proc. ACM Int. Conf. on Multimedia (ACM Multimedia '01),* pp. 319-328, Ottawa, Canada, Sept. 30, 2001.
- "On optimum detection of multiplicative watermarks," Qiang Cheng and Thomas S. Huang*, Proc. Content Based Multimedia Indexing (CBMI '01) Workshop,* Brescia, Italy, Sept. 17, 2001.
- "An additive approach to transform-domain information hiding and optimum detection structure," Qiang Cheng and Thomas S. Huang*, IEEE Transactions on Multimedia*, vol. 3, no.3, pp. 273-284, Sept. 2001.
- "Combined audio and video watermarking using mel-frequency cepstra," Qiang Cheng, Thomas S. Huang, and Hao Pan, *Proc. Int. Conf. on Multimedia and Expo (ICME '01),* Tokyo, Japan, Aug. 22, 2001.
- "Optimum detection of multiplicative watermarks," Qiang Cheng and Thomas S. Huang, *Proc. Int. Conf. on Multimedia and Expo (ICME '01),* Tokyo, Japan, Aug. 22, 2001.
- "Spread spectrum signaling for speech watermarking," Qiang Cheng and Jeffrey Sorensen, *Proc. Int. Conf. on Acoustic, Speech, and Signal Processing (ICASSP '01)*, Salt Lake City, UT, May 2001.
- "A visible digital watermarking system using perceptual models," Qiang Cheng and Thomas S. Huang, *Proc. SPIE Voice, Video, and Data Communications*, Boston, MA, Nov. 2000.
- "A DCT-domain blind watermarking system using optimum detection on Laplacian model,"

Qiang Cheng and Thomas S. Huang, *Proc. Int. Conf. on Image Processing (ICIP '00)*, Vancouver, Canada, Sept. 2000.

- "Identify region of interest for video watermark embedment with principle component analysis on multiple cues," Roy Wang, Qiang Cheng, and Thomas S. Huang*, Proc. ACM Int. Conf. on Multimedia (ACM MM '00),* L.A., California, Oct. 2000.
- "Blind digital watermarking for images and videos and performance analysis," Qiang Cheng and Thomas S. Huang, *Proc. Int. Conf. on Multimedia and Expo (ICME '00)*, New York, Aug. 2000.

Funding

- University Research Grant (PI), Wayne State University, 2003-2004, $7,000

- Research Enhancement Program (CoPI), Wayne State University, 2004-2006, $233,000

Nov. 22, 2004

Jaewu Choi:
Assistant Professor
Electrical & Computer Engineering   (313) 577-3990 (office)
Wayne State University   (313) 577-1101 (lab)
5050 Anthony Wayne Dr. #3100   (313) 577-1101 (fax)
Detroit, MI 48202   jchoi@ece.eng.wayne.edu

Education

Ph.D. in physics, Dec. 1998, University of Nebraska-Lincoln
M.S. in physics, Feb. 1991, Cheonbuk National University, Korea
B.Sc. in physics, Feb. 1986, Cheonbuk National University, Korea

Awards

1) Honorable Mention for the 2002 Outstanding Young Researcher Award:
Association of Korean Physicists in America, Indianapolis, Indiana, March 20, 2002
2) Third place graduate student presentation award:
   American Vacuum Society (Rocky Mountain Chapter), Annual Symposium, Arvada, Colorado,
   Aug. 21, 1997

Appointments

Aug. 2001 – Present: Assistant Professor of Electrical and Computer
Engineering, Wayne State
University
Dec. 1998 – Aug. 2001: Research Associate, Center for Advanced Microstructures & Devices
                 (Synchrotron Radiation Center), Louisiana State University
Jan. 1995 - Nov. 1998:   Teaching Assistant / Research Assistant, University of Nebraska-
                 Lincoln
Oct. 1992 - July 1994:   Application Engineer,
Apr. 1991 - Oct. 1992:   Lab Manager for undergraduate students in the Physics
                 Department, Cheonbuk National University, Korea
May 1989 - Oct. 1990:   Military Service in Korea
Mar. 1987 - Feb. 1989:   Teaching Assistant, Cheonbuk National University, Korea

A. Member of Professional Organizations

1. American Physical Society: Aug. 1995 - Present
2. American Vacuum Society: Oct. 1997 – Present
3. Material Research Society: Nov. 1999 – Present

Academic Services
9. Served as a panelist for National Science Foundation –Nanoscale Interdisciplinary Research
    Team NSF-NIRT program (2001)
10. Served as a reviewer for NSF Proposals

11. Served as a reviewer for Petroleum Research Fund
12. Serve as a reviewer for Applied Physics Letters since 1999
13. Serve as a reviewer for Journal of Applied Physics since 1999
14. Serve as a reviewer for Journal of Vacuum Science and Technology since 2000
15. Serve as a secretary for American Vacuum Society-Michigan Chapter since 2003
16. Korean –American Scientists and Engineers Association (KSEA) Michigan Chapter President since 2004
17. Graduate Committee of Electrical and Computer Engineering Department, Wayne State University since 2001
18. Seminar Committee of Electrical and Computer Engineering Department, Wayne State University since 2001

Research Activities

Currently, I am interesting in nanostructures, nanodevices, micro fuel cell systems, and nanosystems. The interesting nanostructures are molecular building blocks including carbon nanotubes, conducting polymers, ferroelectric polymers, DNA-based molecules and nanowires. Atomic, and electronic structures of nanostructures are studied and manipulated using an OMICRON VT-UHV SPM. In-situ transport properties of these nanostructures are also studied using a home-built nanomanipulator with 4 probes. The interesting nanodevices are molecular electronic devices such as molecular diode, molecular transistor, molecular sensors, molecular memories, and molecular quantum computers. Using these nanostructures and nanodevices, we are developing methods to integrate nanodevices for nanosystems such as a prototype computer and multiple sensor arrays. To achieve these goals, six graduate students are devoted to develop carbon nanotube gas and bio analyzer, carbon nanotube growth, a nanomanipulator, VT-UHV SPM operation, molecular electronic devices, microfluid systems for carbon nanotube separation and manipulation, self-assembly, impedance spectroscopy (5Hz- 22 GHz), and integration of nanodevices. Additionally a quantum computer will be studied as the extension of the effort.

Prof. Choi is author of 32 papers in the referred journal, 4 conference proceedings, and 1 invited review paper (book chapter).

Current Group Members in the laboratory of nano-devices and systems

Youngsik Song: Ph.D. Candidate (From May 2001-Present)
: Carbon nanotube growth, carbon nanotube field emitter, carbon nanotube field effect transistor, and carbon nanotube gas analyzer
Bart Szawarski: Master Graduate Student (From Jan. 2002-Present)
: Microfluid system for carbon nanotube separation and manipulation
Swanand s Vaidya: Master Graduate Student (From Sep. 2002-Present)
: Transport properties of carbon nanotubes/conducting polymers/DNAs using an impedance analyzer and a nanomanipulator,
Gurbrider S. Khara: Ph.D. Student (From Feb. 2003-Present)
: Integration of molecular building blocks and molecular devices for a nanosystem using self-assembly, VT-UHV SPM operation, and molecular electronics
5. **Deepti Phatak**: Ph. D. Student (From Jan. 2004 – Present)
: Simulation of the interaction among carbon nanotubes, gases and DNAs
6. **Sumitha Durairaj**: Ph.D. Student (From sep. 2003- present)
: Quantum cellular Automata using self-assembly and templates, micro fuel cell systems

Previous Group Members in the laboratory of nano-devices and systems

1. **Pridhu Dev Manghat**: Master (From Jan. 2002 – Dec. 2003): Hewlett-Packard, Roseville, CA

Grant

1. **Molecular Diodes and Molecular Memories**, *National Science Foundations*
2. **Carbon Nanotube Gas Analyzer,** *IMR, Wayne State University*
3. **Flexible and Active Fuel Cell Cable, TTO, Wayne State University**

Publications

I.   Publications-Book Chapters

1. P.A. Dowben, **Jaewu Choi**, E. Morikawa and B. Xu, "*The Band Structure of Molecular Adsorbates on Surfaces by Angle-Resolved Electron Spectroscopies*", in Thin Films Handbook- Processing, Characterization and Properties, edited by H.S. Nalwa, Academic Press, (2001).

II.   Published Journal Papers

(Conference proceedings and invited paper are indicated by a number followed by C and I respectively, and the number in parenthesis is corresponding to the citation number)
2004:

1C. Swanand S. Vaidya and Jaewu Choi, "Electrical Properties of Single Molecular Wire", American Vacuum Society, Fifth International Conference on Microelectronics and Interfaces", 33 (2004).

2003:

1. Jaewu Choi, J. Hormes, and P.K. Kahol, "*Study of ammonia-gas-induced irreversibility in polypyrrole films*, Appl. Phys. Lett. **83**, 2288 (2003)
2. Takashi Komesu, Jaewu Choi, C.N. Borca, Hae-Kyung Jeong, P.A. Dowben, A. Petukhov, B.D. Schultz, and C.J. Palmstrom, "*The Electronic Structure of ErAs (100)*", Phys. Rev. **B 67**, 035104 (2003). **(1)**
3. A.N. Caruso, Ya.B. Losovyj, Jaewu Choi, and P.A. Dowben, *The adsorption and Decomposition of HS-(CH$_2$)$_2$-(CF$_2$)-7-CF$_3$ Thin Films on Au(111)*, Materials Letters **57**, 3614(2003).
4. C.G. Duan, W.N. Mei, J.R. Hardy, S. Ducharme, Jaewu Choi, and P.A. Dowben, *Comparison of the theoretical and experimental band structure of poly(vinylidene fluoride) crystal*, Europhys. Lett. **61**, 81 (2003). **(5)**

2002:

1-IC. Jaewu Choi, Y. Song, D. Tang and Y. Zhao, "Ferroelectric polymers for advanced polymeric light emitting devices," **Invited paper**, SPIE Annual Meeting, Seattle, WA, (2002)
2. Jaewu Choi, Seung-Chu Lim, I.A. Samayoa, Young Chul Choi, Young Hee Lee, and P.A.

Dowben " *Band Filling and Correlation Effects in Alkali Doped Carbon Nanotubes*",
Physics Letter **A 299**, 6001 (2002). **(3)**

3C. Youngsik Song, Brian Usner, Jaewu Choi, Seong-Chu Lim, and Young Hee Lee, "*Field Emission Properties of Vertically Aligned Carbon Nanotubes Driven by Polar and Non-Polar Gas Adsorption*", Mat. Res. Soc. Symp. Proc. **706**, Z5.8.1 (2002)

4. H.W. Jang, C.M. Jeon, K.H. Kim, J.K. Kim, S.B. Bae, J.H. Lee, and Jaewu Choi, and J.L.Lee, "Mechanism of two-dimensional electron gas formation in $Al_xGa_{1-x}N$/GaN heterostructures", Appl. Phys. Lett. **81**, 1249 (2002).**(6)**

5. B. Xu, Jaewu Choi, and P.A. Dowben, *Preferential orientation of short chain vapor deposited polyaniline thin films on gold*", J. Vac. Sci. Technol. **A 20**, 741 (2002)

6. B. Xu, Jaewu Choi, A.N. Carso, and P.A. Dowben, *Band Filling and depletion Through the doping of Polyaniline Thin Films*", Appl. Phys. Lett. **80**, 4342 (2002). **(4)**

7. S.C. Lim, C.S. Jo, H.J. Jeong, Y.M. Shin, Y.H. Lee, I.A. Samyoa, and Jaewu Choi, *Effect of Oxidation on Electronic and Geometric Properties of Carbon Nanotubes*, Jpn. J. Appl. Phys**. 41,** 5635 (2002).

2001:

1. Jaewu Choi, Seung Mi Lee, Young Chul Choi, Young Hee Lee, and J.C. Jiang, "*Electronic Band Dispersion of Vertically Aligned Multiwall-Carbon Nanotubes*", Chem. Phys. Lett. **349**, 185 (2001). **(2)**

2C. Jaewu Choi, Young Chul Choi, and Young Hee Lee, "*Electronic Structure Modification of Multiwalled Carbon Nanotubes by Ion Bombardment and Thermal Treatment*", ADC/FCT 2001 conference proceeding

3. Jaewu Choi, M. Chirpara, B. Xu, C.S. Yang, B. Doudin, and P.A. Dowben, *Comparison of the π-conjugated Ring Orientations in Polyanilne and Polypyrrole*, Chem. Phys. Lett. **343**, 193 (2001). **(13)**

4. B. Xu, Jaewu Choi, C.N. Borca, S. Ducharme, A.V. Sorokin, P.A. Dowben, V.M. Fridikin, S.P. Palto, N. Petukhova, and S.G. Yudin, *Comparison of Simple Metal Doped Poly(vinylidene fluoride with trifluoroethylene) Copolymer by XPS*", Appl. Phys. Lett., **78**, 448 (2001).

5. C.N. Borca, S. Adenwalla, Jaewu Choi, Lee Robertson, H. You, V.M. Fridkin, S.P. Palto, N. Petukhova, S. Ducharme, and P.A. Dowben, *Changes in Electron-Phonon Coupling across a Bulk Phase Transition in Copolymer Films of Vinylidene Fluoride (70%) with Trifluoroethylene (30%)*, Appl. Surf. Sci. **175**, 265 (2001).

6. H.W. Jang, C.M. Jeon, K.H. Kim, J.K. Kim, S.-B. Bae, J.-H. Lee, Jaewu Choi, and J.-H. Lee, "*Investigation for the Formation of Polarization-Induced Two-Dimensional Electron Gas in AlGaN/GaN Heterostructure Field Effect Transistors*", Phys. Stat. Sol. **B228**, 621 (2001).

7C. C.N. Borca, R.H. Cheung, S. Stadler, Y.U. Idzerda, Jaewu Choi, D.N. McIlroy, S.H. Liou,Z.C. Zhong, and P.A. Dowben, "*Is Magnetic Circular Dichroism Surface Sensitive in the Manganese Perovskites ?*", in: Magnetoresistive Oxides and Related Materials, Edited by: M. Rzchowski, M.Kawasaki, A.J. Millis, M. Rajeswari, S. von Molnar, MRS Symp. Proc. **602**, 301 (2001)

2000:

1. Jaewu Choi, P. A. Dowben, M. Poulen, S. Adenwalla Stephen Ducharme, V. M. Fridkin,

S. P. Palto, N. Petukhova and S. G. Yudin, "*Phase Transition in the Surface Structure in Copolymer films of Vinylidene Fluoride (70%) with trifluoroethylene (30%)*", Phys. Rev. **B61**, 5760 (2000). **(21)**

2. Jaewu Choi, S.-J. Tang, P.T. Sprunger, P.A. Dowben, S. Ducharme, V.M. Fridkin, S.P. Palto, N. Petukhova, and S.G. Yudin, *" Photoemission Band Symmetries of Crystalline Films of Vinylidene Fluoride (70%) with Trifluoroethylene (30%) Across the Ferroelectric Transition*", J. Phys. Condens. Matt. **12**, 4735 (2000). **(6)**

3. Hani Dulli, P.A. Dowben, Jaewu Choi, S.-H. Liou, and E.W. Plummer, "*A Surface Electronic Phase Transition in CMR Manganese Perovskites: La$_{0.65}$Sr$_{0.35}$MnO3*", Appl. Phys. Lett., **77**, 570 (2000). **(20)**

4. Jaewu Choi, H.M. Manohara, E. Morikawa, P.T. Sprunger, P.A. Dowben, and S.P. Palto, "*Very Thin Crystalline Functional Group Copolymer Poly(vinylidene fluoride-trifluoroethlene) Film Pattering Using a Synchrotron Radiation*", Appl. Phys. Lett. **76**, 381 (2000). **(3)**

5. E. Morikawa, Jaewu Choi, H. Manohara, H. Ishii, K. Seki, K. K. Okudaira, and N. Ueno, " *Photoemission study of direct photomicromachining in poly(vinylidene fluoride)*", J. of Appl. Phys. **87**, 4010 (2000). **(4)**

1999:

Jaewu Choi, P. A. Dowben, A. V. Bune, and Stephen Ducharme, V. M. Fridkin, S. P. Palto and N. Petukhova, "*Evidence of Dynamic Jahn-Teller Distortions in Two Dimensional Crystalline Molecular Films*", Phys. Rev. **B59**, 1819 (1999). **(19)**

C. N. Borca, Jaewu Choi, Shireen Adenwalla, Stephen Ducharme, P. A. Dowben, Lee Robertson, V. M. Fridkin, S. P. Palto and N. Petukhova, "*The Influence of Dynamical Scattering in Crystalline Poly(VDF-TrFE) copolymers*", Appl. Phys. Lett. **74**, 347 (1999). **(10)**

C.N., Borca, S. Adenwalla, Jaewu Choi, P.T. Sprunger, Stephen Ducharme, Lee Robertson, Jianglai Liu, V.M. Fridkin, H. You, S.P. Palto, P.A. Dowben, "*A Lattice Stiffening Transition in Copolymer Films of Vinylidene Fluoride (70%) with Trifluoroethylene (30%)*", Phys. Rev. Lett. **83**, 4562 (1999). **(9)**

Jaewu Choi, Jiandi Zhang, S.H. Liou, P. A. Dowben, and E. W. Plummer, "*Surface of the Perovskite Manganites La$_{1-x}$Ca$_x$MnO3*", Phys. Rev. **B59**, 13453 (1999). **(25)**

Jaewu Choi, Hani Dulli, S.-H. Liou, and P.A. Dowben, "*The Influence of Surface Terminal Layer and Surface Defects on the Electronic Structure of CMR Perovskites: La$_{0.65}$A$_{0.35}$MnO3 (A=Ca,Sr,Ba)*", Phys. Stat. Solidi **(b) 214**, 45 (1999). **(10)**

H.M. Manohara, E. Morikawa, Jaewu Choi, and P.T. Sprunger, "*Pattern Transfer by Direct Photo Etching of Poly (vinylidene fluoride) using X-rays*", JMEMS, **8**, 417 (1999). **(4)**

C. M. Teodorescu, D. Gravel, Jaewu Choi, D. Pugmire, P. A. Dowben, N. Forminykh, A. A. Pavlychev, and E. Rühl, "*Inner-Shell Excitation and Frangmentation of Sulfur Aggregates*", J. Elect. Spec. Rel. Pheon. **101-103**, 193 (1999). **(1)**

1998:

1. Jaewu Choi, P. A. Dowben, Shawn Pebley, A. V. Bune, Stephen Ducharme, V. M. Fridkin, S. P. Palto, and N. Petukhova, "*The Changes in Metallicity and Electronic Structure Across the Surface Ferroelectric Transition of Ultrathin Crystalline Poly(vinylidene Fluoride-Trifluoroethylene) Copolymers*", Phys. Rev. Lett, **80**, 1328 (1998). **(29)**

2. Jaewu Choi, P. A. Dowben, Stephen Ducharme, V. M. Fridkin, S. P. Palto, N. Petukhova and

S. G. Yudin, "*Lattice and Band Structure Changes At the Surface Ferroelectric-Paraelectric Transition*", Phys. Lett. **A**249, 505 (1998). **(12)**

3. Jaewu Choi, C. Waldfried, S.-H. Liou, and P. A. Dowben, "*Can Conventional Photoemission Accurately Probe the Bulk Electronic Structure of the Complex Oxides?*", J. Vac. Sci. Technol., **A16**, 2950 (1998). **(11)**

4. C.D. Gravel, C. M. Teodorescu , E. Ruhl, Jaewu Choi, D. Pugmire, and P. A. Dowben, "*S 2p Photoelectron Spectroscopy of Sulfur Aggregates*", BESSY annual report on the photoelectron spectroscopy (1998).

5. C. M. Teodorescu, D. Gravel, E. Rühl, T. J. McAvoy, Jaewu Choi, D. Pugmire, P. Pribil, J. Loos and P. A. Dowben, "*Retractable Miniature Cylindrical Mirror Analyzers*", Rev. Sci. Instr. **69**, 3805 (1998). (0)

1997:

1. D. N. McIlroy, C. Waldfried, T. McAvoy, Jaewu Choi and P. A. Dowben, D. Heskett, "*The Nonmetal to Metal Transition with Alkali Doping of Films of Molecular Icosahedra*", Chem. Phys. Lett. **264**, 168 (1997). **(8)**

1996:

1. D. N. McIlroy, C. Waldfried, Jiandi Zhang, Jaewu Choi, F. Foong, S. H. Liou, and P. A. Dowben,"*A Comparison of the Temperature Dependent Electronic Structure of the Perovskites La$_{0.65}$A$_{0.35}$MnO$_3$(A= Ca, Ba)*", Phys. Rev. **B54**, 17438 (1996). **(33)**

III. Patents

1. Jaewu Choi, "*Molecular Diodes and Molecular Nonvolatile Memory*", filed at Louisiana State University, in process
2. Jaewu Choi, "Active Fuel Cell cable", Wayne State University Invention File #04-710

IV. Submitted Papers for Publications

19. Jaewu Choi, S.S. Khara, Y. Song, and Y. Zhao, "*Ferroelectricity at single molecular scale*", in process.
20. Manghat, Jaewu Choi, E.F. McCullen, G. Auner, B.K. Pradahn, and P.C. Eklund, *Interface between Single-Walled Carbon Nanotubes and Electrodes.*
21. Jaewu Choi, E. Morikawa, P.A. Dowben, S.P. Palto, *Comparison of the Electronic and vibrational Structure of long chain vinylidene fluoride (70%) with trifluoroethylene (30%) with short chain poly(vinylidene fluoride).*
22. Takashi Komesu, Jaewu Choi, G.A. Gallup, N.M. Boag, C. Waldfried, D. Pugmire and P.A. Dowben, *The Electronic Structure of Cyanoferrocene.*
23. Jaewu Choi, and P.A.Dowben, *Angle Resolved Photoemission Study on Cobaltocene Adsorption on Cu(111).*
24. Jaewu Choi, N.M. Boag, and P.A. Dowben, *The Adsorption and Decomposition of Pd(η^5-C$_5$H$_5$)(η^3-C$_3$H$_5$) on Cu(111).*

V. Invited Talks

1. "Single Molecular Nonvolatile Memory", Samsung Advanced Institute of Technology (SAIT), Aug. 9, 2004 and Hynix, Korea, Aug. 13, 2004
2. "Flexible and Active Fuel Cell Cable", Samsung Display Incorporation (SDI), Aug. 11, 2004
3. "Flexible and Active Fuel Cell Cable", Korea Institute of Energy Research (KIER), Aug. 12, 2004
4. "Single Molecular Nonvolatile Memory", Hynix Semiconductor, Korea, Aug. 13, 2004
5. "*One-Dimensional System for Single Molecular Electronics*", ISPSA (International Symposium on the Physics of Semiconductors and Applications), March 15th, 2004
6. "*One-Dimensional System for Single Molecular Electronics*", SungKyunKwan University (Korea), Dept. of Physics, March. 17th, 2004
7. "*One-Dimensional Molecular Building Blocks for Future Nanotechnology*", Wayne State University, Dept. of Chemistry, April. 16th, 2003
8. "*Carbon Nanotubes and Polymers for Nano-Technology*", Wayne State University, Dept. of Electrical and Computer Engineering, March 6th, 2002
9. "*Electronic Band Structure of Carbon Nanotubes and Its Modifications, and Application for Electronic Devices*", Wayne State University, Dept. of Electrical & Computer Engineering, Feb. 19th, 2001
10. "*Electronic Band Structure of the Carbon Nanotubes and Its Modifications*", University of New Orleans, Dept. of Physics, Nov. 1st, 2000
11. "*The Surface Ferroelectric Transition*", University of Osnabrück, Germany, *(Oct. 30, 1997).*

VI. Contributed Presentations

1. "Changes in Screening in $La_{0.65}Ca_{0.35}MnO_3$ Across the Metal-Nonmetal Transition", *6th Midwest Regional Conference of the Korean-American Scientists and Engineer Association, 21-22 June, Iowa City, Iowa (1996).*
2. "Desorption Studies of Molecular Films Grown on Metal and Semiconductor Surfaces", *Midwest Regional Meeting of the American Chemical Society, November 6 - 8, Sioux Falls, South Dakota (1996).*
3. "The Surface Composition of the CMR Perovskites $(La_{1-x}Ca_xMnO_3)$", *March Meeting of the American Physical Society, Kansas, Missouri, (1997).*
4. "Angle Resolved Core Level Photoemission of $La_{1-x}Ca_xMnO_3$ (x=0.1, 0.35)", *Nebraska Academy of Science, 107th Annual Meeting, Apr. 25-26, 1997, at Nebraska Wesleyan University, Lincoln, Nebraska, and at* Korean *-American Scientist and Engineer Association, 25th Anniversary Commemorative Technical Conference, Feb.21-23, McLean, Virginia (1997).*
5. "The Nonmetal to Metal Transition with Alkali Doping on the Two Dimensional Ferroelectric Films", *Rocky Mountain Chapter, American Vacuum Society, Annual Symposium, Aug. 21th, Arvada, Colorado (1997).*
6. "X-Ray Photoemission Spectroscopy of $La_{1-x}Ca_xMnO_3$ Perovskite (x=0.1, 0.35), *44th National Symposium of the American Vacuum Society, San Jose, California (1997).*
7. "The Electronic Structural Change of the Two Dimensional Crystalline Ferroelectric Copolymer p(VDF-TrFE) Across the Surface Ferroelectric Transition", *March Meeting of the Americal Physical Society, Los Angeles, CA, (1998).*
8. "Changes in the Band Structure Across the Surface Ferroelectric Phase Transition in the

Crystalline Ferroelectric Copolymer P(VDF-TrFE)", *Society of Sigma Xi Nebraska Chapter fourth Annual Graduate Student Paper Competition, 4, April 1998.*

9. "Changes in the Band Structure Across the Surface Ferroelectric Phase Transition in the Crystalline Ferroelectric Copolymer P(VDF-TrFE)", *45th National Symposium of the American Vacuum Society, Baltimore, Maryland (1998).*

10. "Surface Ferroelectric Transitions", 5*8th Physical Electronic Conferences (Nottingham Competition), Berkley, CA, July 6th-July10h, 1999*

11. "Very Thin Crystalline Functional Group Copolymer Poly(vinylidene fluoride-trifluoroethylene) Film Patterning Using Synchrotron Radiation", *Material Research Society, Boston, MA, Nov. 29th – Dec. 3rd, 1999*

12. "Angle Resolved Photoemission Study on Adsorption and Desorption of Cobaltocene on Cu(111)", *47th American Vacuum Society, Boston, MA, Oct. 2 – 6, 2000*

13. " Electronic Band Structure Study on Carbon Nanotubes Using Angle Resolved Ultraviolet and X-ray Photoemission Spectroscopy", Material Research Society, Boston, MA, Nov. 27th – Dec 1st, 2000

14. "Carbon Nanotube Electronic Structure and Its Modification", *National Academy of Science-Sackler Colloquium: Nanoscience*, *Washington D.C. May 18-20, 2001*

15. " Electronic Structure Modification of Multiwalled Carbon Nanotubes by Ion Bombardment and Thermal Treatment", *ADC-FCT 2001 conference, Auburn University, Aug. 6-10, 2001*

16. "Band Filling and Correlation Effects in Alkali Metal Doped Carbon Nanotubes", *MRS fall Meeting Boston, MA, Nov. 26-30, 2001*

17. "Field Emission *Properties of Vertically Aligned Carbon Nanotubes Driven by Polar and Non-Polar Gas Adsorption", MRS fall Meeting, Boston, MA, Nov. 26-30, 2001*

18. "Interface between Carbon Nanotubes and Metal Electrodes', *MRS fall meeting, Boston, Nov 2002*

19. "Substrate Effect on Carbon Nanotube Devices', *APS March Needing, Austin, Mar 2-8, 2003*

20. "Irreversibility of Polypyrrole Gas Sensor", *MRS fall meeting, Boston, Dec 2003*

21. "Interface between water soluble conducting polymer and metal electrodes", *MRS fall meeting, Boston, Dec 2003*

22. "Electrical Properties of Single Molecular Wire", Swanand S. Vaidya and Jaewu Choi, *American Vacuum Society, Fifth International Conference on Microelectronics and Interfaces, Santa Clara, CA, March 1-3, 2004.*

WAYNE STATE UNIVERSITY
Professional Record

Date Prepared: 1/19/2005

NAME: Robert F. Erlandson

Office Address: 3115 Eng'g Bldg   Home Address: 1494 Buckingham

              Birmingham, MI 48009
Telephone No: (313) 577-3900   Telephone No: (313) 644-8790
_____
DEPARTMENT/COLLEGE: Electrical & Computer Engineering, College of Engineering
PRESENT RANK & DATE OF RANK: Professor ECE
WSU APPOINTMENT HISTORY: Started Wayne 4/75
Year Appointed/Rank: Assistant Professor 4/75
Year Awarded Tenure: 8/80
Year Promoted to Associate Professor: 8/80
Year Promoted to Full Professor: 8/2001
_____
DATE & PLACE OF BIRTH: 8/27/43, Detroit, MI
CITIZEN OF: USA
_____
EDUCATION:
    (Give name of institution, place, and date of degree)
High School: Cass Technical High School, Detroit, MI, 1961
Baccalaureate: EE, Wayne State University, 1965
Graduate: Ph.D. Bio-Medical/Systems Engineering, CASE-Western Reserve University, Cleveland, OH, 1970
Postgraduate (postdoctoral):
Licensure:
Certification:
_____
FACULTY APPOINTMENTS AT OTHER INSTITUTIONS (Years and Rank):
    (Not administrative appointments)
    8/70 to 4/75   Bell Telephone Laboratories, Naperville, IL
                                Member of the Technical Staff - This is mentioned because I taught in the Bell Labs
                In-Hours Continuing Education program. This required a stringent educational training program
                                            operated by the Technical Education Department at Bell Labs.

PROFESSIONAL SOCIETY MEMBERSHIP(s):

                    Senior member, Institute for Electrical and Electronics Engineers.
                    Specialty groups: The Biomedical Engineering Society; Systems, Man and
                    Cybernetics; Computer Society (Expert Systems, Machine Intelligence),
                    Rehabilitation Engineering.

                    American Society for the Advancement of Science.

                    RESNA - Rehabilitation Engineering Society of North America

                    International Service Robot Association, Board of Directors and Vice Pres. 6/90 - 6/96

                    Association of Accessible Engineering Specialists (AAES)

                    American Society for Engineering Education

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HONORS/AWARDS:

_____

BIOGRAPHICAL CITATIONS (National/Regional or Professional Directories):

_____

I. TEACHING
A. Years at Wayne State: 28
B. Years at Other Colleges/Universities (Please list)
C. Courses Taught at Wayne State in Last Five Years

Courses: (Last five years)
ECE 3300: Introductory Circuits 1
ECE 3330: Introductory Circuits 2
ECE 4990: Undergraduate Directed Study
ECE 5370: Mechatronic Systems Design 1 (every Fall) { Cross-listed BME 5530)
ECE 5380: Mechatronic Systems Design 2 (every Winter)   {Cross-listed BME 5540}
ECE 5990: Directed Study
ECE 6100: Cross listed with OT 6620 and BME 6500 Enabling Technology – as of Winter 2000 this class is required by
          the Special Education students. It is the technology requirement for the Developmental Disabilities Institute
          (DDI) Certification Program, and the Gerontology Institute's Certification Program.
ECE 7990: Directed Study
ECE 7996: Research Topics
ECE 9999   Ph.D. Dissertation
IE 4800: co-taught groups of IE students on their design projects
ME 4500: co-taught groups of ME students on their design projects
BE 1100: Developed and delivered curriculum modules on design and accessible design principles

Laboratory Development

I have developed two Research Laboratories; the Rehabilitation Robotics Laboratory (RRL) and the Enabling Technologies Laboratory (ETL). ETL grew out of the Rehabilitation Robotics Laboratory.

The RRL formed the basis for my research activity between 1987-1992. This laboratory developed new and unique applications of robotics for individuals with disabilities. Through the work of this laboratory I became involved with the International Congress on Rehabilitation Robotics and the RESNA SIG on Rehabilitation Robotics. I served as a special editor for The IEEE Transactions on Rehabilitation Engineering, Special Topics edition on Rehabilitation Robotics (D1.17). This volume contains a paper (D1.18) that summarizes my RRL activities.

The Enabling Technologies Laboratory (ETL) was formed to provide a focal point for research, teaching and service activities aimed at creating and applying technology that enhances human capabilities, particularly for individuals with disabilities. ETL embraced the activities of the RRL and expanded them to include the development and application of accessible design principles. ETL successfully integrates research, education, and service as witnessed by its being awarded the Michigan Campus Compact 2000 award. The diversity of on-going projects can be seen in the educational activities described above and in subsequent sections, the research activities sited in the research funding summary, and the service component described in subsequent sections dealing with Project Enable and the eight county consortium of Intermediate School Districts.

The ETL focus on accessible design is particularly timely. Recent federal legislation mandates that telecommunication products and services be accessible to individuals with disabilities and that accessible design principles be used in the design process (Telecommunications Act 1996). Furthermore, Section 508 of the amended Rehabilitation Act 1998, specifies that all electronic and information technology (E&IT) used by federal agencies and organizations receiving federal funds must be accessible and that accessible design principles be used in the design process. E&IT is very broadly interpreted to include products, services, service and maintenance operations, customer support, packaging, and instruction manuals. Recent awarding of the NSF grant to develop accessible design principles and undergraduate curriculum material speaks well of ETL's expertise and capabilities and positions us well for future funding and R&D activities in this expanding area.

As noted in the Consultant Section – I have also been asked to consult on several national standard setting projects with respect to accessible design.

    3.   Graduate Professional School

D.   Essays/Theses/Dissertations Directed

    1.   Students by Name, Level, Title of Project, Year

      Emad Attalla, Ph.D., Shape Based Digital Image Fuzzy Matching, (advisory committee), completed on 3/1/2004

      Abhilash Pandya, Ph.D., Medical Augmented Reality System For Image-Guided And Robotic Surgery : Development And Surgeon Factors Analysis, (advisory committee), Ph.D.completed on 4/16/2004

      Mazen A. Hamdan, MS Thesis, Validity of a Low Cost Digital Cell Phone and Hearing Aid Testing System, Completed December 2003.

      Donna Case, Inter-Disciplinary Ph.D. Engineering & Occupational Therapy.
                Improving Work Performance of Individuals with Severe Cognitive Impairment through Enabling Technology,
      Completed, April 15, 2003.

      Russel Clark, Ph.D., An Information Theoretical Approach to the Adaptive Segmentation and Classification of the
      Sleeping Electroencephalogram, Completed 1998

      Thomas P. Moyles, Ph.D, A Statistical Pattern Recognition Model for
      Sleep Apena Syndrome, Completed 1988.

      Calvin J. Geyer, M.S. Thesis. "A Microprocessor Based System for
      Recording Periodic Leg Movements in Sleep" completed 1983.

Jeffrey Tenenbaum, M.S. Thesis, "A Program for the Analysis and
Simulation of Signals," completed 1979.

E.   Course or Curriculum Development:

* Creation of PSPICE (computerized circuit analysis program) exercise and
   problem set for inclusion into ECE 3300 and ECE 3330. .

* ECE 537, ECE 538 Mechatronic Systems Design {cross-listed with BME 5530 and BME 5540 respectively}. I
have secured NSF funding for student design projects.
                 As part of the NSF project requirements I have co-taught student design groups from IE 4500 and
ME 4800.

   * ECE 610, OT 6620, BME 6500 Enabling Technology - A cross disciplinary class developed in
cooperation
                 with the Occupational Therapy Department. Course development funded by
                 Tech 2000 (federal grant to disseminate information about enabling technology), The
                 Institute for Gerontology (part of its certification program requirements) and the
                 Developmental Disabilities Institute (part of its certification requirements). This class is required
by Special
        Education students

* Curriculum goals: objectives and outcomes analysis (1998): developed model course/curriculum goals,
objectives
   and outcomes analysis procedures. These are to serve as models for ECE courses. This material was also
passed
    along to Steve Sally as reference material for the College of Engineering.

* Accessible Design Curriculum Material – Under an NSF CCLI grant – (WSU #33158; NSF DUE-9972403).

* ERMS – Educational Resource Management System – Under development from a Wayne State University,
Omnibus Funds Educational Development, 2003-2004. The design and implementation of a web based system to
provide educational resources in a "just-in-time" manner. ERMS contains multi-media instructional material for
the College of Engineering and College of Education.

F.   Course Materials (Unpublished):
         * Applications of MathCAD and PSPICE to Basic Circuit Analysis and Design, Packet 1
       Supplemental Material for ECE 330. Sold at University Bookstore.
         * Developed a series of MathCAD and PSPICE exercises for Packet 2 of the above
       course pack. This material is for ECE 333 .
         * Lecture and slide material for ECE 610/ OT 662/BME 6500.
         * Accessible Design Curriculum Modules – Funded by an NSF CCLI grant. Prototype material was
developed and
         field-tested. Two Introductory Modules, two demonstration modules and fifteen experimental modules.
         * MathCad and Matlab instructional modules – multi-media files presenting very specific application notes
in 3-5
            minute audio/video clips.

II. RESEARCH

A.   Research in Progress, Not Funded

                Assistive Environments - use of sensor technology, decision support
                systems for "intelligent" environments to provide greater independence for
                the handicapped and elderly.

                Mathematical Systems Theory – use of multi-valued logic in data analysis.

The following research is funded by in-kind support from the collaborating organizations:

A series of pilot studies to assess the effect of Design for Assembly and process optimization techniques on performance enhancement for individuals with disabilities. The research includes the following organizations:

> Wayne County Regional Educational Service Agency (WC RESA)
> Western Wayne Skills Center (NWWSC)
> Lorro Digitron
> Creform, Inc.
> Beta Tech, Inc.
> General Motors
> Detroit Institute for Children

B. Funded Research in Last Five Years (1995- present)

	Source	Funding Level and Period	Notes
1	Community Foundation for Southeastern Michigan-Dow Innovation in Science Grant	$50,000 1993-1996	R. F. Erlandson, sole PI
2	Ronald McDonald's Children's Charities of Southeastern Michigan	$15,400 Sept 93 –Dec 96	R. F. Erlandson, sole PI
3	Michigan Rehabilitation Services: Innovation and Expansion Grant	$34,922 1 year, Oct 1, 94-Sept 95	R. F. Erlandson, sole PI
4	WSU: Richard J Barber Fund for Interdisciplinary Legal Research	$19,560 1 year Jan 2, 95-Dec 96	R. F. Erlandson, Co PI L. Athens, ESQ, Co-PI
5	Region IV - Enabling Technology Laboratory Consortium Phase 1 - Organizational	$28,668 Feb 1, 1995 to June 30, 1995	R. F. Erlandson, sole PI
6	Region IV - Enabling Technology Laboratory Consortium Implementation Phase 3 Years	$281,351 July 1, 1995 to June 30, 1998	R. F. Erlandson, sole PI
7	Region IV - Enabling Technology Laboratory Consortium Operational Phase 3 Years	$286,632 July 1, 1998 to June 30, 2001	R. F. Erlandson, sole PI
8	National Science Foundation - Bioengineering / Rehabilitation - Student Design 5 Years BES 9707720	$124,105 August 1997 – August 2002	R. F. Erlandson, sole PI
9	National Science Foundation – Accessible Design Principles - DUE 9972403 18 months	$74,920 June 1999 – December 2000	R. F. Erlandson, sole PI
10	Region IV - Enabling Technology Laboratory Consortium 7th year	$40,000 July 1, 2001 – June 30, 2002	R. F. Erlandson, sole PI
11	National Science Foundation – Accessible Design Curriculum and Material DUE 0088807	$405,000 February 2001- January 2002 5 year grant – through FY 2006	R. F. Erlandson, sole PI
12	National Science Foundation - Bioengineering / Rehabilitation - Student Design 5 Years	$124,000 August 2002 – August 2007	R.F. Erlandson sole PI
12	Wayne State University – Omnibus Fees Grant	$80,000 September 2003 1 year.	R.F. Erlandson, Co-PI Robert Kakos, Co-PI
13	National Science Foundation – Co-PI in collabortation with College of Education. Translating Information Technology Into Classrooms	$1,199,921 – 10/24/2004 3 years	R.F. Erlandson, Co-PI J. Ebenezer, Co-PI
14	City of Detroit – Ridelocator	$80,000 1/2/2005 Contract , 12 months	R.F. Erlandson sole PI

C. Fellowships/Grants/**Special Awards** in Last Five Years

Mary E. Switzer Rehabilitation Research Fellowship National Institute for Disability and Rehabilitation Research Distinguished Fellowship Award	$40,000 1994-1995

III. PUBLICATIONS

A. Scholarly Books Published
  1. Authored
  2. Co-Authored

B. Chapters Published
  1. Authored

   B1. Erlandson, R.F., "Local and Global Information Used in the
    Cerebellar Coordination System," in Regulation and Control in

Physiological Systems, ed. by A.S. Guyton, publication of the
International Federation of Automatic Control, August 1975.

B2. Erlandson, R.F., "Goal Analysis: Higher Order Goals," in Large
Engineering Systems , ed. by G.J. Savage and P.H. Roe, Sanford
Educational Press, 1978.

B3. Erlandson, R.F., "The Participant Observer Reviewed," in Current
Topics in Cybernetics and Systems , ed. by J. Rose, pub. World
Organization of General Systems and Cybernetics, Springer Verlag,
N.Y., 1978.

B4 Erlandson, R.F., "Business and Legal Conditions Supporting the Employment of Individuals with Disabilities",
         Chapter 5 in Sourcebook on Rehabilitation and Mental Health Practice, 2003, Plenum, NY, NY Eds: Moxley,
         D.P. and Finch, J.R, pp51-59

B5. Erlandson, R.F., "Accessible Design and the Employment of People with Disabilities",
         Chapter 19 in Sourcebook on Rehabilitation and Mental Health Practice, 2003, Plenum, NY, NY Eds: Moxley,
         D.P. and Finch, J.R, pp235-252

2. Co-Authored

B6. Erlandson, R.F., Babbitt, B.C., "The Movement of Accessible Design Principles into Mainstream Engineering:
          Now & Then," 2002, Chapter 1, in Emerging and Accessible Telecommunications, Information and Healthcare
         Technologies, Edited by: J.M. Winters, C.J. Robinson, R.C. Simpson, and G.C. Vanderheiden., RESNA Press,
         Arlington, VA, pp 2-18.

C.   Editorships of Books/Proceedings –

D.   Journal Articles Published

1.   Refereed Journals

D1.1. Mesarovic, M.D., Erlandson, R.F., Macko, D. And Fleming, D.,
"Satisfaction Principle in Modeling Biological Functions,"
Cybernetics, Vol. 2, 1973, pp. 67075.
               {Equal controbution with Mesarovic – this was my Ph.D. dissertation material}

D1.2. Erlandson, R.F. And D.G. Fleming, "Uncertainty Sets Associated with
Saccadic Eye Movements--Basis of Satisfaction Control," Vision
               Research, Vol. 14, 1974, pp. 481-6.
               {Principal author – results of my Ph.D. dissertation}

D1.3. Erlandson, R.F., "Interaction Measures," IEEE Trans. Systems, Man and
Cybernetics Vol. SMC-5, January 1975, pp. 116-24.

D1.4. Erlandson, R.F., "Observations of Control System Design: Problems and
Promise," IEEE Trans. Systems, Man and Cybernetics
Vol. SMC-6, December 1976, pp. 882-7.

D1.5. Erlandson, R.F., "System Evaluation Methodologies: Combined

Multi-Dimensional Scaling and Ordering Techniques," IEEE Trans. on Systems, Man and Cybernetics, Vol. SMC-8, June 1978, pp. 421-32.

D1.6. Erlandson, R.F., "Rethinking the Introduction to the Engineering Course," IEEE Trans. on Education, Vol. E-22, No. 4, November 1979, pp. 161-5.

D1.7. Erlandson, R.F., "The Participant-Observer Role in Systems Methodologies," IEEE Trans. on Systems, Man and Cybernetics, Vol. SMC-10, January 1980, pp. 16-19.

D1.8. Erlandson, R.F., "The Satisficing Process: Computational Aspects of Extended Filters," Information Sciences, Vol. 25, pp. 195-216, 1981.

D1.9. Erlandson, R.F., "A Community Developed Knowledge Base System and its Impact on a School Closing Decision," IEEE Trans. on Systems, Man and Cybernetics, Vol. 11, April 1981.

D1.10. Erlandson, R.F., "The Satisfaction Process: A New Look," IEEE Trans. on Systems, Man and Cybernetics, Vol. SMC-11, no.11, November 1981, pp. 740-52.

D1.11. Erlandson, R.F., "The Satisficing Process: A Characterization Using Extended Topology," Information Sciences, Vol. 26, pp. 1-43, 1982.

D1.12 Moyles, T.P., Schneider, D.R. And Erlandson, R.F. "An Automated Microprocessor Controlled Data Collection Device for Use with the Technicon Autoanalyzer System," Journal of Pharmacological Methods, 1982, Vol. 8, pp. 225-30.
            {Co author-equal contributions}

D1.13. Joynt, R.L., Erlandson, R.F., Rourke, M., "Computerized Synthesis of Electromyographic Interference Patterns," Arch Phys Med and Rehabilitation, Vol 69, July, 1988, p517-523
{Joynt, Erlandson Advisors, Rourke student}

D1.14. Dijkers, M., deBear, P., Geer, D., Erlandson, R.F., Kristy, K. and Nichols, A., "Patient and Staff Acceptance of Robotic Technology in Occupational Therapy: A Pilot Study," Journal of Rehabilitation Research and Development, Vol 28, No.2 Spring 1991, pp. 33-44.
            {Co author-equal contributions}

D1.15 Joynt, R.L., Erlandson, R.F., Wu, S.J.,and Wang,C.M., "EMG Interference Pattern Decomposition," Archives of Physical Medicine and Rehabilitation, Vol. 72, July 1991, pp.567-572.
            { Joynt, Erlandson advisors, Wu, Wang students}

D1.16. Erlandson, R.F., Genaw, R., Adler, L., Kelm, K., Nizio, P., " A Mobile Robot System for Training Mobility and Activities of Daily Living Skills," Alliance, publication of The Michigan Consortium for Enabling Technology, Vol. 3, N0. 1, Fall 1991, pp4-9.
            {Erlandson, principal author}

D1.17. Van der Loos, M. H.F., Hammel, J.M., Erlandson, R.F., "Rehabilitation Robotics," Guest Editorial, IEEE Trans. on Rehabilitation Engineering, .Vol. 3, No. 1, March 1995, p 1.
            {Co author-equal contributions}

D1.18. Erlandson, R.F., "Applications of Robotic/Mechatronic Systems in Special Education, Rehabilitation Therapy and Vocational Training: A Paradigm Shift," IEEE Trans. on Rehabilitation Engineering, .Vol. 3, No. 1, March 1995, pp 22-34.

D1.19. Erlandson, R, F., Noblett, M., J., Phelps, J., A, "Impact of a Poka-Yoke Device on Job Performance of Individuals with Cognitive Impairments," IEEE Trans on Rehabilitation Engineering, 1998, Vol 6, Number 3, p269-276.
{Co author-equal contributions}

D1.20 Erlandson, R, F., Sant, D., "Poka-Yoke Process Controller:Designed for Individuals with Cognitive Impairments", Assistive Technology, RESNA Press, 1998, Vol 10, p102-112.
{Co author-equal contributions}

2. Invited Review Articles

3. NonReferred Journals

E. Papers Published in Conference Proceedings

1. Refereed Papers

E1.1 Erlandson, R.F., "An Introduction to the Properties and Characteristics of Goals, Proceedings of the 1973 IEEE, Conference on Decision and Control, . December 6, 1973, pp.281-5

E1.2 Erlandson, R.F., "Synthesis of Ordering Procedures: Application to Systems Evaluation," Proceedings of the 1975 IEEE International Conference on Cybernetics and Society.

E1.3 Erlandson, R.F., "Goal Analysis: Implementation of Control Actions Using Decision Tables," Allerton Conference on Communication, Control and Computers, September 28-30th 1977, The University of Illinois.

E1.4 Erlandson, R.F., "Use of Extended Topology in Modeling Sensory Projections," Proceedings the 6th Annual New England Bioengineering Conference, March 23-24th 1978, The University of Rhode Island, Kingston, Rhode Island.

E1.5 Tenenbaum, J. And Erlandson, R.F., "A Program for the Analysis and Simulation of Signals," Proceedings of the 7th New England Bioengineering Conference, ed. L.E. Ostrander, March 22-23rd 1979, Rennselaer Polytechnic Institute, Troy,N.Y., pp. 118-20.
{First author supervised by Erlandson}

E1.6 Dymek, M.S. Maulsby, R.L., Gedye, J. And Erlandson, R.F., "A Goggle System, Using Electrically Activated Liquid Crystal Shutters, for Use in Visually Evoked Response Tests," Proceedings of the 7th New England Bioengineering Conference," ed. L.E. Ostrander, March 22-23rd 1979, Rennselaer Polytechnic Institute, Troy, N.Y., pp. 45-8.
{Co author-equal contributions}

E1.7 Moyles, T.P., Erlandson, R.F., Joynt, R.L., "A General Purpose Data Collection, Data Analysis and Communication System," presented at the 9th Annual Northeast Bioengineering Conference, March 19-20th 1981, Rutgers University
{Moyles supervised by Erlandson and Joynt}

E1.8 Moyles, T.P., Schneider, D.R. And Erlandson, R.F. "A Microprocessor Controlled Automated Data Collection Device for the Technician Auto-Analyzer System," presented at the 9th Annual Northeast Bioengineering Conference, March 19-20th 1981, Rutgers University
{Moyles supervised by Schneider and Erlandson}

E1.9 Gedye, J.L., Erlandson, R.F., Domino, E. And Mariott, J., "An Aid to Hypothesis Generation for Clinical Researchers," presented at the 1981 Annual Conference on Engineering, Medicine and Biology, September 19-23rd 1981, Houston , Texas.
{Gedye & Erlandson equal contributions – others collaborators on research}

E1.10 Erlandson, R.F. And Joynt, R.L., "Simulation Studies of the Effect of Motor Unit Recruitment on the Fourier Transform of EMGs," American Association of Electromyography and Electrodiagnosis, October 8-9th 1982, St. Paul, Minnesota.
{Co author-equal contributions}

E1.11 Gedye, J.L. And Erlandson, R.F., "A Telotaxic Data Analysis System: ZAP," presented at the International Conference on Cybernetics and Society, October 28-30th 1982, Seattle, Washington.
{Co author-equal contributions}

E1.12 Erlandson, R.F. And Gedye, J.L., "A Functionally Complete Three-Valued Logic System Empirically Derived from Human Decision Making Tasks," presented at the International Conference on Cybernetics and Society, October 28-30th 1982, Seattle, Washington.
{Co author-equal contributions}

E1.13 Geyer, C.J., Erlandson, R.F. And Roth, J., "A Microprocessor Based System for Recording Periodic Leg Movements in Sleep," American Association of Electromyography and Electrodiagnosis, September 1983, Toronto, Canada.
{Geyer supervised by Erlandson & Roth}

E1.14 Erlandson, R.F., Joynt, R.L. And Rourke, M., "A Comparison of Computer-Simulated EMG Interference Patterns with Actual Subject Data," presented at the American Association of Electromyography and Electrodiagnosis (AAEE), September 1984.
{Erlandson & Joynt co-equal controbutors, Rourke collaborated on data acquisition}

E1.15 Rourke, M., Erlandson, R.F. And Joynt, R.L., "Quantitative Analysis of Computer-Simulated EMG Interference Patterns," presented at the AAEE meeting, September 1984.
{Rourke supervised by Erlandson & Joynt}

E1.16 Joynt, R.L. And Erlandson, R.F., "Interexaminer Variations in the Characteristics of a Good EMG Interference Pattern," presente d at the AAEE meeting, September 1984.
{Co author-equal contributions}

E1.17 Rourke, M., Erlandson, R.F. And Joynt, R.L., "Quantification of the FFT of Computer-Simulated EMG Interference Patterns," presented at the meeting of the Academy of Physical Medicine and Rehabilitation, October 1984.
{Rourke supervised by Erlandson & Joynt}

E1.18 Rourke, M. And Erlandson, R.F., "The Variability Among Observers in

the Choice of Interference Patterns for Analysis," presented at the meeting of the <u>Academy of Physical Medicine and Rehabilitation</u>, October 1984.
{Rourke supervised by Erlandson}

E1.19 Erlandson, R.F., "Data Pass: A Signal Waveform Analysis Programs, Applied to EMG Data Analysis," presented at the <u>IEEE International Conference on Systems, Man and Cybernetics</u>, Halifax, Nova Scotia, Canada, October 1984.

E1.20 Erlandson, R.F., "A Clustering Technique Using Graph Theory and Nonparametric Statistics," presented at the <u>IEEE International Conference on Systems, Man and Cybernetics</u>, Halifax, Nova Scotia, Canada, 1984.

E1.21 Rourke, M., Erlandson, R.F. And Joynt, R.L., "Computer Simulated EMG Interference Patterns," SIMULATORS, proceedings of the <u>Conference on Simulators</u>, ed. J.S. Gardenier, Simulation Series, Vol. 16, no. 1, March 1985.
{Rourke supervised by Erlandson & Joynt}

E1.22 Erlandson, R.F., Poland, M.L., Olson, J., A Combined AI/Stastical Approach to Data Analysis, <u>ACEMB</u>
38th, Chicago, IL Septembet 30-Oct. 2, 1985

E1.23 Robbins, S., DeBear, P., Fuller, M., Erlandson, R.F., Kristy, K., "Use of a Robot System in Vocational Assessment: Exploratory Study," <u>Proceedings of the Fourth National Forum of Issues in Vocational Assessment</u>, St Louis, March 1989.
{Co author-equal contributions}

E1.24 Erlandson, R.F., Joynt, R.L., Wu, S.J., And Wang, C.M., "A Non-Parametric Statistical Approach to EMG Signal Analysis," <u>Proccedings of the IEEE Engineering in Medicine & Biology Society 11th Annual International Conference</u>, pp. 727-728, Seattle, WA, Nov. 1989.
{Erlandson & Joynt co –equal contributors, Wu & Wang experimental work}

E1.25 Kristy, K. A., Wu, S.J., Erlandson, R.F., deBear, P., Geer, D., Dijkers, M., "A Robotic Arm "Smart Execise System:" A Rehabilitation Therapy Modality," <u>Proccedings of the IEEE Engineering in Medicine & Biology Society 11th Annual International Conference</u>, pp. 1504-1505, Seattle, WA, Nov. 1989.
{Co author-equal contributions}

E1.26 Moyles, T. P., Erlandson, R.F., And Roth, T., "A Non-Parametric Statistical Approach to Breath Segmentation," <u>Proccedings of the IEEE Engineering in Medicine & Biology Society 11th Annual</u> International Conference, pp. 320-321, Seattle, WA, Nov. 1989.
{Moyles supervised by Erlandson & Roth}

E1.27 Erlandson, R.F., Wu, S., Debear, P., Dijkers, M., Kristy, K., " A Robotic System to Provide Movement Therapy," <u>Proceedings of the Fifth International Service Robot Congress</u>, June 6, 1990, Detroit, MI, p7-159.
{Co author-equal contributions}

E1.28 Erlandson, R.F., Dijkers, M.D, deBear,P, Creighton, C., Joynt, R.L., "A Robotic System As A Remedial Tool in Rehabilitation," <u>Proceedings</u>

of the 1991 International Conference on Rehabilitation Robotics, June
19-20, 1991, Atlanta, GA., pp 26-38.
    {Co author-equal contributions}

E1.29 Erlandson, R.F., "Use of Robots in Training and Therapy," Proceedings
of the 1992 International Conference on Rehabilitation Robotics,
Sept. 15-16, 1992, Keele University, Staffordshire, England.

E1.30 Erlandson, R.F., Nizio, P., Lelm, K.A., Genaw, R., Adler,L.,"Skills
Training for Mobility and Activities of Daily Living Using a Mobile
Robot System," Proceedings of the 1992 International Conference on
Rehabilitation Robotics, Sept. 15-16, 1992, Keele University,
Staffordshire, England.
    {Co author-equal contributions}

E1.31 Phelps, J.A., Erlandson, R.F., "A Partnership: University Electrical
and Computer Engineering and Special Education," Proceedings of the
Rehabilitation Engineering Society for North America Annual Conference,
June 12-17, 1993 Las Vagas, NV
    {Co author-equal contributions}

E1.32 Erlandson, R.F., Phelps, J.A., "Mechatronic Systems As Vocational
Enablers for Persons with Severe Multiple Handicaps," Proceedings of the
Rehabilitation Engineering Society for North America Annual Conference,
June 12-17, 1993 Las Vagas, NV
    {Co author-equal contributions}

E1.33 Phelps, J.A., Erlandson, R.F., "Impact of Mechatronic Systems as Vocational Enablers,"
accepted for the 1994 Rehabilitation Engineering Society for North America Annual
Conference, June 17-23, 1994, Nashville, TN
{Co author-equal contributions}

E1.34 Erlandson, R.F., Phelps, J.A., "Simplification of Essential Functions Using
Design for Assembly Techniques," RESNA '95, Proceedings and
presentation. June 11-19, 1995, Vancouver, BC. Canada,.p 551-553.
{Co author-equal contributions}

E1.35 Erlandson, R.F., Sant, D., Wiadnyana, k., Rippy, J. and Nizio, P., "Instrumentation
of the HANDY 1 for Oral-Motor Therapy," RESNA '95, Proceedings and
presentation. June 11-19, 1995, Vancouver, BC. Canada, p 496-498.
{Co author-equal contributions}

E1.36 Clark, R.J., Erlandson, R.F., Roehrs, A., "Segmentation of the Sleep Electroencephalogram Using an
Information-Theoretic Approach," Second International Congress of the World Federation of Sleep Research
Society, Sept. 12-16, 1995

E1.37 Erlandson, R.F., "Accessible Design Issues and Principles in the
Undergraduate Engineering Curriculum," ASEE 2001 Annual
Conference, June 24-27, 2001, Albuquerque, MN, Published in
Conference Proceedings, DC ROM format.

E1.38 Erlandson, R.F. "A Student Design Program that Integrates Research,
Education, and Community Service," ASEE 2001 Annual Conference,
June 24-27, 2001, Albuquerque, MN, Published in Conference
Proceedings, DC ROM format.

 2. NonRefereed Papers

F. Translations of Other Authors Published

1. Books

2. Articles or Creative Works

G. Abstracts Published in Academic Journals

   G1.1 Erlandson, R.F. And Tenenbaum, J., "A Program for the Analysis and
   Simulation of Signals and its Use in EMG Analysis," Muscle and Nerve,
   Vol. 5, p. 561, 1983.
         {Co author-equal contributions}

   G1.2 Rourke, M., Erlandson, R.F. And Joynt, R.L., "Frequency Analysis of
   Computer-Simulated EMG Interference Patterns," Muscle and Nerve, Vol. 6,
   p. 538, 1983.
         {Rourke supervised by Erlandson & Joynt}

   G1.3 Joynt, R.L., Erlandson, R.F. And Rourke, M., "Synthesis of EMG Signals by
   Computer Simulation," Archives of Physical Medicine and Rehabilitation,
   1985.
         {Rourke supervised by Erlandson & Joynt}

H. Book Reviews Published

1. Academic Journals

2.   In Magazines/Newspapers
         H2.1 Erlandson, R.F., "Michigan Consortium Studies Customized Enabling Technology - Japanese Concept Focuses
         on Reducing Physical and Cognitive Demands Placed on Workers," Center for Educational Networking,
         Newsline (Newsletter), Vol 4., No.4, December 1996/January 1997.

I. Creative Shows/**Exhibits**

1. Refereed or Judged: National Competition

2. Refereed or Judged: Local/Regional Competition

3. Not Refereed **- Invited**
      The Enabling Technologies Laboratory – which I direct – was invited to exhibit its products at several
         Exhibits. These exhibitions seem to fall most naturally in the Exhibits category.

      ETL Product EXPO - Presentation of the enabling technology devices developed
               during the past eight months. Held for members of the consortium. March 27, 1996 at
               Visions Unlimited, Farmington Hills, MI.

         Tech 2000 Assistive Technology Expo., Weston Hotel, Detroit, MI, October 2, 1997
         The Enabling Technologies Laboratory exhibited its products.

         Jackson Assistive Technology Expo, Jackson, MI, October 17, 1997
         The Enabling Technologies Laboratory exhibited its products.

         The POHI (Physically/or Health Impaired) 2000 Michigan Conference – Technology Exhibit,
November, 10, 2000,
         Plymouth, Michigan.

J. Creative Performances

1. Outside Metropolitan Area

2. Metropolitan Area

3. Campus

K. Instructional Materials Formally Published

1. Textbooks

2. Study Guides/Laboratory Workbooks

3. Other Published Materials

L. Papers Presented

1. Invited and/or refereed Internationally of Nationally

L1.1 Erlandson, R.F., "General Systems Theory in Medicine: Theory to
Practice," presented at the 23rd Annual Meeting of the Society for
General Systems Research, January 3-9th 1979, Houston, Texas.

L1.2 Erlandson, R.F. And Gedye, J.L., "A Telotaxic Approach to Hypothesis
Generation in Clinical Research," presented at the International
Conference on Systems Methodology and the 26th Annual Meeting of the
Society for General Systems Research, January 5-9th 1982, Washington,
D.C.
                    {Co author-equal contributions}

L1.3 Erlandson, R.F., "Goal Directed Systems," presented at the
International Conference on Cybernetics and Society, October 28-30th
1982, Seattle, Washington.

L1.4 Erlandson, R.F.; Kristy, K.A.; Wu, S.J.; Geer, D.; deBear, P. And
Dijkers, M. "Use of a Robotic Arm in the Rehabilitation of Stroke
Patients," presented at the Society of Manufacturing Engineers Robots
13 Conference, May 7-11th 1989, Gaithersburg, Maryland.
                    {Co author-equal contributions}

L1.5 Erlandson, R.F., deBear, P., Kristy, K., Dijkers, M., and Wu, S.J.,
"A Robotic System to Provide Movement Therapy," Proceedings of the
Fifth International Service Robot Congress, June 6, 1990, Detroit,
MI, p159-168
                    {Co author-equal contributions}

L1.6 Erlandson, R.F., "Accessible /Universal Design Movement into Mainstream Engineering,",
RESNA Research Symposium on Accessible Design, Reno, NV, June 22-24, 2001

L1.7 Erlandson, R.F., "Universal Design for Learning: Curriculum, Technology, and
Accessibility," ED-MEDIA
2002 World Conference on Educational Multimedia, Hypermedia & Telecommunication, available on CD
through
ED-MEDIA

2. Invited and/or Refereed Locally/Regionally

L2.1 Erlandson, R.F., "Future Probe: Overview of Microcomputers," Metro
Detroit World Future Society Meeting, May 15, 1979.

L2.2 Prevot, E. And Erlandson, R.F., "Community Data Base Systems for Health Research," presented at the North Central Sociological Association Meeting, May 1-3rd 1980, Dayton, Ohio.
{Co author-equal contributions}

L2.3 Erlandson, R.F., "Continuing Education," presented at The University of Detroit, July 7, 1980.

L2.4 Erlandson, R.F., "Medical Data Bases," presented at the Detroit Rehabilitation Institute, Seminar for Continuing Medical Education, July 17, 1980.

L2.5 Moyles, T.P., Schneider, D.R. And Erlandson, R.F., "An Automated Data Collection Computer for Analog Laboratory Recordings," presented at the 2nd Microprocessor Conference, May 20, 1981, Engineering Society of Detroit.
{Moyles supervised by Erlandson & Schneider}

L2.6 Dijkers, M., deBear, P., Geer, D., Erlandson, R.F., And Kristy, K., "Stroke Rehabilitation Using a Robotic Arm: A Proof-of-Concept Study of the Application of Robotics in Rehabilitation Assessment and Treatment," Wayne State University Bioengineering Center - 50th Anniversary Symposium Proceedings, pp. 141-147, ed. by J. Cavanaugh, Presented at WSU, College of Engineering, November 10, 1989.
{Co author-equal contributions}

L2.7 Erlandson, R.F., "A Robotic Arm Therapeutic Tool," presented at the Society of Manufacturing Engineers (SME) Autofact 90/ Robots 14/ Vision 90 Conference, Detroit, MI November 12-15, 1990.

L2.8 Erlandson, R.F., NSF Conference at New Mexico State University - July 1995, presentation of Interactive Science Experiments System and experiences to-date at the Detroit Academy for Mathematics, Science and Technology and the Detroit Science Center.

M.   Invited Seminars or Lectures

M1.1 Erlandson, R.F., Joynt, R.L. And Rourke, M., "EMG Interference Pattern Simulation," presented at the 2nd International Conference of Computerized Electromyography, Monte Carlo, Monaco, June 15-19th 1985.
{Rourke supervsed by Erlandson & Joynt}

M1.2 Erlandson, R.F., "The Information Revolution," keynote address, Conference on Medical Practice in the Computer Age, Oakland Health Education Program, March 7-8th 1984, Dearborn, Michigan.

M1.3 Erlandson, R.F., "Promoting Development Through Innovation Technologies," presented at the Innovations and Developmental Disabilities: A Michigan Conference on the State of the Art, March 28-29th 1985, East Lansing, Michigan.

M1.4 Erlandson, R.F., "The Use of Robotics in Rehabilitation Therapy," lecture at the Research Track Session, 3rd Annual Midwest Regional RESNA Conference: Assistive Technology Working for You. Oct 4-5, 1991, Michigan State University.

M1.5 Erlandson, R.F., Phelps, J.A., "Enabling Technologies in the Workplace", The 10th Annual Conference on Developmental Disabilities, March 23-24, 1994, Michigan State University, East Lansing, MI   - a workshop.

Co authors – equal contributors}

M1.6 Erlandson, R.F., "Mechatronics and Vocational Enablers," Macomb County Intermediate School District, in service seminar, July 28, 1994.

M1.7 Erlandson, R.F., "Design and Development of Vocational Enablers," Keith Bovenschen School, in service seminar, Macomb County Intermediate School District, September, 29, 1994

M1.8 Erlandson, R.F., "Design and Development of Vocational Enablers," Robert G. Lutz School, in service seminar, Macomb County Intermediate School District, September, 29, 1994

M1.9 Erlandson, R.F., "The Enabling Technologies Laboratory," Macomb County Intermediate School District, Parents Advisory Council, October 3, 1994

M1.10 Erlandson, R.F., "The Enabling Technologies Laboratory," Presentation at the General Motors Knowledge Center, seminar series, November 4, 1994.

M1.11 Erlandson, R.F (WSU), Reocigh, R., Hinds, C.(both GM), "Synchronization and Design for Assembly as Applied to Vocational Rehabilitation," presentation to Community Job Placement Professionals, STEP (Service to Enhance Potentials), November 22, 1994. {co-presenters – equal contributions}

M1.12 Erlandson, R.F., "Synchronization and Design for   Assembly as Applied to Vocational Rehabilitation," part of a Workshop at the General Motors Knowledge Center for Vocational / Rehabilitation Professionals, December 9, 1994.

M1.13 Erlandson, R.F. "Talking Scale: a Poka-Yoke Job Accommodation," presentation to STEP and MRS (Michigan Rehabilitation Services Agency), Staff Seminar, at Enabling Technologies Laboratory, Wayne State University, December 14, 1994.

M1.14 Erlandson, R.F. "The Region IV-Enabling Technologies Laboratory: DFA, Poka-Yoke, Process Optimization and Related Techniques Applied to Vocational Rehabilitation", This is a presentation being delivered to staff at all eight Intermediate School Districts who are members of the Consortium.

M1.15 Erlandson, R, ""Enabling Technology and Applications for Severely Multiply Impaired Students," State of Michigan 1995 POHI Conference, Ann Arbor, MI, October 6, 1995. Erlandson, R.F. and Hardin S. running a breakout session on Enabling Technology in the Workplace.

M1.16 Erlandson, R, "Enabling Technology and Applications for Severely Multiply Impaired Students," Macomb ISD Spring 96, POHI Conference, February 28, 1996.

M1.17 Erlandson, R., Athens, L., "Issues Related to the Employment of Individuals with Disabilities," Center for Legal Studies, Lecture Series, February 29, 1996. {co-presenters – equal contributions}

M1.18 Erlandson, R., ETL Products and Applications, St. Clair County ISD, August 1996.

M1.19 Erlandson, R,F., Phelps, J,A., "What's New in Vocational Technology," 13th Annual Developmental
    Disabilities Conference, April 8-9, 1997, Michigan State Univ., Lansing, MI.
        {co-presenters – equal contributions}

M1.20 Erlandson, R.F., "Kaizen and Implications for Job Improvement for Individuals with Disibilities," Warren

Woods, 1997 POHI Conference, May 1, 1997, Warren, MI.

        M1.21 Erlandson, R.F., Sant, D., "Enabling Technology for the Workplace: Concepts and Demonstrations", Jackson
        ISD, November 6, 1997, two half day sessions.
                {co-presenters – equal contributions}

N.   Other Scholarly Work

Project Enable: is a joint agreement between General Motors (Knowledge Center, Productivity Laboratory) for collaborative delivery of educational service to non-engineering professionals on the concepts and applications of Kaizen.

        Project Enable - General Motors Knowledge Center & ETL -Workshops
        Erlandson, R. " Application of Poka-yoke, DFA and Process Control Strategies in
        Vocational Rehabilitation and Special Education," This was my part of these Workshops
                     *   October 26, 1995 at the GM Knowledge Center
                     *   November 15, 1995
                     *   March 21, 1996
                    *   April 29, 1996
                            April 29, 1997

        Project Enable Lean & Flexible Assembly Workshops -
        Phillips, S. (GM - Productivity Lab), Erlandson, R. "Application of Lean and Flexible
        Assembly Techniques to Sheltered Workshops, and Community Worksites."
        There was a series of these:
                *   Macomb ISD, January 16, 1996.
                *   Wayne County ISD, April 22, 1996
              *   Lenawee ISD, May 3, 1996

        Project Enable Lean & Flexible Assembly Workshops at GM Productivity Lab
        Phillips, S. (GM - Productivity Lab), Erlandson, R. "Application of Lean and Flexible
        Assembly Techniques to Sheltered Workshops, and Community Worksites." This
        is a hands-on workshop where devices are actually built. Erlandson reviews the
        proposed designs prior to the workshops.
                Lean/Agile Device Workshop, June 14, 1996
                Lean/Agile Device Workshop, November 19, 1997
                Lean/Agile Device Workshop, April 21, 1997

        Conference: Assistive Technology in the Workplace: The ETL / Region IV Consortium
        is a co-sponsor along with Wayne County Regional Educational Service Agency, May
        2, 1995.

        Erlandson, R.F., "The Region IV Enabling Technologies Laboratory Consortium.
         Design and Implementation Strategies for job accommodation."
        This is the Workshops Introductory/Keynote Address.

        Erlandson, R.F., "Concepts & Application Seminar," presented for Region IV
        Consortium members (eight counties southeastern Michigan) at Wayne County
        Regional Educational Service Agency, February 12, 1997

        Project Enable Process Improvement Workshops: R Erlandson and Steve Hillard, GM Quality
Network Group.
        Since 1998 at least four such workshops are run each year. These are all day workshops and are
        run at participating schools in Region IV. Over 1000 teachers, occupational, physical and speech
        therapists and voc rehab specialists have taken these workshops.

Agile Device Workshops: ETL runs these workshops at Creform Logis-Tech facilities.
Since the fall of 1997 ETL has run at least four Agile Device Workshops per year in conjunction with Creform Logis-Tech. GM provided at $22,000 credit line with Creform for operations of the Agile Wotkshop. Over 1000 teachers, occupational, physical, and speech therapists and voc rehab specialists have completed this training. Participants actually build a device for their use in a school setting.

PATENTS

Method and Apparatus for Rehabilitation of Disabled Patients
Patent Number: 4,936,299
Date of Patent: June 26, 1990

IV. SERVICE

A.   Administrative Appointments at Wayne State in Last Five Years

B.   Administrative Appointments at Other College/University in Last Years

C.   Committee Assignments in Last Five Years

1.   University Committees Chaired
Chairman - the Wayne State University Enabling Technology Task Force.

2.   University Committee Membership
Mathematics Review committee (joint committee Math Dept and Engineering)

3.   College/Department Committees Chaired
ECE Undergraduate Committee (99/00 and 00/01)

4.   College/Department Committee Membership
Graduate Committee - ECE Department
Undergraduate Committee
AOC - College
Student Design Committee

D.   Positions Held in Professional Associations

5/89 to   SOUTHEASTERN MICHIGAN VENTURE GROUP,
12/91   Member of the Board of Directors.

6/88 to   MICHIGAN CONSORTIUM FOR ENABLING TECHNOLOGY,
6/90   Member of the Technical Advisory Board.

4/89 to   INTERNATIONAL SERVICE ROBOT ASSOCIATION,
6/93   Member of the Board of Directors.
              Vice President, June 1990 – June 1993

6/92 to   Rehabilitation Egineering Society of North America (RESNA)
6/93   Chair-Elect (Vice Chair) - The Special Interest Group on
              Mechatronics and Rehabilitation Robotics.

6/93 to   Rehabilitation Egineering Society of North America (RESNA)
6/94   Chair - The Special Interest Group on Mechatronics and Rehabilitation

Robotics.

Co-Chairman of the Invited Symposia on Hypothesis Generation in Clinical Research, The International Conference on Systems Methodology and the 26th Annual Meeting of the Society for General Systems Research, January 5-9, 1982, Washington, DC.

Chairperson of the Engineering Society of Detroit, Committee on Computer Utilization, 1982-1983.

Secretary-Treasurer of the IEEE Bionics Group, the Southeastern Michigan Section, 1984-1985.

President of the IEEE Bionics Group, the Southeastern Michigan Section, 1985-1986.

Member of the Governor's Tech Act Focus Group to provide guidance for Michigan's proposal to P.L. 100-407 (Tech Act of 1988), 4/89 to the 6/89

E. Memberships/Offices Held in Public or Private Agencies Related to Discipline in Last Five Years

   1/85 to   METROPOLITAN CENTER FOR HIGH TECHNOLOGY (MCHT)
   9/89   Detroit, MI
                          Vice-President for Research and Technology Development

   9/86 to   MICHIGAN AUTOMATED VEHICLE RESEARCH CONSORTIUM
   8/89   (MAVRC), Detroit, MI
                          Treasurer and member of the Board of Directors

F. Professional Consultation

   1. Public Presentations as an Exert in Discipline

   2. Testimony before Public Bodies

   3. Consulting to Public Agencies, Foundations, Professional Associations

   4. Consulting to Private Enterprises

      * Consulted for Cybermotion, Inc. and UMI-Microbot, Inc. Both are robotic companies. Areas of consultation; product development and market development.

         * Consulted for Services to Enhance Potentials (STEP), not-for-profit vocational rehabilitation service agency.

         * Consultant to ERIM and Author D. Little on a GSA contract for the development of accessibility standards for
             Electronic and Information Technology (E&IT) as required by Section 508.

G. Journal/Editorial Activity

   1. Editorships
                     Guest Editor IEEE Trans on Rehabilitation Engineering - Vol 3, No. 1, March 1995, Section on Robotics and Mechatronic Systems in Rehabilitation.

2. Editorial Board Memberships

H. Other Professionally Related Service

Reviewer for IEEE Transactions on Systems, Man and Cybernetics.
Reviewer for IEEE Transactions on Education.
    Reviewer for IEEE Transactions on Rehabilitation Engineering.
Review panel for the National Institute on Disability and Rehabilitation
    Research (NIDRR), Rehabilitation Engineering Centers Program,
    quantification of performance sub-section, Spring 1989.

Review panel for the NIDRR Rehabilitation Engineering Centers, 1991
    program solicitation. May 8, 9, 10, 1991. Final evaluations /
    selection site visitation team, June 1991.

Robotic Industries Association (RIA) and National Service Robot
    Association (NSRA) 1991 international conference - Robotics, Vision,
    Automation - Solutions for Global Competition. I was on the Program
    planning committee. I was the session organizer and chairman for the
    "Robots in health care and medicine" session. I was responsible for
    organizing and running two tutorial sessions.

Michigan Consortium for Enabling Technology (MCET) - Research Session
    Co-Chairman for the Fall 1991, regional meeting of the
    Rehabilitation Engineering Society of North Amercia (RESNA), October
    4 and 5, 1991.

Robotic Industries Association (RIA) and National Service Robot
    Association (NSRA) 1993 International Conference - Robotics, Vision,
    Automation - organized and chaired a session on Service Robots in
    Health Care, April 5-8, 1993

 RESNA Conference - Organized and chaired a session on Rehabilitation
    Robotics, June 12-17, 1993.

RESNA Conference - Organized and conducted a workshop on Assessment
    Techniques for Rehabilitation Robotics. June 12-17, 1993.

RESNA Conference - Organized and will chair a session on Rehabilitation
    Robotics, June 17-22, 1994.

Name: **Xiaoyan Han**
Sex: Female
Birthday: October 21, 1965
Birthplace: China
Nationality: USA

EDUCATION:

Ph.D.   Applied Physics, Wayne State University, 1997
   Ph.D. Dissertation: *Measuring Subsurface Defect Depth and Metal Loss by Thermal Wave Imaging & Inverse Scattering of Photon Density Waves*

M.S.   Electrical and Computer Engineering, Wayne State University, 1997

M.S.   Physics (Optics), Nankai University, China, 1991
   Thesis: *Inverse Scattering and Diffraction Tomography*

B.S.   Physics (Optics), Nankai University, China, 1985
   Thesis: *Applications of coherent light in optical communication*

AWARDS AND HONORS RECEIVED:

1) NSF CAREER award, 2003-2008

2) Outstanding junior faculty, Academy of Scholars, 2002

3) "Invention of the Year" award, WSU Technology Transfer Office, 2002

4) Research work was featured in the Association of University Technology Managers Annual Survey and Report, 2002. Only 6 U.S. Universities were highlighted in this way.

5) Rumble Fellowship, Wayne State University, 1995 - 1996

6) Outstanding Thesis Award, Nankai University, 1991

7) Wan Kechang Prize (competitive), Nankai University, 1988 - 1990

EXPERIENCE:

Associate Professor, Department of Electrical and Computer Engineering, Wayne State

University, 2004 - Present

Assistant Professor, Department of Electrical and Computer Engineering, Wayne State University, August 22, 1999 - 2004

Assistant Professor (Research), Department of Physics and Astronomy, Wayne State University, August 18, 1998 – August 16, 1999

Visiting Assistant Professor, Department of Physics and Astronomy, Wayne State University, August 17, 1997 – August 17, 1998

Graduate Research Assistant, Wayne State University, May, 1, 1993 – August, 1997

Engineer, Institute of Automation, the Chinese Academy of Sciences, Beijing, June, 1991 – April, 1993

Engineer, Institute of Beijing Machine Tools, the Ministry of Mechanics and Electronics, PRC, Beijing, July, 1985 – August, 1988

PATENTS

2. Title of Invention: "Method for infrared imaging of ultrasonically excited subsurface defects in materials" **US Patent # 6,236,049,** issued on May 3, 2001
    Licensee: Siemens Westinghouse Power Corporation, Orlando, Florida;
    Licensee: Indigo Systems, Inc., Santa Barbara, CA
    Licensee: FLIR, Inc.
    Licensee: Thermal Wave Imaging, Inc.
    Total License Fees and royalty income from 1/1/2000 – Oct/6/2003: **$886,200,** with continuing $150,000-$200,00 per year (Data from the Technology Transfer Office under VP Research, WSU).
3. Title of Invention: "Miniaturized Contactless Sonic IR Devices for Remote Non-Destructive Inspection", **US Patent # 6,399,948**, issued on June 4, 2002.
4. Title of Invention: "Method for infrared imaging of ultrasonically excited cracks in teeth", **US Patent # 6,437,334**, issued on August 20, 2002
5. Title of Invention: "Hand-held sound source gun for infrared imaging of sub-surface defects in materials", **US Patent # 6,593,574,** issued on July 15, 2003
6. Title of Invention: "Thermal imaging system for detecting defects", **US Patent # 6,759,659,** issued on July 6, 2004
7. Title of Invention: "System and method for acoustic chaos and sonic infrared imaging", filled for US patent, August, 2003
8. Title of Invention: " hand-held sound source for sonic infrared imaging of defects in materials ", filled for US patent, May 2004
9. Title of Invention: "system and method for generating chaotic sound for sonic infrared imaging of defects in materials" filled for US patent, September 2004

PROFESSIONAL SOCIETY MEMBERSHIP:

SME: Society of Manufacturing Engineering
APS: American Physical Society
SPIE: The International Society for Optical Engineering

PROFESSIONAL SERVICE:

Associate Editor on "Microwave-induced thermoacoustic tomography: reconstruction by Synthetic Aperture" for *Medical Physics*.

Associate Editor on "Pulsed-microwave-induced thermoacoustic tomography: filtered back projection in a circular measurement configuration" for *Medical Physics*.

Reviewer for the Journal of Nondestructive Evaluation: "Reconstruction of two different corrosion parameters from uncomplete boundary data in a thin rectangular domain" by D. Fasino and G. Inglese.

Reviewer for the Journal of Nondestructive Evaluation: "Detection of embedded defects in structural components by monitoring surface thermal pattern evolved under flash heating-an analytical study" by K. Madhusoodanan, B.B. Rupani, and R.K. Sinha.

Reviewer for the Journal of Ultrasonics: "FEM analysis of transient temperature fields of samples with defects during ultrasonic pulse excitation" by Peng-Cheng Miao, Xiao-bing Mi, Shu-yi Zhang, Yi Hong and Zhong-ning Zhang.

Reviewer for the Journal of Nondestructive Evaluation: "Investigation of Uncooled Microbolometer Focal Plane Array Infrared Camera for Quantitative Thermography" by Joseph N. Zalameda and William P. Winfree.

EXTERNAL SUPPORT:

- NSF, 5/1/2005-4/30/2008, $400,000 (pending). Co-PI. 33%
  "Hybrid Structural Health Monitoring Via Integrated Sensing of Global Vibration and Local Infrared Imaging", Henry Yang, Xiaoyan Han

- NSF/MRI (CMS-0319767), 9/15/2003 – 21/31/2005, $275,434, plus $100,476 cost sharing
  "Development of instrumentation for measurement of microscopic dynamic motions in physical systems", Ron Gibson, Golam Newaz, Greg Auner, Sheng liu, Xiaoyan Han

- FAA, 8/16/03 – 8/15/06, $769,020
  "IR Crack Detection in Aircraft Structures Using Chaotic Sound Excitation", Xiaoyan Han, L.D. Favro, Golam Newaz, and R.L. Thomas, $769,020

- USAF, 9/1/03 – 2/28/05, $401,015
  "Whole-Field Sonic Infrared Imaging of Turbine Engine Rotors", Xiaoyan Han, L.D. Favro, Golam Newaz, and R.L. Thomas

- NSF CAREER Award (CMS-0238622), 2/1/2003-1/31/2008, $400,095
  "CAREER: Investigation of hybrid acoustic-infrared NDE imaging mechanisms", Xiaoyan Han.

- FAA, 6/14/00 - 9/30/03, $723,818
  "Infrared Detection of Ultrasonically Detected Cracks", Xiaoyan Han, R.L. Thomas, L.D. Favro

- US Air Force/UTC (Universal Technology corporation), 4/1/02-9/30/02, $32,262
  "Laser Vibrometer Measurement of Crack Vibration Mode", Xiaoyan Han.

- US Air Force/UTC/SAIC, 4/1/02-9/30/02, $77,196
  "Investigation of Sonic Infrared Techniques for Inspection of Turbine Engine Rotors", Xiaoyan Han, L.D. Favro, and R.L. Thomas.

- ONR (Office of Naval Research), 1/1/02 - 9/30/03, $131,432
  "Study of Thermosonic imaging Mechanisms", Xiaoyan Han, R.L. Thomas, L.D. Favro

- The Budd Company, 10/1/01 - 8/31/03, $50,964
  "Thermal Wave Metal Thickness Measurements", Xiaoyan Han, L.D. Favro

- US Air Force/UTC, 5/1/2001 – 2/28/2002, $108, 851
  "Investigation of Thermosonics for Crack Detection in Turbine Engines", Xiaoyan Han, R.L. Thomas, L.D. Favro

- Ford, 10/2000 - indefinite, $20,000 (gift)
  "Continuing Thermal wave studies of automotive Corrosion", Xiaoyan Han, R.L. Thomas

- US Air Force/UTC, 10/1/2000 – 4/30/2001, $74, 977,
  "Assessment of Thermosonic Method for ERLE" Xiaoyan Han, R.L. Thomas, L.D. Favro

- NSWC (Naval Surface Warfare Center), 4/1/00 - 9/30/00, $49,738
  "Sonic IR Imaging for Nondestructive Inspection of cracks", Xiaoyan Han, R.L. Thomas, L.D. Favro

- GM, 1/00 - 6/00, $9,000
  "Study weld spots using thermosonics", Xiaoyan Han, R.L. Thomas

13. Ford Motor Company, 8/1/98 - indefinite, $50,000
  "Thermal wave studies of automotive Corrosion", Xiaoyan Han, R.L. Thomas

- Sandia National Lab/FAA, 4/99 - 3/00, $127,054
  "Thermal Wave Imaging Technology Transfer", R.L.Thomas, Xiaoyan Han.

- AFOSR/DURIP, 03/01/99 - 2/28/00, $110,000
  "High-Speed, High-Resolution Focal Plane Array Imaging System", Xiaoyan Han, R.L.Thomas

- Sandia National lab, 2/99 - 9/99, $50,766
  "Thermal Wave modeling simulations", Xiaoyan Han

- US Air Force/Sandia National Lab, 7/8/98 - 4/30/99, $48,213
  "Thermography System of Composite Inspection", Xiaoyan Han, R.L.Thomas, L.D. Favro

- Sandia National Lab/FAA, 1/1/98 - 2/28/99, $174,955
  "Thermal Wave Imaging Technology Transfer", R.L.Thomas, Xiaoyan Han

- US Air Force/ARINC, 8/1/98 - 1/31/99, $59,725
  "Thermal Wave Imaging Studies of Wing Fastener Corrosion", R.L.Thomas, L.D. Favro, Xiaoyan Han

- Sandia National Lab/FAA, 1/1/98 - 12/31/98, $50,000
  "Study of the effect of paint on thermal wave images of hidden corrosion", Xiaoyan Han

- Ford Motor Company, 1/1/98 - indefinite, $30,000
  "Preliminary Evaluation of Thermal Wave Imaging as a Non-destructive Inspection Method for Vehicle Body Corrosion", Xiaoyan Han

- Westinghouse Electric Corporation, 8/1/97 - 1/31/98, $30,000
  "Thermal Modeling for ATS Combustion Turbine Engines", R.L.Thomas, Xiaoyan Han, L.D.Favro

- Westinghouse Electric Corporation, 6/1/97- 12/31/97, $20,000
  "Blade Monitor Feasibility", R.L.Thomas, Xiaoyan Han, L.D.Favro

INTERNAL SUPPORT:

- IMR, WSU, the Academic Year 2004/2005, $29,760
  "Developing novel Sonic IR NDE technique for Automotive Applications", Xiaoyan Han

- IMR, WSU, the Academic Year 2003/2004, $28,760
  "Further development on the novel Sonic IR NDE technique and its Automotive Applications", Xiaoyan Han

- WSU, 2003, $72,000
  "VP Research Equipment Fund", Xiaoyan Han.

- WSU, 2002, $30,000
  "Laser Vibrometer Measurement of Crack Vibration Mode", Xiaoyan Han.

- IMR, WSU, the Academic Year 2002/2003, $26,511
  "Development on the novel thermosonics NDE technique and its Automotive Applications", Xiaoyan Han

- IMR, WSU, the Academic Year 2001/2002, $24,931
  "Further Investigation on the novel thermosonics NDE technique and its Automotive Applications", Xiaoyan Han

- IMR, WSU, the Academic Year 2000/2001, $22,516
  "Sonic IR Imaging for Detection of Subsurface/Surface Cracks and Defects in Automotive Applications", Xiaoyan Han

- WSU, 9/1/1999 – 8/31/2001, $240,000
  "Start up package", Xiaoyan Han

- IMR, WSU, the Academic Year 1999/2000, $22,516
  "Thermal Wave Imaging for Detection and Quantitative Measurement of Corrosion on Vehicles", Xiaoyan Han

- IMR, WSU, the Academic Year 1998/1999, $22,516
  "Thermal Wave Imaging for Automotive Materials Characterization", Xiaoyan Han

NOT FUNDED:

- NSF IGERT, 9/1/2005 – 8/31/2010, $2,500,000 (not final)
  "Multidisciplinary approaches to the utilization and control of sound and vibration", Sean F. Wu, Xiaoyan Han, Golam M. Newaz, Emmanual Ayorinde, Ronald F. Gibson

- FAA/GE, 7/1/2003/ - 7/30/2003
  "Sonic Infrared Inspection for Aircraft Engine Rotating Parts Program", Xiaoyan Han, L.D. Favro, Golam Newaz, and R.L. Thomas. $361,917, 40%

- U.S. Department of Energy, 8/1/00 - 7/31/03,
  "ThermoSonic Nondestructive Evaluation of Defects in Gas Turbine Engines", Xiaoyan Han, R.L. Thomas, L.D. Favro, $1,248,587

- DARPA, 3/1/00 - 2/28/03,
  "Sonic IR Imaging for Nondestructive Inspection of Composite Structures", Xiaoyan Han, R.L. Thomas, L.D. Favro, $338,343,

- NSF, 6/1/02 - 5/31/05,
  "Solar Neutrino TPC R&D", Giovanni Bonvicini, Xiaoyan Han, L.D. Favro, Claude Pruneau, $1,867,868, 25%, this also was sent to DOE

- NSF CAREER proposal, 2/1/02 – 1/31/07
  "Developing integrative system of an innovative IR sensing and imaging NDE technique", Xiaoyan Han, $375,000, submitted on July 23, 2001

- The American Society for Nondestructive Testing (ASNT), 7/1/2001 – 6/30/2002,
  "Infrared NDT&E" (Proposal of New NDT&E course development), Xiaoyan Han, $7,953, 100%

- BFGoodrich Aerospace, 4/99 - 10/99,
  "Measurements of thermal diffusivity on carbon/carbon disks", R.L.Thomas, Xiaoyan Han,

$45,742

PUBLICITY

1. Presentation and lab tour on "Sonic Infrared Imaging for aerospace applications" to the Boeing group, January 8, 2004

2. Presentation and lab tour on "Sonic Infrared Imaging" to Mike Marino, the CEO of Aviation Partners Boeing, April 28, 2003

3. New Science magazine, Vol.15, 2003, Wayne State University: "THE WORLD'S BEST CRACK DETECTOR" highlights Dr. Han's, as well as her collaborators' research, by Leslie Mertz.

4. College of Engineering: Faculty Honors in *Exemplar*, 2003.

5. Presentation and lab tour on "Infrared Imaging and Its Applications: From Aircraft to Art", to the national Tau Beta Pi group's visit, October 5, 2002

6. Research work was featured in the Association of University Technology Managers Annual Survey and Report, 2002. Only 6 U.S. Universities were highlighted in this way.

7. ABC channel 7's science editor Jerry Hodak interviewed me and my colleagues on June 26, 2001 regarding the new invented technology: Thermosonics. The report was shown in the evening news on June 29, 2001.

8. Expanding Minds, Enriching Lives, 2000 President's Report, WSU. "Detecting Invisible Cracks".

9. Gear Technology, March/April, 2001 issue in Revolutions Section reported my, as well as my collaborators' outstanding research activity and technology transfer effort. The title of the article is "NDT Process Finds Cracks by Shaking Parts".

10. FutureTek, the August, 2000 issue reported my, as well as my collaborators' outstanding research activity and technology transfer effort. The title of the article is 'Wayne State's "Hot Sound" is one cool technology', by Karey McCann.

11. On May 25, 2000, Michigan Press Reading Service, Plymouth Observer reported my outstanding research on IR NDE. The title of the article is "Plymouth Resident helps with 'hot sound' invention".

12. On April 20, 2000 (Issue No.26, Vol. No. 3), the Wayne State University Campus News reported my, as well as my collaborators' outstanding research activity and technology transfer effort. The title of the article is "Using 'Hot Sound'-inventors license special camera technology", by Robert Wartner.

13. On April 2, 2000, Detroit News reported my, as well as my collaborators' outstanding research activity and technology transfer effort. The title of the article is "Camera snaps industry error"

as part of "WSU plans research, tech park" by R.J. King.

14. On May 26, 1999, presented "Thermal Wave Imaging Technique for Aerospace Industry" in the Senate office building on Capitol Hill; On May 27, in the foyer of the House office building on Capitol Hill. The purpose was to inform congressmen about the research activities in NDE. WSU was the only university representative. The demonstrations were organized by NASA and FAA. Both the administrators Daniel Goldin from NASA and Jane Garvey from FAA were present.

15. On March 22, 1999, presented "Thermal Wave Imaging NDI" for the FAA and NASA administrators and CEOs, VPs of Aerospace Industries.

16. On October 3, 1997, the South End reported my, as well as my collaborators' outstanding research activity and technology transfer effort. The title of the article is "WSU researchers make planes safer".

PUBLICATIONS:

BOOKS CHAPTERS PUBLISHED:

BC-1) "**Thermal Methods Used in Composite Inspection**", R.L. Thomas, L.D. Favro, Xiaoyan Han, and Zhong Ouyang, in *Comprehensive Composites*, edited by Robert Crane, Elsevier, 2000. Co- Author

BC-2) "**Thermal Wave Materials Characterization and Thermal Wave Imaging**", L.D. Favro, and Xiaoyan Han, Section 7 of *Topics on Nondestructive Evaluation, Volume I, Sensing for Materials Characterization, Processing, and Manufacturing*, page 399 – 415, edited by George Birnbaum and B.A. Auld, ASNT publication office, 1998. Co- Author

PAPERS PUBLISHED IN REFEREED JOURNALS:

"**Mechanical Model for the Generation of Acoustic Chaos in Sonic IR Imaging**", Xiaoyan Han, V. Loggins, and Zhi Zeng, L.D. Favro, R.L. Thomas, *Applied Physics Letters*, Vol.85, No.8, pp1332-1334, August 23, 2004

"**Acoustic Chaos for Enhanced Detectability of Cracks by Sonic Infrared Imaging**", Xiaoyan Han, Zhi Zeng, Wei Li, Mahmad Islam, Jianping Lu, Vera Loggins, E. Yitamben, L.D. Favro, G. Newaz, and R.L. Thomas, *Journal of Applied Physics*, Vol.95, No.7, pp3792-3797, April 1, 2004

"**Response of Sub-surface fatigue damage under sonic load – A finite element study**", Ahsan Mian, Golam Newaz, Xiaoyan Han, Chinmoy Saha, J*ournal of Composites Science and Technology*, Vol. 64, pp1115-1122, 2004

"**Fatigue damage detection in Graphite/Epoxy composites using sonic infrared imaging technique**", Ahsan Mian, Xiaoyan Han, Mahmad Islam, Golam Newaz, *Journal of Composites Science and Technology*, Vol 64, pp657-666, 2004

"**Thermomechanics of slow stable crack growth: closing the loop between experiments and computational modeling**", Kavi Bhalla, Alan Zehnder and Xiaoyan Han, *Engineering Fracture Mechanics*. Vol. 79, Issue 17, pp2439-2458, November, 2003

"**Frequency dependence of the thermosonic effect**" Xiaoyan Han, *Review of Scientific Instruments*, vol. 74, No. 1, pp414-416, January, 2003

"**Acoustic Chaos and Sonic Infrared Imaging**", Xiaoyan Han, Wei Li, and Zhi Zeng, L.D. Favro, R.L. Thomas, *Applied Physics Letters*, vol.81, 17, pp3188-3190, October 21, 2002

"**Sonic IR Imaging of Cracks and Delamination**", L.D. Favro, Xiaoyan Han, Zhong Ouyang, Gang Sun, and R.L. Thomas, *Analytical Sciences*, 17, pp451-453, 2001.

"**Sonic Infrared Imaging of Fatigue Cracks**," L.D. Favro, R.L.Thomas, Xiaoyan Han, Zhong

Ouyang, Golam Newaz, and Dominico Gentile, the *International Journal of Fatigue*, Vol.23/1001, pp471-476, Dec. 2001.

"**Thermosonic imaging of cracks and delaminations**", L.D. Favro, Xiaoyan Han, Zhong Ouyang, Li Li, Sheng Wang, and R.L. Thomas, *Progress in Natural Science*, Volume 11, ppS133-136, May, 2001.

"**Thermosonics: Detecting cracks and adhesion defects using ultrasonic excitation and infrared imaging**", Xiaoyan Han, L.D. Favro, Zhong Ouyang, and R.L. Thomas, *The Journal of Adhesion*, Vol.76, No.2, 2001, pp151-162, 2001.

"**Application of an Inverse Scattering Technique to Diffusive Photon Density Wave Images**" Xiaoyan Han, *Journal of Applied Physics*, Volume 88, No. 1, pp 11-19, July 1, 2000.

"**Infrared imaging of defects heated by a sonic pulse**", L.D. Favro, Xiaoyan Han, Zhong Ouyang, Gang Sun, Hua Sui, and R.L. Thomas, *Review of Scientific Instrument*s, Vol. 71, P2418-2421, June 2000.

"**Thermal-Wave Imaging for Characterizing Structures in Aging Aircraft** ", Xiaoyan Han, L.D. Favro, and R.L. Thomas, *Nondestructive Characterization of Materials in Aging Systems*, Vol. 503, pp47-52, May, 1998

"**Defect Depth Determination by Thermal-Wave Imaging**", L.D. Favro, Xiaoyan Han, P.K. Kuo and R.L. Thomas, *Progress in Natural Science*, Vol. 6, S139-141, 1997.

"**Improving the Resolution of Pulsed Thermal Wave Images with a Simple Inverse Scattering Technique**", L.D. Favro, Xiaoyan Han, P.K. Kuo and R.L. Thomas, *Journal De Physique IV, Colloque C7*, Vol. 4, pp.545—55, juillet 1994

"**A Comparison of Intermediate, Rytov and Born Transformations in Acoustic Tomography**", Z.Q. Lu, Xiaoyan Han, Yan-Yun Zhang and Guo-Ping Chen, *Acoustical Imaging*, Vol. 20, 1992

PAPERS PUBLISHED IN TECHNICAL MAGAZINES

25. "**Optoelectronics World: Test & Measurement: NDT: Infrared Imaging and Ultrasonic Excitation Team Up to Detect Hidden Defects**", Austin Richards, Xiaoyan Han. *Laser Focus Magazine*, 2000

26. "**ThermoSoniX: Finding Defects in Safety-Critical Components and Materials**", Austin Richards, Xiaoyan Han. *Advanced Imaging,* 2000

27. "**Ultrasound with IR imaging detects hidden defects**", Austin Richards, Xiaoyan Han. *Optoelectronics World,* November, 2000, pp.s13-s14

28. "**ThermoSoniX^{TM} : A Novel Infrared- and Ultrasonic-Based System for Non-Destructive Testing built with LabVIEW^{TM}, IMAQ Vision^{TM} and DAQ^{TM}**", Dino J.

Farina, Austin Richards, Xiaoyan Han. *NIWeek*, 2000

29. "**Finding Cracks and Checking Out Walnuts**", Austin Richards, Xiaoyan Han. *Photonics Tech Briefs,* March, 2000, pp. 14a-16a.

REFEREED AND NON-REFEREED CONFERENCE PROCEEDINGS

RCP-1)   "**Study The Effect Of Geometry In Sonic IR Imaging**", Xiaoyan Han, Wei Li, Zhi Zeng, L.D. Favro, G.M. Newaz, and R.L. Thomas, AIP, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 24, pp, 2005.

RCP-2)   "**Developing Sonic IR Imaging NDE For Aircraft Structures**" Xiaoyan Han, Jianping Lu, Md. Sawar Islam, Wei Li, Zhi Zeng, Nagarag Kashyap, Esmeralda Yitamben, L.D. Favro, G.M. Newaz, and R.L. Thomas, AIP, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 24, pp, 2005.

RCP-3)   "**Importance of Acoustic Chaos in Sonic IR Imaging NDE**", Xiaoyan Han, Zhi Zeng, Wei Li, Md. Sawar Islam, Jianping Lu, Vera Loggins, Lawrence Dale Favro, Golam Mohammed Newaz and Robert Leighton Thomas, AIP, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 23, pp496-500, 2004.

RCP-4)   "**Infrared Imaging for Detection of Defects and Real-time Monitoring of a Consolidation Treatment in Stone Sculpture**" Xiaoyan Han, Jianping Lu, L.D. Favro, Kathleen M. Garland, and Paul L. Benson, AIP, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 23, pp501-506, 2004.

RCP-5)   "**Acoustic Chaos in Sonic Infrared Imaging of Cracks in Aerospace Components**", Xiaoyan Han, Md. Islam, Wei Li, V. Loggins, Jianping Lu, Zhi Zeng, L.D. Favro, G. Newaz and R.L. Thomas, the *International Journal on Structural Health Monitoring*, pp1285-1291, 2003

RCP-6)   "**Sonic IR Imaging And Vibration Pattern Studies Of Cracks In An Engine Disk**", Xiaoyan Han, L.D. Favro, and R.L. Thomas, AIP, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 22, pp. 513-516, 2003.

RCP-7)   "**Recent Developments In Sonic IR Imaging**", Xiaoyan Han, L.D. Favro, and R.L. Thomas, AIP, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 22, pp. 500-504, 2003.

RCP-8)   "**Development In Thermosonic NDE Technique**" Xiaoyan Han, L.D. Favro, and R.L. Thomas, the *Nondestructive Characterization of Materials XI*, 497, 2003

RCP-9)   "**Recent Developments In Thermosonic Crack Detection**", Xiaoyan Han, L.D. Favro, Zhong Ouyang, and R.L. Thomas, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 21, pp. 552-557, 2002.

RCP-10) "**Pulsed Thermography Modeling**", Ignacio Perez, Xiaoyan Han. *Review of*

Progress in Quantitative Nondestructive Evaluation, Vol. 21, pp. 564-571, 2002.

RCP-11) "**Theoretical Modeling of Thermosonic Imaging of Cracks**", Zhong Ouyang, L.D. Favro, R.L. Thomas, and Xiaoyan Han. *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 21, pp. 577-581, 2002.

RCP-12) "**Progress In Thermosonic Crack Detection**", L.D. Favro, Xiaoyan Han, Zhong Ouyang, and R.L. Thomas, *Thermosense XXIII*, 2001, SPIE Vol.4360 pp. 546-549

RCP-13) "**Damage Assessment In Thermal Barrier Coatings Using Thermal Wave Imaging Technique**", X. Chen, Xiaoyan Han, G. Newaz, *ASME International*, 2001.

RCP-14) "**Thermosonic Imaging Of Cracks: Applications To Teeth**", Xiaoyan Han, L.D. Favro, R.L. Thomas, the proceeding of *European Conference on Biomedical Optics, 2001*.

RCP-15) "**Detecting Cracks In Teeth Using Ultrasonic Excitation And Infrared Imaging**", Xiaoyan Han, L.D. Favro, and R.L. Thomas, proceedings of the *International Biomedical Optics Symposium*, 2001, SPIE vol. 4256, pp.188-191.

RCP-16) "**Quantitative Thermal Wave Corrosion Measurements on a DC-9 Belly Skin in the Presence of Irregular Paint Thickness Variations**", Xiaoyan Han, L.D. Favro, Li Li, Zhong Ouyang, Gang Sun and R.L. Thomas, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 20, pp. 483- 486, 2001.

RCP-17) "**Thermosonic Imaging for NDE** ", L.D. Favro, Xiaoyan Han, Li Li, Zhong Ouyang, Gang Sun, and R.L. Thomas. *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 20, pp. 478- 482, 2001.

RCP-18) "**Sonic IR Imaging of cracks and Delaminations**", L.D. Favro, Xiaoyan Han, Zhong Ouyang, Gang Sun, and R.L. Thomas, the *11th International Conference in Photoacoustic and Photothermal Phenomena*, June 2000

RCP-19) "**Sonic IR Imaging: A novel crack-detection method**", L.D. Favro, Xiaoyan Han, Zhong Ouyang, Gang Sun, and R.L. Thomas, *the Fourth Joint DoD/FAA/NASA Conference on Aging Aircraft*, May, 2000.

RCP-20) "**Detecting adhesion defects using ultrasonic excitation and an infrared imaging**", L.D. Favro, Xiaoyan Han, Zhong Ouyang, Gang Sun, Hua Sui, and R.L. Thomas, *Proceedings of the 23rd Annual Meeting of the Adhesion Society*, pp. 323-324

RCP-21) "**IR Imaging Of Cracks Excited by an Ultrasonic Pulse**", L.D. Favro, Xiaoyan Han, Zhong Ouyang, Gang Sun, Hua Sui, and R.L. Thomas, *Thermosense XXII*, 2000, SPIE Vol.4020 pp. 182-185

RCP-22) "**Dynamic Infrared Imaging of Crush Tests Of Composite Tubes** ", Xiaoyan Han, L.D. Favro, And R.L. Thomas, M. Chadwick, A. Caliskan, And N. Griffith, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 19, pp. 621-625, 2000.

RCP-23) "**Mapping Thermal Diffusivity** ", Zhong Ouyang, Xun Wang, Z.J. Feng, Huijia Jin, Hua Sui, Xiaoyan Han, L.D. Favro, And R.L. Thomas, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 19, pp. 617-619, 2000.

RCP-24) "**Imaging and Quantitative Measurement of Corrosion In Painted Automotive and Aircraft Structures** ", Gang Sun[1], Xun Wang, Z.J. Feng, Hua Sui, Zhong Ouyang, Xiaoyan Han, L.D. Favro, And R.L. Thomas, John L. Bomback, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 19, pp. 603-607, 2000.

RCP-25) "**Quantitative Thermal-wave measurement of defects in composite aircraft structures**", L.D. Favro, Xiaoyan Han, R.L. Thomas, *the 44th International SAMPE Symposium and Exhibition*, 1999.

RCP-26) "**Fast Infrared Imaging of Static and Dynamic Crush Tests Of Composite Tubes**", Xiaoyan Han, L.D. Favro, and R.L. Thomas, M. Chadwick, A. Caliskan, and N. Griffith, *Thermosense XXI*, SPIE Vol.3700 P48-52, 1999

RCP-27) "**State-of-the-art of thermal wave imaging for NDE of aging aircraft** ", L.D. Favro, R.L. Thomas, Xiaoyan Han, *44th International SPIE Conference on Nondestructive Evaluation of Aging Aircraft, Airports, and Aerospace Hardware III*, Vol. 3586, page 94-97, 1999.

RCP-28) "**Thermal Wave Imaging for Defect Depth Measurement in Composites**", Xiaoyan Han, L.D. Favro, and R.L. Thomas, *the 7th International Workshop on Modern Acoustics -Ultrasonics,* 1999.

RCP-29) "**Delamination Depth Determinations In Composites Using Thermal Wave Imaging**", Xiaoyan Han, L.D. Favro, T. Ahmed, Xun Wang, and R.L. Thomas, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 18, pp593-596, 1999.

RCP-30) "**Active Messages Using Interrupts Without Polling**", C. Xu, Xiaoyan Han, Chunlin Liu, and J. Mann, the *Tenth IASTED International Conference on Parallel and Distributed Computing and Systems*, pp 547-550, 1998

RCP-31) "**Thermal Wave NDI Of Disbonds And Corrosion In Aircraft**", Xiaoyan Han, L.D. Favro, and R.L. Thomas, *the Second Joint NASA/FAA/DOD Conference on Aging Aircraft*, NASA/CP-1999-208982/Part 1, pp 265-274, 1998.

RCP-32) "**Thermal Wave Imaging of Aircraft for Evaluation of Disbonding and Corrosion**" R.L. Thomas, Xiaoyan Han, L.D. Favro, *7th European Conference on Non-destructive Testing*, Vol. 1, pp 126-130, 1998.

RCP-33) "**Thermal Wave Imaging of Defects in Fiber-Reinforced Composites** ", Lawrence D. Favro, Xiaoyan Han, and Robert L. Thomas, *Nondestructive Evaluation of Aging Aircraft, Airports, and Aerospace Hardware*, SPIE Vol. 3397, pp 129 - 134, 1998

RCP-34) "**Infrared Imaging of Polymer Fracture**", L.D. Favro, Yingxia Wang, S.A. Telenkov, Xiaoyan Han, P.K. Kuo, and R.L. Thomas, *Proceedings of 21st Annual*

Meeting of The Adhesion Society, *New Directions in Adhesion Science*, pp 209-211, 1998.

RCP-35) "**Thermal-Wave Imaging for NDE of Composites**", L.D. Favro, Xiaoyan Han, and R.L. Thomas, *Proceedings of ASME Symposium on Design and Manufacture of Composites*, 1998.

RCP-36) "**Quantitative Defect Depth Measurements for NDE of Composites**", Xiaoyan Han, L.D. Favro, and R.L. Thomas, *Proceedings of the American Society for Composites*, pp 1077-1081, 1998.

RCP-37) "**Quantitative Detection and Characterization of Corrosion in Aircraft**", Xiaoyan Han, L.D. Favro, and R.L. Thomas, *Proceedings of the Workshop on Intelligent NDE Sciences for Aging and Futuristic Aircraft*, pp 83-91, 1998

RCP-38) "**NDE of Corrosion and Disbonding on Aircraft using Thermal Wave Imaging**", Xiaoyan Han, L.D. Favro, Tasdiq Ahmed, Zhong Ouyang, Li Wang, Xun Wang, and R.L. Thomas, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 17A, pp 449-452, 1998.

RCP-39) "**Thermal-Wave Imaging for Detection and Quantification of Corrosion and Disbonds in aging Aircraft** ", Xiaoyan Han, L.D. Favro, and R.L. Thomas, *the First Joint DoD/FAA/NASA Conference on Aging Aircraft*, vol. II, pp. 1589-1592, 1997.

RCP-40) "**Quantitative Thermal Wave Imaging of Corrosion on Aircraft**", Xiaoyan Han, L.D. Favro, Tastiq Ahmed, Zhong Ouyang, Li Wang, Xun Wang, Feng Zhang, P.K. Kuo and R.L. Thomas, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 16A, pp. 353-356, 1997.

RCP-41) "**Measuring Corrosion Thinning by Thermal-Wave Imaging**", L.D. Favro, Xiaoyan Han, P.K. Kuo and R.L. Thomas, *Nondestructive Evaluation of Aging Aircraft, Airports, and Aerospace Hardware*, SPIE, Vol. 2945, pp. 374-379, 1996.

RCP-42) "**Measuring Defect Depths by Thermal-Wave Imaging**", L.D. Favro, Xiaoyan Han, P.K. Kuo and R.L. Thomas, *Thermosense XVIII*, SPIE Vol. 2766 pp. 236-239, 1996.

RCP-43) "**Early-Time Pulse-Echo Thermal Wave Imaging**", Xiaoyan Han, L.D. Favro, P.K. Kuo and R.L. Thomas, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 15A, pp. 519-524, 1996.

RCP-44) "**Thermal Wave Imaging of Disbonding and Corrosion on Aircraft**", L.D. Favro, Tasdiq Ahmed, Xiaoyan Han, Li Wang, Xun Wang, P.K. Kuo and R.L. Thomas, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 15B, pp. 1747-1753, 1996.

RCP-45) "**Pulse-Echo Thermal-Wave Imaging for Non-Destructive Evaluation**", R.L. Thomas, L.D. Favro, P.K. Kuo, T.Ahmed, Xiaoyan Han, Li Wang, Xun Wang and S.M.Shephard, *Proceedings of the 15th International Congress on Acoustics*, Vol. 1 pp. 433-436, 1995.

RCP-46) "**Imaging the Early Time Behavior of Reflected Thermal-Wave Pulses**", L.D. Favro, Xiaoyan Han, P.K. Kuo and R.L. Thomas, *Thermosense XVII*, SPIE Vol.2473 pp. 162-166, 1995.

RCP-47) "**Thermal Wave Imaging of Aircraft Structures**", L.D. Favro, T. Ahmed, Xiaoyan Han, Li Wang, Xun Wang, Yingxia Wang, P.K. Kuo and R.L. Thomas, S.M. Shephard, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 14A, pp. 461-466, 1995.

RCP-48) "**Pulse-Echo Thermal Wave Imaging**", L.D. Favro, Xiaoyan Han, Yingxia Wang, P.K. Kuo and R.L. Thomas, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol.14A , pp. 425-429, 1995.

RCP-49) "**Progress in the Development of Pulse-Echo Thermal Wave Imaging for NDE**", L.D. Favro, P.K. Kuo, R.L. Thomas, T. Ahmed, Xiaoyan Han, and X. Wang, *Review of Progress in Quantitative Nondestructive Evaluation*, Vol. 13A, pp 395-399, 1994.

CONFERENCE/CONFERENCE SESSIONS ORGANIZED & CHAIRED

1. "**Monitoring Systems**", *SPIE March 2005 SN09 Smart Structures and Nondestructive Evaluation International Symposium*, March 7-10, 2005, San Diego, CA

2. "**Thermal NDE Techniques: Sonic IR Imaging and Thermal Wave Imaging**", *Review of Progress in Quantitative Non-Destructive Evaluation*, July 25-July 30, 2004, Golden, Colorado

3. "**Thermal Wave Imaging and Thermosonics NDE Techniques**", *Review of Progress in Quantitative Non-Destructive Evaluation*, July 27-August 1, 2003, Green Bay, Wisconsin

4. "**Photothermal Effects in Nanoscale and Molecular Systems**", *Gordon Research Conference on Photoacoustic & Photothermal Phenomena*, June 8-13, 2003,New London, NH

5. "**Dual-mode NDE Techniques: Thermosonics and Thermal Wave Imaging**", *Review of Progress in Quantitative Non-Destructive Evaluation*, July 14-19, 2002, Bellingham, Washington

6. "**Thermal Wave NDE**," 2001 *Review of Progress in Quantitative Non-Destructive Evaluation*, July 29-August 3, 2001, Brunswick, Maine

INVITED TALKS:

5. "**Fundamentals of Acoustic Thermography**", Sonic IR Workshop, *Cocoa Beach*, Florida, December 6, 2004

6. "**Modeling Acoustic Chaos**", Sonic IR Workshop, *Cocoa Beach*, Florida, December 6, 2004

7. "**Sonic Infrared Imaging: A Novel NDE Technique**", Kanamos *Institute of Imaging Retreat, Wayne State University*, November 19, 2003

8. "**Infrared Imaging NDE**", *Department of Electrical and Computer Engineering, Michigan State University*, July 8, 2003

9. "**Advances In Sonic IR Imaging For NDE Using Acoustic Chaos**", *Gordon Research Conference on Photoacoustic & Photothermal Phenomena*, New Hampshire, June 12, 2003

10. "**Chaos in Sonic Infrared Imaging and its Applications**", *Lawrence Livermore National Laboratory*, May 6, 2003

11. "**Sonic Infrared Imaging and its Applications**", *Department of Materials Science and Engineering, College of Engineering*, Ohio State University, April 18, 2003

12. Invited **panel** discussion member on ASNT (American Society of Non-destructive Testing) meeting, the only member from a university among the four panelists. Orlando, March 13, 2003.

13. "**Infrared Imaging and Its Applications: from Aircraft to Art**", *Academy of Scholars, WSU*, Feb.20, 2002

14. "**Infrared Imaging & Its Applications**", *College of Engineering, Lawrence Technology University*, Southfield, MI, December 5, 2001

15. "**Thermosonic imaging of cracks: Applications to teeth**", *European Conference Biomedical Optics*, Munich, Germany June 17-21, 2001

16. "**Thermal Wave and Thermosonic Imaging**", *Ford Scientific Research Labs*, May, 25, 2000.

17. "**Thermal Wave Imaging & Thermal Properties of Materials**", *Ford Scientific Research Lab*, July 2, 1998

18. "**Inversion of Photon Density Wave Images**", *American Physical Society March 1998 General Meeting*, Los Angeles, CA. March 19, 1998

A. PRESENTATIONS AT TECHNICAL/PROFESSIONAL MEETINGS

This list includes only those talks that I actually presented. Some of the talks were published in conference proceedings, and therefore the titles may also be included in the list of publications above.

1. "**Developing Sonic IR Imaging NDE For Aircraft Structures**", *Progress in Quantitative Nondestructive Evaluation*, Golden, Colorado, July 29, 2004

2. "**Enhancement of Sonic Infrared Imaging with Acoustic Chaos**", invited to present at SPIE Defense & Security Symposium *Thermosense XXVI*, Orlando, April 14, 2004

3. "**Advances in Sonic IR Crack Detection using Chaotic Sound**", *7th DoD/NASA/FAA Conference on Aging Aircraft*, New Orleans, September 9, 2003

4. "**Importance of Acoustic Chaos in Sonic IR Imaging NDE**", *Progress in Quantitative Nondestructive Evaluation*, Green Bay, Wisconsin, July 29, 2003

5. "**Fatigue Damage Evaluation in Composite Materials Using Thermosonics Technique**", 14th *International Conference on Composite Materials*, San Diego, July 16, 2003

6. "**Advances in sonic IR imaging for NDE using acoustic chaos**", *Gordon Research Conference on Photoacoustic & Photothermal Phenomena*, New Hampshire, June 12, 2003

7. "**Enhancement of Sonic IR Imaging through the use of Chaotic Acoustic Pulses**", *ASNT conference*, Orlando, March 13, 2003

8. "**Frequency Dependence of Sonic Infrared Imaging of Aircraft Components**", *6th FAA/DoD/NASA Conference on Aging Aircraft*, San Francisco, September 17, 2002

9. "**Recent Developments in Sonic IR Imaging**", *Progress in Quantitative Nondestructive Evaluation*, Bellingham, WA, July 16, 2002

10. **"Sonic IR Imaging and Vibration Pattern Studies of Cracks in an Engine Disk**", *Progress in Quantitative Nondestructive Evaluation*, Bellingham, WA, July 16, 2002

11. **"Frequency Dependence of the Thermosonic Effect",** *12th International Conference on Photoacoustic and Photothermal Phenomena*, Toronto, June 24, 2002

12. "**Thermosonic imaging of cracks: Applications to teeth**", *European Conference Biomedical Optics*, June 17-21, 2001, Munich, Germany

13. "**Thermosonics - A New Era in Crack Detection**", *Society for Experimental Mechanics*, Southern Michigan Section, February 12, 2001.

14. "**Thermosonics: A Novel NDE Technique Using Ultrasonic Excitation And Infrared Imaging**", *Seminar* in Electrical and Computer Engineering, Wayne State University, February 14, 2001.

15. "**Detecting cracks in teeth using ultrasonic excitation and infrared imaging**", the *International Biomedical Optics Symposium*, San Jose, CA, January 20-26, 2001

16. "**Inversion of diffusive photon density images**", the 8th *International Workshop on Modern Acoustics - NDE*, Nanjing, China, October 28-31, 2000

17. "**Quantitative Thermal Wave Corrosion Measurements on a DC-9 Belly Skin in the Presence of Irregular Paint Thickness Variations**", *Progress in Quantitative Nondestructive Evaluation*, Ames, Iowa, July 20, 2000

18. " **Sonic IR Imaging of cracks and Delaminations**", *11ᵗʰ International Conference on Photoacoustic and Photothermal Phenomena*, Kyoto, Japan, June 27, 2000.

19. "**Thermal Wave and Thermosonic Imaging**", Ford Scientific Research Labs, May, 25, 2000.

20. "**Sonic IR Imaging of Cracks in Metals**", *Hot Metal Gas Forming*, Detroit, MI, January 27, 2000.

21. "**A New NDE Breakthrough: Sonic IR Imaging**", *3ʳᵈ FAA/DOD/NASA Joint Conference on Aging Aircraft*, Albuquerque, New Mexico, September 22, 1999.

22. "**Dynamic Infrared Imaging of Crush Tests Of Composite Tubes**", *Progress in Quantitative Nondestructive Evaluation*, Montreal, Canada, July 29, 1999.

23. "**Fast Infrared Imaging Of Static And Dynamic Crush Tests Of Composite Tubes**", *Thermosense XXI, SPIE's 13ᵗʰ Annual International symposium on Aerospace/Defense Sensing, Simulation and Controls*, Orlando, Florida, April 6, 1999.

24. "**Thermal Wave Imaging for Defect Depth Measurement in Composites**", *the 7th International Workshop on Modern Acoustics -Ultrasonics,* October 10-14, 1998, Nanjing, China.

25. "**Thermal Wave NDI of Disbonds and Corrosion in Aircraft**", *the Second Joint NASA/FAA/DOD Conference on Aging Aircraft*, Williamsburg, VA, September 2, 1998.

26. "**Static vs. Dynamic Crush Tests Video and Thermal Imaging**", *ACC (Automotive Composite Consortium) Meeting*, Southfield, MI, September 16, 1998.

27. "**Pulse-Echo Thermal Wave Timing For Precise Defect Depth Measurement And Subsurface Material Identification**", *X International Conference on Photoacoustic and Photothermal Phenomena*, Rome, Italy, August 23-27, 1998.

28. "**Delamination Depth Determinations In Composites Using Thermal Wave Imaging**", *Review of Progress in QNDE*, Snowbird, Utah, July 23, 1998.

29. "**Thermal Wave Imaging**", Physics Department, Wayne State University, February, 1998.

30. "**Quantitative NDE of Corrosion on Aircraft by Thermal-Wave Imaging**", *Thermal Solutions '97 at NDE in the Aerospace Industry*, Cleveland, Ohio, USA, June 24-26, 1997.

31. "**Thermal-Wave Imaging for Detection and Quantification of Corrosion and Disbonds in aging Aircraft**", *the First Joint DoD/FAA/NASA Conference on Aging Aircraft*, Ogden, Utah, July 7-10, 1997.

32. "**NDE of Corrosion and Disbonding on Aircraft using Thermal Wave Imaging**", *Review of Progress in QNDE*, San Diego, California, July 30, 1997.

33. "**Quantitative Thermal Wave Imaging of Corrosion on Aircraft**", *Review of Progress in QNDE*, Bowdoin, Maine, August 1, 1996.

34. "**Early-Time Pulse-Echo Thermal Wave Imaging**", *Review of Progress in QNDE*, Seattle, WA, August 3, 1995.

Curriculum Vitae   **Date: November 2004**

<div align="center">

MOHAMAD H. HASSOUN

</div>

Address:	**Home Address:**
Department of Electrical & Computer Engineering	7518 Oakman Blvd.
Wayne State University	Dearborn, MI 48126
Detroit, Michigan 48202	Tel. (313) 846-9148
Tel. (313) 577-3966	**Birth Date:** Jan. 1, 1961
e-mail: hassoun@brain.eng.wayne.edu	Married with two children
WWW: http://neuron.eng.wayne.edu	U.S. Citizen

Degrees

Ph.D., Electrical Engineering, May 1986, Wayne State University, Detroit, Michigan. Dissertation title: *Optical Threshold Gates and Logical Signal Processing.*

M.S.E.E., December 1982, Wayne State University, Thesis title: *Multi-Fault Identification and Sensitivity Computation in Linear Analog Time-Invariant Circuits with the Aid of Least-Squares Method.*

B.S.E.E, December 1981, Wayne State University.

Positions Held

August 1995 - Present: **Professor**, Wayne State University.

June 1994 - August 1995: **Interim Chair**, Department of Electrical & Computer Engineering, WSU.

      Year Granted Tenure: 1992

June 1991 - May 1995: Associate Professor, Wayne State University.

January 1988 - May 1991: Assistant Professor, Wayne State University.

September 1987 - December 1988: Assistant Professor (Research), Wayne State University.

June 1986 - July 1987: Research Associate, Digital Optics, Inc., Rochester, Michigan.

June 1986 - July 1987: Lecturer, ECE Department, Wayne State University.

January 1982 - May 1986: Graduate Research Assistant, Wayne State University.

Sabbatical Leaves

Fall 2002: Developed a Lego-Based Engineering Design course for engineering freshmen.

Fall 1995: Completed the writing of a textbook on Artificial Neural Networks for college use (published by: The MIT Press).

Courses Taught/Directed Studies Supervised

    <u>Undergraduate (most recently taught; Term and number of students indicated):</u>

        BE 1010   Introduction to Engineering: Robotics-based Section (F-04: 33)

BE 1100   Introduction to Engineering – Special Robotics Section (W-02: 7)

ECE 2620 Introduction to Microcomputers:

(F-99: 41; F-00: 38; W-01: 35; F-01: 40; W-03: 31; S/S-03: 28; F-03: 47; W-04: 46; F-04:28)

ECE 3300 Introduction to Electrical Circuits (W-96: 22; F-03: 50; W-04: 49)

ECE 3330 Electric Circuits II

ECE 4330 Linear Network and System Analysis

ECE 4800 Electromagnetic Fields and Waves I

ECE 4850 Introduction to Engineering Optics

ECE 4900 Directed Study

Graduate:

ECE 5120 Artificial Neural Systems I:

(F-97: 8 students;W-98; 11; F-98: 5; F-99: 8, F-00: 7; F-01: 7)

ECE 5310 Active Filters (W-97: 9 students)

ECE 5360 Computer-Aided System Analysis and Design

ECE 5870 Introduction to Lasers

ECE 5990 Directed Study

ECE 7120 Artificial Neural Systems II (W-96: 5 students, W-97: 7; W98: 5)

ECE 7990 Directed Study (F-97: 2 students; F-99: 2)

ECE 7950 Special Topics

ECE 8120 Advanced Artificial Neural Systems (F-96)

Course/Curriculum Development

Developed BE1010 (Introduction to Engineering, will be renumbered as BE1200) to be required by all engineering freshmen starting Fall 2004. This is a hands-on course which utilizes the Lego Robotics Invention System and a C-like programming language geared toward the freshman student. This course is based on a pilot course that I taught in fall 2002.

Chaired the ECE curriculum development committee for three years. The committee has developed a new ECE curriculum which is currently pending college approval and implementation.

Developed and implemented (with Professor Pepe Siy) a Masters of Science Core in Machine Intelligence and Applications, February 1993. This new core is based on two courses I have developed (ECE 5120 and ECE 7120; see below) in 1988 and 1991, respectively, along with three other existing courses in ECE.

ECE 5120, Artificial Neural Systems I, 1991.

ECE 7120, Artificial Neural Systems, 1988. Upgraded to Artificial Neural Systems II in 1992.

ECE 8120, Advanced Artificial Neural Systems, 1989.

Course Materials Developed

Lecture Modules, BE1100: Robotics version (Web assisted course); Fall 2002.

Lecture Notes/Slides, ECE330 (Web assisted course).

Lecture Notes/Slides, ECE262 (Web assisted course).

Lecture Notes, ECE 512, Artificial Neural Systems I.

Lecture Notes, ECE 712, Artificial Neural Systems II.

Lecture Notes, ECE 812, Advanced Artificial Neural Systems.

Wisdum 1.2, A PC software for associative neural memory synthesis and performance analysis.

Developed by Dr. Hassoun and his graduate student David Clark and was employed as the main simulation package in ECE 7120.

Several computer demonstrations (DOS & Unix Based) have been developed for ECE 5120 and 7120. These demonstrations span a number of engineering application areas including: Optical character recognition, control, optimization, associative memory, image compression, etc. Some interactive Java demo programs have also been developed for access over the web/internet (http://neuron.eng.wayne.edu).

Developed a web-based version of my Fundamentals of Artificial Neural Networks Textbook with interactive Java and Matlab demos. The project was supported by WSU Library division.

Technology in Learning

Developed teaching material and demonstrations for a new Engineering Design course (BE1200) which is required by all entering freshman in the college of engineering. This activity was sponsored by the of the Provost through an Innovative Instructional Technology Grant (2003-2004).

Developed a paperless and chalkless instruction scheme for BE1100, ECE 2620, ECE3300 and ECE 5120. I use color slides (PC-based presentation), animations, Java demos, live Matlab demos, etc. inside the classroom. All course information (presentation slides/notes, syllabus, sample quizzes, reference material, Java demos, grades, etc.) are available to all students remotely via the WWW. Extensive use of e-mail and web-based anonymous feedback (via convenient electronic forms). This allows for seven-days-a-week "virtual office hours" access to the instructor (in addition to regular office hours). Feedback from students is very encouraging regarding this new method of teaching (documentation available). I formally shared my experiences with my technology-based teaching approach with WSU faculty by giving a talk entitled "Creating a Paperless and Chalkless Course: Lessons Learned," on November 19, 1998 upon invitation by the WSU Office of Teaching and Learning.

Essays/Thesis/Dissertations Supervised

Ph.Ds Graduated

Xiaoyan Mu, Ph.D., *Automated Face Recognition: A Weighted Voting Method*. Graduated May 2004. Current employer: Rose-Hulman Institute of Technology. Title: Assistant Professor.

Metin Artiklar, Analysis of Voting Networks with Application to Human Face Recognition, Graduated in Summer 2002. Employed by Fatih University, Istambul, Turkey.

Agus Sudjianto, *Artificial Neural Networks for Nonlinear Extensions of Principal Component Analysis*. Graduated in May, 1996. (Industrial & Manufacturing Engineering Department. Dr. Hassoun served as co-advisor). Employed by Ford Motor Company, Dearborn, MI.

Paul Watta, *A Coupled Gradient Network Approach for Static and Temporal Mixed Integer Optimization*. Graduated in March, 1994. Current employer: University of Michigan-Dearborn, Department of Electrical and Computer Engineering. Title: Assistant Professor.

Raed Abu-Zitar, *Machine Learning with Rule Extraction by Genetic Assisted Reinforcement*

(REGAR): Application to Nonlinear Control. Graduated in August 1993. Employment: United Arab Emirates University, United Arab Emirates. Title: Assistant Professor, Faculty of Engineering and Computer Science, 1994-1995. Currently Assistant Professor in Amman, Joardan.

Jing Song, *Hybrid Genetic/Gradient Learning in Multi-Layer Artificial Neural Networks.* Graduated in December 1992. Current employer: Ford Motor Company, Car Product Development, E/E Systems, Dearborn, Michigan, Title: Product Design Engineer.

Abbas Youssef, *Design and Implementation of High Performance Associative Neural Memories.* Graduated in May 1992. Currently Senior Project Engineer, Delphi, Advanced Product Center , Saginaw, MI.

Chuanming Wang, *A Robust System for Automated Decomposition of the Electromyogram Utilizing a Neural Network Architecture*. Graduated in December 1991. Current employer: Coin Acceptors, Inc., St. Louis, Missouri. Title: Senior Engineer, R&D.

Current Ph.D. Students

Mehmet Artiklar, Ph.D. Applicant.

Graduated Masters Students

David Hagner, *Experimental Comparison of Recurrent Neural Network Architectures and Training Algorithms for Trajectory Generation*, Graduated Spring 1999. Employed by Ford Motor Company. Title: Product Development Engineer.

David Clark. *High Performance Learning Algorithms and Associative Neural Memories*. Graduated October 1991. Current employer: EDS, working with the AI Core Group, Advanced Engineering Staff, General Motors Technical Center, Warren, MI. Title: Knowledge Engineer.

Administrative Experience

University Level (WSU)

Member, Educational Development Grant Committee, Wayne State University, 2001-02.
Member, Nominating Committee, Wayne State University, 1999-00.
Member, President's Award for Excellence in Teaching Selection Committee, Wayne State University, 1989-99.
Board Member, Office for Teaching and Learning (OTL) Advisory Board, Winter 1999 - 2002.
Panel Member, Review Advisory Panel for the Department of Near East and Asian Studies, 1998.
Member, Ad Hoc Committee on Doctoral Education, Graduate School, 1997.
Panel Member, Student Teachers' Portfolio Presentations, College of Education, April 1995.
Reviewer, Thomas C. Rumble Fellowship Competition (95-96 Awards), March 1995.
Reviewer, Graduate-Professional Scholarship Competition (95-96 Awards), April 1995.
Committee Member, Teaching Evaluation Task Force, January 1994.
Committee member, President's Award for Excellence in Teaching Selection Committee, Wayne State University, 1992-93.
Committee member, Faculty Competition for Research Equipment, Wayne State University,

February 1993.
Committee member, President's Award for Excellence in Teaching Selection Committee, Wayne State university, February 1992.
Committee member, Student Task Force, WSU Strategic Planning Commission, April - July 1991.
Committee member, Faculty Competition for Graduate Research Assistantships, Wayne State University, January 1991.

College of Engineering:
Committee Member, College of Engineering Math Committee, Wayne State University, 2004-2005.
Executive Committee Member, Faculty Assembly, College of Engineering, Wayne State University, 2004-2005.
Committee Member, College of Engineering Academic Operations Committee, Wayne State University, 2003-2004, 2004-2005.
Committee Member, Nominations Committee, 2003-2004.
Committee Member, College Tenure and Promotion Committee, 1998-1999.
Committee Member, College Salary Committee, 1998-1999.
Committee Member, College Tenure and Promotion Committee, 1997-1998.
Committee Member, College Faculty Budget Committee, 1996 - present.
Committee Chair, College of Engineering Teaching and Learning Committee, 1993 - 1994.
Committee Member, ECE Chairman Search Committee, College of Engineering, 1993 - 1994 & 1996 - present.
Committee Member, Salary Committee, College of Engineering, 1993 - 1994.
Committee Member, Charles DeVlieg Professor of Mechanical Engineering Selection Committee, September 1993.
Committee Member, College of Engineering Hearing Committee (academic issues), 1992 - 1994.
Representative of ECE Department, Engineering Student-Faculty Board, Wayne State University, 1987 - 1994.
Committee Member, Student Recruiting Committee, College of Engineering, Wayne State University, 1989 - 1993.
Committee Member, College of Engineering Academic Operations Committee, Wayne State University, 1989 - 1991.
Committee Member, Wingerter Awards Selection Committee, College of Engineering, Wayne State University, March 1991.
Member, Library Committee, College of Engineering, Wayne State University, 1987 - 1989.

Department of Electrical and Computer Engineering:
Member, Electrical and Computer Engineering Graduate Committee, Wayne State University, 1987 - 1990 & 1991 - 1994 & 1996 – 2002.
Member, Electrical and Computer Engineering Undergraduate Committee, Wayne State University, 1990 - 1991, 1997 - present.
Member, Budget Committee, Salary Committee and Tenure and Promotion Committee, 1992–-993, 1996-1999, 2003-2004, 2004-2005.
Member, Faculty Search Committee, 93-94 and 97-98.
Member, Curriculum Committee, AY 97-98.
Chair, Committee for Curriculum Restructuring to address a better freshman experience in ECE, design, and other ABET requirements. Developed a draft ECE curriculum for the 21st

Century. AY 1996 -1997.

Interim Chair, June 1994 - August 1995. Major accomplishments: Went through ABET review and University mandated graduate program review (by internal and external reviewers). Department obtained three years plus report ABET accreditation (report is mainly due to lack of permanent Chairperson). The graduate program review resulted in praise for the department. Other accomplishments include the hiring of a new faculty (tenure track appointment) and an Administrative Assistant.

Service on Oral Qualifying Exam and Thesis/Dissertation Defense Examiner:

Oral Ph.D. Qualifying Exam, Department of Psychology, Wayne State University, February, 2001.

Oral Ph.D. Qualifying Exam, (Candidate: Jonathan I. Maletic), Department of Computer Science, Wayne Sate University, April 19, 1994.

Invited External Examiner, Ph.D. Defense (Candidate: Walid Fakhr), Department of Electrical and Computer Engineering, University of Waterloo, Waterloo Canada, September 30, 1993.

Examiner, Oral Ph.D. Qualifying Exam (Candidate: Hui Wan), Department of Electrical and Computer Engineering, Wayne State University, September 15, 1993.

Examiner, Oral Ph.D. Qualifying Exam, (Candidate: Franeette Fey), Physics, Wayne Sate University, September 7, 1993.

Examiner, Oral Ph.D. Qualifying Exam, Education/Instructional Technology, Wayne State University, December 17, 1992.

Consulting

July 1999 - present: Fenwick and West LLP Law Firm, Palo Alto, CA:Investigated Patent infringement relating to a neural network based credit card fraud detection system.

May 1996 -July 1996: Howard & Howard Attorneys, Bloomfield Hills, Michigan: Investigated Patent infringement for an electronically controlled multifunction back massager.

June 1993 - December 1993: Computer Methods Corporation (CMC), Livonia, Michigan: Design of OCR Engine.

March 1991 - September 1991: M&M Mars, Inc., Chicago Illinois: Applications of Artificial Neural Networks in Candy Manufacturing.

March 1990 - December 1990: Federated Monetary, INC., Ferndale, Michigan: Design of a robust unsupervised feature extractor using neural networks for market prediction.

September 1987 - June 1988: Digital Optics, Inc., Rochester, Michigan: The consulting involved the design and development of advanced fiber optic-based computer architecture.

Editorial Boards

Editor for Book Reviews, *IEEE Transactions on Neural Networks*, January 1991 – 1998.

Associate Editor, *IEEE Transactions on Neural Networks*, January 1991 - December 1997.

Member of the Editorial Board, *Neural Processing Letters*, April 1994 - December 1997.

Other Professional Activities

Co-Editor-in-Chief (USA), *Neural Processing Letters*, January 1998 - present.

Awards Committee Chair, *Neural Networks Council*, January 1994 – 1998.

National Committee Member, Sixth International Conference on Manufacturing, PCM' 2000, September 6 - 8, 2000, Detroit, MI.

Program Committee Member, *The Fourth International Conference on Neural Information*

Processing (ICONIP97), Dunedin/Queenstown, New Zealand, November 24-28, 1997.

Program Committee Member, *International Workshop on Artificial Neural Networks (IWANN97)*, Lanzarote - Canary Islands, Spain, June 4-6, Spain.

Program Committee Member, *1996 World Congress on Neural Networks*, September 15-18, 1996, San Diego, CA.

Panel Organizer and Moderator, Neural Networks and Statistical Models, *1996 IEEE International Conference on Neural Networks*, Washington, D.C., June 3, 1996.

Session Chair, Associative Memory and Reinforcement Learning, *World Congress on Neural Networks,* September 15 - 19, 1996, San Diego, CA.

Program Committee Member, *Second Annual International Conference on Electronics, Circuits, and Systems (ICECS95),* December 18-21, 1995, Amman, Jordan.

Proposal Review Panelist, National Science Foundation, Competition for Postdoctoral Fellowship, January 1995.

Session Chair, Prediction 2, *IEEE International Conference on Neural Networks*, November 27 - December 1, 1995, Perth, Australia.

Session Chair, Architecture 5, *IEEE International Conference on Neural Networks*, November 27 - December 1, 1995, Perth, Australia.

Program Committee Member, *IEEE International Conference on Neural Networks (ICNN94),* Orlando, Florida, June 26-July 2, 1994.

Proposal Review Panelist, National Science Foundation, Competition for Engineering Research Centers FY 1994, Panel C: Computer & Information Science and Engineering, January 6-7, 1994.

Session Organizer and Chair, Special Session on Nonlinear Principal Component Analysis Neural Networks, *IEEE International Conference on Neural Networks,* Orlando, FL, June 26 - July 2, 1994.

Session Vice-Chair, General Plant Systems, *Electric Utility Conference and Exhibition (UTEXPO '93),* Dearborn, Michigan, July 1993.

Session Chair, Optimization Session, *IEEE International Conference on Neural Networks (ICNN '93),* San Francisco, March - April 1993.

Session Chair, Associative Memories II Session, *IEEE International Conference on Neural Networks (ICNN '93),* San Francisco, March - April 1993.

Session Chair, Associative Memories III Session, *IEEE International Conference on Neural Networks (ICNN '93),* San Francisco, March - April 1993.

Program Committee member, *IEEE International Conference on Neural Networks (ICNN'93),* San Francisco, March - April 1993.

Program Committee member, *International Workshop on Artificial Neural Networks (IWANN'93),* Spain, June 1993.

Technical Session Co-Chair, Spatial Light Modulators and Neural Networks II, *SPIE Conference 1558: Wave Propagation and Scattering in Varied Media II,* San Diego, CA, July 22-24, 1991.

Proposal Review Panelist, National Science Foundation, Division of Electrical and Communications Systems: Neuroengineering, April 1990.

Session Organizer and Chair, Artificial Neural Networks and Their Applications Session, *Symposium for Innovation in Measurement Science (SIMS),* Instrument Society of America, Geneva, New York, August 6-11, 1989.

Reviewer
    National Science Foundation, USA
    National Research Council, USA
    Natural Sciences and Engineering Council of Canada

Proceedings of the National Academy of Sciences
IEEE Transactions on Neural Networks
IEEE Transactions on Circuits and Systems
IEEE Transactions on Systems, Man, and Cybernetics
IEEE Transactions on Computers
IEEE Transactions on Biomedical Engineering
IEEE Computer Magazine
Optical Engineering
Journal of the Optical Society of America (JOSA A)
Optics Letters
IEEE International Symposium on Circuits and Systems'90
International Joint (IEEE/INNS) Conference on Neural Networks, 1991 & 1992.
IEEE International Conference on Neural Networks, San Francisco, CA, March - April
1993.
International Workshop on Artificial Neural Networks, Sitges, Spain, June 1993.
World Congress on Neural Networks, San Diego, CA, June 4-9, 1994.
IEEE International Conference on Neural Networks, Orlando, FL, June 26-July 2, 1994.
IEEE International Symposium on Circuits and Systems'95.
Neural Network review
Association of Computing Machinery '90 Conference.
Connection Science
Europhysics Letters
Applied Optics
 Simulation: The Journal of the Society for Computer Simulations
Oxford University Press
West Publishing

Books
Fundamentals of Artificial Neural Networks, M. H. Hassoun (MIT Press, Cambridge: 1995).

Associative Neural Memories: Theory and Implementation, M. H. Hassoun, Editor (Oxford University Press, New York: 1993).

Book Chapters
Comparison of Recurrent Neural Networks for Trajectory Generation, (with D. G. Hagner and P. B. Watta), *in Recurrent Neural Networks: Design and Applications*, L. R. Medsker and L. C. Jain (eds.), CRC Press, Boca Rotan, 243-276, 1999.

Feedback Models: Associative Memory Networks, (with Paul Watta), in *Handbook of Neural Computation*, E. Fiesler and R. Beale (Eds.), Oxford University Press and Institute of Physics Publishing, pp. C1.3:1 C1.3:14, 1997.

Alternatives to Energy Function-Based Analysis of Recurrent Neural Networks, (with Paul Watta), in *Computational Intelligence: A Dynamic System Perspective*, M. Palaniswami, Y. Attikiouzel, R. Marks II, and T. Fukada, Eds., pp. 46-67, IEEE Press, 1995.

Dynamic Associative Memories, in *Artificial Neural Networks and Statistical Pattern Recognition: Old and New Connections*, A. Jain and I. Sethi (Eds.), Elsevier Science Publishers, Amsterdam, pp. 195-218, 1991.

Publications in Refereed Journals

N. Ikeda, P. B. Watta, M. Artiklar, and M. H. Hassoun, "A Two-Level Hamming Network for High Performance Associative Memory," *Neural Networks*, **Vol. 14**, pp. 1189-1200, 2001.

P. Watta and M. H. Hassoun, "Generalizations of the Hamming Associative Memory," *Neural Processing Letters*, **Vol. 13**, pp.183-194, 2001.

N. Ikeda, P. Watta, and M. H. Hassoun, "Performance of the Two-Level Parallel Hamming Associative Memory," *Transactions of the Institute of Electronics, Information, and Communications Engineers*, D-II, J82(9), 1528-1532 (in Japanese), 1999.

P. Watta, K. Wang , and M. H. Hassoun, Recurrent Neural Nets as Dynamical Boolean Systems with Application to Associative Memory, *IEEE Transactions on Neural Networks*, **Vol. 8(6)**, pp. 1268-1280, 1997.

P. Watta and M. H. Hassoun, A Coupled Gradient Network Approach for Static and Temporal Mixed Integer Optimization, *IEEE Transactions on Neural Networks,* **Vol. 7(3**), pp. 578-593, 1996.

R. Abu Zitar and M. H. Hassoun, Neurocontrollers Trained with Rules Extracted by a Genetic Assisted Reinforcement Learning System*, IEEE Transactions on Neural Networks*, **Vol. 6(4)**, pp. 859-879, 1995.

P. B. Watta and M. H. Hassoun, Experiments in Machine Learning Using Artificial Neural Networks for Control and Image Compression, *Computer Applications in Engineering Education*, **Vol. 3(3)**, pp. 195-204, 1995.

A. Sudjianto and M. H. Hassoun, Statistical Basis of Nonlinear Hebbian Learning and Application to Clustering, *Neural Networks*, **Vol. 8(5)**, pp. 707-715, 1995.

M. H. Hassoun, C. Wang, and A. R. Spitzer, NNerve: Neural Network Extraction of Repetitive Vectors for Electromyography -- Part I: Algorithm, *IEEE Transactions on Biomedical Engineering*, **Vol. 41(11**), pp. 1039-1052, 1994.

M. H. Hassoun, C. Wang, and A. R. Spitzer, NNerve: Neural Network Extraction of Repetitive Vectors for Electromyography -- Part II: Performance Analysis, *IEEE Transactions on Biomedical Engineering***, Vol. 41(11)**, pp. 1053-1061, 1994.

Invited paper: M. H. Hassoun and J. Song, Hybrid Genetic/Gradient Search for Multilayer Perceptron Training, Optical Memory and Neural Networks*, Special Issue on Architectures, Designs, Algorithms and Devices for Optical Neural Networks (Part I),* **Vol. 2(1)**, pp. 1-15, 1993.

M. H. Hassoun and J. Song, Adaptive Ho-Kashyap Rules for Perceptron Training*, IEEE Transactions on Neural Networks*, **Vol. 3(1)**, pp. 51-61, 1992.

A. R. Spitzer, C. Wang, J. Luo, R. Ward, and M. H. Hassoun, Quantitative Computer Analysis of

the Sounds of Isolated Motor Unit Potentials, *Neurology: Journal of the American Academy of Neurology*, **Vol. 42**, pp. 868-874, April 1992.

M. H. Hassoun and P. B. Watta, Exact Associative Neural Memory Dynamics Utilizing Boolean Matrices, *IEEE Transactions on Neural Networks*, **Vol. 2 (4)**, pp. 437-448, July 1991.

M. H. Hassoun and A. J. Sanghvi, Fast Computation of Optimal Paths in Two- and Higher Dimension Maps, *Neural Networks*, **Vol. 3(3)**, pp. 355-363, 1990.

S. Bhama and M. H. Hassoun, Continuous Hopfield Computational Network: Hardware Implementation, *Int. J. Electronics*, **Vol. 69(5)**, pp. 603-612, 1990.

M. H. Hassoun, Dynamic Heteroassociative Neural Memories, *Neural Networks*, **Vol. 2(4)**, pp. 275-287, 1989.

M. H. Hassoun and A. M. Youssef, High Performance Recording Algorithm for Hopfield Model Associative Memories, *Optical Engineering*, **Vol. 27**, pp. 46-54, January 1989.

Invited Paper: M. H. Hassoun and R. Arrathoon, Logical Signal Processing with Optically Connected Threshold Gates, *Optical Engineering*, **Vol. 25**, pp. 56-68, January 1986.

M. H. Hassoun and R. Arrathoon, Integrated Optical Fast Electro-Optical D/A Converter Design, *Applied Optics*, **Vol. 23**, p. 1425-1427, May 1984.

R. Arrathoon and M. H. Hassoun, Optical Threshold Logic Elements for Digital Computations, *Optics Letters*, **Vol. 9**, p. 143-145, April 1984.

Journal Manuscripts Under Review
X. Mu,, P. Watta and M. H. Hassoun, A Weighted Voting Model of Associative Memory with Application to Human Face Recognition, submitted to *IEEE Transactions on Neural Networks*, May 2004.
X. Mu, M. Artiklar, P. Watta and M. H. Hassoun, An Associative Memory with Application to Human Face Recognition, submitted to *Neural Processing Letters*, August 2003.

Publications in Refereed Conference Proceedings (Presented by Dr. Hassoun)
Invited Paper: P. B. Watta and M. H. Hassoun, Efficient Realization of the Grounded Hamming Associative Memory, *1996 World Congress on Neural Networks (WCNN 96)*, pp. 763-767, San Diego, CA, September, 1996.

M. H. Hassoun and P. B. Watta, The Hamming Associative Memory and its Relation to the Exponential Capacity DAM, *IEEE International Conference on Neural Networks (ICNN 96),* **Vol. 1**, pp. 583-587, Washington, D. C., June 1996.

Invited Symposium: M. H. Hassoun and P. B. Watta, Alternatives to Energy Function-Based Analysis of Recurrent Neural Networks, *IEEE International Conference on Neural Networks*, November 27 - December 1, 1995, Perth, Australia. Published in: *Computational Intelligence: A Dynamic System Perspective*, M. Palaniswami, Y. Attikiouzel, R. Marks II, and T. Fukada, Eds., pp. 46-67, IEEE Press, 1995.

M. H. Hassoun, P. Watta, and R. Shringarpur, Cross-Validation Without a Validation Set in BP-Trained Neural Networks, *IEEE International Conference on Neural Networks*, 27 November - 1 December, Perth Australia, pp. 369-372, 1995.

M. H. Hassoun and Jing Song, Multilayer Perceptron Learning Via Genetic Search for Hidden Layer Activations, *World Congress on Neural Networks*, **Vol. III**, pp. 437-444. Portland, OR, July 11-15, 1993.

M. H. Hassoun and A. M. Nabha, Implementation of O(n) Complexity Max/Min Circuits for Fuzzy and Connectionist Computing, *IEEE International Conference on Neural Networks*, pp. 998-1003, San Francisco, California, March 28 - April 1, 1993.

M. H. Hassoun, C. Wang, and A. R. Spitzer, Electromyogram Decomposition via Unsupervised Dynamic Multi-layer Neural Network, *International Joint Conference on Neural Networks*, **Vol.II**, pp. 405-412, Baltimore, June 8-11, 1992.

M. H. Hassoun, Adaptive Versions of the Ho-Kashyap Learning Algorithm, *SPIE proceedings*, **Vol. 1558**, pp. 459-465, San Diego, CA, July 1991.

M. H. Hassoun and A. M. Youssef, Autoassociative Neural Memory Capacity and Dynamics*, International Joint Conference on Neural Networks (IJCNN),* Session on Associative Memory, **Vol. I**, pp. 763-769, June 17-21, San Diego, CA, 1990.

M. H. Hassoun and A. Sanghvi, Locally Interconnected Layered Neural Network for Path Optimization, *International Joint Conference on Neural Networks (IJCNN)*, Session on Optimization, **Vol. III**, pp. 811-817, June 17-21, San Diego, CA, 1990.

Invited Paper: M. H. Hassoun, Fast Computation of Optimal Paths in two- and Higher-Dimension Maps, Special Session: Artificial Neural Network Theory, **Vol. I**, pp. 710-713, *IEEE International Symposium on Circuits and Systems*, New Orleans, Louisiana, May 1990.

Invited Paper: M. H. Hassoun, Discrete Dynamic Neural Memories: Training and Performance*, IEEE International Symposium on Circuits and Systems*, Special Session: Optronics Architectures for Neural Networks, **Vol. I**, pp. 470-473Portland, Oregon, May 1989.

M. H. Hassoun, Adaptive Dynamic Heteroassociative Neural Memories for Pattern Classification, in Optical Pattern Recognition, *Proc. SPIE*, **Vol. 1053**, H-K. Liu, ed., pp. 75-83, Los Angeles, CA, January 1989.

M. H. Hassoun, and D. W. Clark, An Adaptive Attentive Learning Algorithm for Single-Layer Neural Networks, in Learning Algorithms II*, Proceedings of the IEEE Annual International Conference on Neural Networks*, pp.431-440, San Diego, CA, July 24-27, 1988.

M. H. Hassoun, "A High Performance Associative Neural Memory (ANM) for Pattern Recognition, in Piece Recognition and Image Processing*, Proc. SPIE*, **Vol. 956**, W. Wiitanen, ed., pp. 85-93, Dearborn, Michigan, June 1988.

M. H. Hassoun, Two-Level Neural Network for Deterministic Logic Processing, in Optical

Computing and Nonlinear Materials, *Proc. SPIE*, **Vol. 881**, N. Peyghambarian, ed., pp. 258-264, Los Angeles, CA, January 1988.

M. H. Hassoun and A. M. Youssef, New Recording Algorithm for Hopfield Model Associative Memories, in Neural Network Models for Optical Computing, *Proc. SPIE*, **Vol. 882**, R. Athale and J. Davis, eds., pp. 62-70, Los Angeles, CA, January 1988.

M. H. Hassoun and R. Arrathoon, Adaptive Optical Threshold Logic, in Optical Information Processing II, *Proc. SPIE*, **Vol. 639**, D. R. Rape, ed.,pp. 95-101, Orlando, Florida, April, 1986.

M. H. Hassoun and R. Arrathoon, Integrated Optical Threshold Gates in Digital Image Processing, in Intelligent Robots and Computer Vision, *Proc. SPIE*, **Vol. 579**, D. P. Casasent, ed., pp. 258-264, Cambridge, Massachusetts, September 1985.

M. H. Hassoun and R. Arrathoon, Pattern Recognition and Logic with Optical Threshold Gates, *Topical Meeting on Optical Computing, Incline Village*, paper WB5-1, Nevada, March 1985.

M. H. Hassoun and R. Arrathoon, Hybrid Digital/Integrated Optical Processor for On-line Classification, in Analog Optical Processing and Computing, *Proc. SPIE*, **Vol. 519**, H. J. Caulfield, ed., pp. 108-113*, First International Conference on Analog Optical Processing and Computing*, Cambridge, Mass., October 1984.

Publications in Refereed Conference Proceedings (Presented by a Student of Dr. Hassoun)

Xiaoyan Mu, Mohamad Hassoun and Paul Watta, "A Weighted Voting and Sequentia Combination of Classifiers Scheme for Human Face Recognition," submitted to the *International Conference on Computer Vision and Pattern Recognition (CVPR 2005)*, San Diego, CA, June 20-26, 2005.

Xiaoyan Mu, Mohamad Hassoun and Paul Watta, "A Weighted Voting Model of Associative Memory," submitted to the *Eighteenth Annual Conference on Neural Information Processing Systems*, Vancouver, B.C., Canada, December 14-16, 2004.

Xiaoyan Mu, Mohamad Hassoun and Paul Watta, "Combining Local Similarity Measures for Gabor features: Summing vs.Voting," *IEEE International Conference on Systems, Man, and Cybernetics*. Washington, DC., October 5-8, 2003.

Xiaoyan Mu, Mehmet Artiklar, P. Watta, and M. Hassoun, "An RCE-based Associative Memory with Application to Human Face Recognition," *International Joint Conference on Artificial Neural Networks (IJCNN '03),* Portland, Oregon, July 20-24, 2003.

Mehmet Artiklar, P. Watta, and M. Hassoun, "Local Voting Networks for Human Face Recognition," *International Joint Conference on Artificial Neural Networks (IJCNN '03),* Portland, Oregon, July 20-24, 2003.

X. Mu, Mehmet Artiklar, Metin Artiklar, P. Watta, and M. Hassoun, "A Training Algorithm for Robust Face Recognition," *International Joint Conference on Neural Networks*, Washington, DC., July 14-19, 2001.

M. Artiklar, A. Masadeh, M. H. Hassoun, and P. Watta, "The Effect of Expression in a Database of Face Images," *Proceedings of the 43rd Midwest Symposium on Circuits and Systems*, August 8-11, 2000, Lansing, MI.

P. Watta, M. Artiklar, A. Masadeh, and M. H. Hassoun, "Construction and Analysis of a Database of Face Images which Requires Minimal Preprocessing," *Proceedings of the IASTED Conference on Modeling and Simulation MS'2000*, May 15-17, 2000, Pittsburg Pennsylvania, pp. 465-469, 2000.

P. Watta, N. Ikeda, M. Artiklar, A. Subramanian, and M. Hassoun, Comparison Between Theory and Simulation for the Two-Level Decoupled Hamming Associative Memory, *IJCNN 99*, July 1999, Washington D.C. CD proceedings paper number JCNN0337.pdf.

M. Artiklar, M. Hassoun, and P. Watta, Application of a Post-processing Algorithm for Improved Human Face Recognition, *IJCNN 99*, July 1999, Washington D.C., CD proceedings paper number JCNN2166.pdf.

N. Ikeda, P. Watta, and M. H. Hassoun, Capacity Analysis of the Two-Level Decoupled Hamming Associative Memory, *1998 IEEE World Congress on Computational Intelligence*, *Proceedings of IJCNN 98*, pp. 486-491, Anchorage, Alaska, May 4-9, 1998.

P. B. Watta, M. Akkal, and M. H. Hassoun. Decoupled-Voting Hamming Associative Memory Networks, *1997 International Conference on Neural Networks (ICNN 97),* **Vol. 2**, pp. 1188-1193, June 9-12, Houston, Texas.

Invited Paper: P. B. Watta, M. H. Hassoun, and Jerome Meisel, Design of OptimalNeuro-Controllers for the Separately Excited DC Motor using a Hybrid Genetic Algorithm-Neural Network Approach, *SPIE Conference on the Applications and Science of Artificial Neural Networks II*, **Vol. 2760**, pp. 230-241, April 1996, Orlando, FL.

A. Sudjianto, G. S. Wasserman, and M. H. Hassoun, Extensions of PCA for Data Intensive Computing, *Proceedings of the Fifth Industrial Engineering Research Conference*, R. G. Askin, B. Bidanda, and S. Jagdale, Eds., pp. 711-716, Minneapolis, May 18-20, 1996.

A. Sudjianto, M. H. Hassoun, and G. S. Wasserman, Extensions of Principal Component Analysis for Nonlinear Feature Extraction, *International Conference on Neural Networks (ICNN 96),* **Vol. 3**, pp. 1433-1438, Washington, D.C., June 1996.

Invited Paper: P. W. Watta, K. Wang, R. Shringarpure, and M. H. Hassoun, Dynamical Boolean Systems: Stability Analysis and Applications, in Applications and Science of Neural Networks, *1995 SPIE Symposium on OE/Aerospace Sensing and Dual Use Photonics*, **Vol. 2492**, pp. 512-523, April 17-21, 1995, Orlando, Florida.

P. W. Watta, R. Shringarpure, K. Wang, and M. H. Hassoun, Dynamical Boolean Systems: Stability Analysis and Applications, *SPIE Applications and Science of Artificial Neural Networks*, April, 1995, Orlando, Florida.

P. W. Watta and M. H. Hassoun, A Coupled Gradient Network for the Solution of the Temporal Unit Commitment Problem in Power Systems Planning, *IEEE International Conference on*

Neural Networks, **Vol. VI**, pp. 3761-3765, June 26-July 2, 1994, Orlando, Florida.

P. W. Watta and M. H. Hassoun, A Coupled Gradient Network for the Solution of the Static Unit Commitment Problem in Power Systems Planning, *World Conference on Neural Networks*, **Vol. I**, pp. 471-477, June 4-9, 1994, San Diego, CA.

Invited Paper: A. Sudjianto and M. H. Hassoun, Nonlinear Hebbian Rule: A Statistical Interpretation*, IEEE International Conference on Neural Networks*, **Vol. II**, pp. 1247- 1252, June 26-July 2, 1994, Orlando, Florida.

M. H. Hassoun and P. B. Watta, Optimization of the Unit Commitment Problem by a Coupled Gradient Network and by a Genetic Algorithm, *UTEXPO '93*, Dearborn, Michigan, July 19-21, 1993.

R. Abu Zitar and M. H. Hassoun, "Genetic and Reinforcement-Based Rule Extraction for Regulator Control, *The 32nd IEEE Conference on Decision and Control*, San Antonio, Texas, December 15-17, 1993.

R. Abu Zitar and M. H. Hassoun, Regulator Control via Genetic Search Assisted Reinforcement, *Proceedings of the Fifth International Conference on Genetic Algorithms*, S. Forrest, Editor, pp. 254-262, Urbana-Champain, 1993.

A. R. Spitzer and M. H. Hassoun, NNERVE: Neural Network Extraction of Repetitive Vectors for Electrodiagnosis, *Proc. of the Sixth Annual IEEE Symposium on Computer Based Medical Systems*, pp. 171-176, Ann Arbor, 1993.

A. M. Youssef and M. H. Hassoun, Performance of Dynamic Associative Memories with Constrained Weight Accuracy, *Proceedings of the Artificial Neural Networks in Engineering Conference*, pp. 305-312, St. Louis, Missouri, November 1992.

A. R. Spitzer, M. H. Hassoun, C. Wang, and F. Bearden, Signal Decomposition and Diagnostic Classification of the Electromyogram Using a Novel Neural Network Technique*, Proceedings of the 14th Annual Symposium on Computer Applications in Medical Care*, Washington, D.C., November 1990, pp. 552-556.

J. Song and M. H. Hassoun, Learning with Hidden Targets, *International Joint Conference on Neural Networks (IJCNN),* Session: Supervised Learning II, **Vol. III**, pp. 93-98, June 17-21, San Diego, CA, 1990.

J. Sun, W. Grosky, and M. H. Hassoun, A Fast Algorithm for Finding Global Minima of Error Function in Layered Neural Networks, *International Joint Conference on Neural Networks (IJCNN)*, Session: Supervised Learning I, **Vol. I**, pp. 715-720, June 17-21, San Diego, CA, 1990.

W. Grosky, J. Sun, and M. H. Hassoun, Heuristics and Hybrid Methods for Finding the Global Minima of the Error Function in Artificial Neural Networks, *Proceedings of the 1990 Pittsburgh Conference on Modeling and Simulation*, Pittsburgh, Pennsylvania, May 1990, pp. 512-526.

M. H. Hassoun, J. Song, S-M Shen, and A. R. Spitzer, Self-Organizing Autoassociative Dynamic Multiple-Layer Neural Net for the Decomposition of Repetitive Superimposed Signals*,*

Proceedings of the International Joint Conference (IEEE/INNS) on Neural Networks, Washington, D.C., **Vol. I**, pp. 621-626, January 1990.

A. M. Youssef and M. H. Hassoun, Dynamic Autoassociative Neural Memory Performance vs. Capacity, in Optical Pattern Recognition, *Proc. SPIE*, **Vol. 1053**, H-K. Liu, ed., pp. 52-59, Los Angeles, CA, January 1989.

R. Arrathoon and M. H. Hassoun, Design and Performance of a High-Precision Programmable High-Precision Threshold Gate, in Digital Optical Computing, *Proc. SPIE*, Vol. 752, pp. 143-150, Los Angeles, CA, January 1987. Also appeared in Selected Papers on Optical Computing, **Vol. 1142**, pp. 281-288, H. J. Caulfield and G. Gheen, Editors.

Published Abstracts

A. R. Spitzer, C. Wang, J. Luo, R. Ward, and M. H,. Hassoun, Quantitative Computer Analysis of the Sounds of Isolated MUPs, *American Academy of Neurology, 43 Annual Meeting*, Boston, Mass., abstract appeared in Neurology, **Vol. 41(3),** supplement 1, p. 355, May 1991.

A. R. Spitzer, S. Shen, and M. H. Hassoun, Identification of Unstable MUP Waveforms for Stability Analysis, *Muscle & Nerve*, **Vol. 12**, p. 757, AAEE Annual Scientific Meeting, September, 1989.

A. R. Spitzer, C. Wang, and M. H. Hassoun, Digital Filtering of the EMG for Automated EMG Decomposition, *Muscle & Nerve*, **Vol. 12**, p. 779, AAEE Annual Scientific Meeting, Sept. 1989.

M. H. Hassoun and A. R. Spitzer, Neural Network Identification and Extraction of Repetitive Superimposed Pulses in Noisy l-D signals, *Neural Networks*, **Vol. 1**, Supl. 1, p. 443, *Abstracts of the First Annual Meeting of the International Neural Network Society*, Boston, Mass., September 6-10, 1988.

R. A. Spitzer and M. H. Hassoun, Automated Motor Unit Extraction by Neural Network Processing, *Neurology*, **Vol. 38(S1)**, p. 216, 40th Annual Meeting of the American Academy of Neurology, Cincinnati, Ohio, 17-23, April, 1988.

Research Reports (for External Contracts)

M. H. Hassoun and P. Watta, Optimization of the Unit Commitment Problem by a Coupled Gradient Network and by a Genetic Algorithm, Final Research Report, Contract RP8010-29, Electric Power Research Institute (EPRI), March, 1993.

M. H. Hassoun and J. Song, A Hybrid Genetic/Gradient Descent Learning Algorithm, Final Research Report, Contract # 4700-942391, Ford Motor Company, April 1992.

M. H. Hassoun and P. Watta, A Coupled Gradient Neural Network with Application to the Unit Commitment Problem, Progress Research Report, Contract RP8010-29, Electric Power Research Institute (EPRI), September, 1992.

Invited Seminars/Presentations

Automated Human Face Recognition: A Weighted Voting Method, American University of Beirut (AUB), Department of Electrical and Computer Engineering, June 29, 2004.

Freshman Engineering Design with LEGO® Programmable Robots (BE1200), 5th Annual TLTR Conference, WSU, March 11, 2004.

Curriculum development: BE1100 Introduction to Engineering – Special Lego Robotics Design Section. Teaching and Learning with e-Technology, 3rd Annual TLTR Conference, Wayne State University, March 7, 2002.

Creating a Paperless and Chalkless Course: Lessons Learned, Technology in Learning Presentation Series, Office of Teaching and Learning, Wayne State University, November 19, 1998.

M. H. Hassoun and A. Sudjianto, Compression Net-Free Autoencoders, Workshop on Autoencoders, 11th Annual Conference on Neural Information Processing Systems (NIPS 97), Denver, Colorado, December 1997.

M. H. Hassoun and P. Watta, A WWW-Based Multimedia Textbook for Artificial Neural Networks, Technology in Learning Presentation Series, Office of Teaching and Learning, Wayne State University, October 1997.

Genetic-Assisted Reinforcement Neurocontrollers, presented at Chrysler's Technical Center, Auburn Hills, MI, November 4, 1994.

Artificial Neural Networks: Basic Concepts and Applications, presented at Wayne State University, sponsored by Society of Palestinian Engineers and Scientists, September 16, 1993.

Hybrid Genetic/Gradient Learning in Multi-Layer Neural Networks, presented at the Institute for Computer Research, Systems Design Department, University of Waterloo, Waterloo, Canada, November 25, 1992.

Hybrid Genetic/Gradient Search Algorithms for Neural Network Training, presented at the Scientific Research Laboratory, Ford Motor Company, Dearborn, MI, October 5, 1992.

Artificial Neural Networks: Paradigms and Applications, presented at TRW Transportation, Electronics Division, Farmington Hills, MI, July 2, 1992.

A Connectionist Approach to Optimal Path Computation, presented at The Ohio State University, Department of Electrical Engineering, Columbus, OH, November 21, 1991.

Autoassociative Neural Memory Capacity and Dynamics, presented at The University of Toledo, Department of Electrical Engineering, Toledo, Ohio, October 25, 1991.

Locally Interconnected Concurrent Neural Like Architecture for on-line Optimization, presented at EPRI, Palo Alto, California, June 14, 1991.

Artificial Neural Systems: Introduction and Applications, presented at M&M Mars, Inc. Chicago, Illinois, March 15, 1991.

Artificial Neural Systems: An Introduction, talk invited by the Association for Lebanese

American Engineers and Scientists (ALAES), Dearborn, Michigan, November10, 1990.

Parallel Search for Optimal Solutions Utilizing Neural-Like Architectures, presented at Smith Industries (Aerospace and Defense Systems), Grand Rapids, Michigan, February 9, 1990.

Associative Neural Memories Synthesis and Dynamics, Symposium for Innovation in Measurement Science, Instrument Society of America, Geneva, New York, August 1989.

Neural Net-Based Physiologic Waveform Analysis, presented at the Industrial Technology Institute, Ann Arbor, MI, February 4, 1989.

Associative Neural Memories: Synthesis and Dynamics, presented at the Department of Electrical Engineering, Michigan State University, East Lansing, MI, February 15, 1989.

Artificial Neural Systems for Pattern Recognition and Intelligent Control, presented at the Scientific Research Laboratory, Ford Motor Company, Dearborn, MI, June 12, 1988.

Interviews in Local Magazines/Newspaper
Computer Sees the Light: Machine of the Future Could have the Ability to Learn, Much Like the Human Brain, article featured in March 21, 1989 issue of *Detroit Free Press*, Science & Medicine Section.

Contributed Articles in Wayne State University's Publications
LEGO mania makes for fun curriculum, *The South End*, Vol. 38, Issue 131, p. 1, March 7, 2002.

Programming Computers to Recognize face, *The Helios News*, College of Engineering, p. 3, March – April 1998.

WSU Research Could Lead to Well-Mannered Machines, *The South End*, Vol. 34, Issue 119, p. 1, February, 1988.

Duplicating the Brain: Research in Artificial Neural Computing, *Exemplar*, College of Engineering, pp. 9-12, Fall 1989.

Book Reviews
Pattern Recognition with Neural Networks, Bill Bialek (New York: Oxford University Press, 1994). Manuscript reviewed upon the request of Donald C. Jackson, Vice President and Executive Editor, Science and Medicine, Oxford University Press.

Introduction to Artificial Neural Systems, Jacek Zurada. (St. Paul, MN: West Publishing). Manuscript reviewed upon the request of P. Gordon, Engineering Editor, West Publishing.

Foundations of Neural Networks, Tarun Khanna. (Reading, Mass.: Addison-Wesley, 1990). *IEEE Transactions on Neural Networks*, **Vol. 2(3)**, 1991.

Content-Addressable Memories, 2nd ed., Teuvo Kohonen. (New York: Springer Verlag, 1987) appeared in Optical Engineering, Vol. 27(2), p. SR-027, February 1988.

Critical Reviews

Neural Selective Processing and Learning, P. Gelband and E. Tse, *Proceedings of the IEEE International Conference on Neural Networks*, **Vol. I**, 417-424, 1989. Review appeared in *Neural Network Review*, **Vol. 3(1),** pp. 24-25, 1989.

Funded Internal Research Grants

WSU Undergraduate Research Grant, "Design and Implementation of an Excel-based M6800 Microprocessor Simulator for Enhancing Student Learning," sponsored student: Dave Conger, **$3,050**, 2005.

Innovative Instructional Technology Grant: "Freshman Engineering Design with LEGO® Programmable Robots (BE 1200), **$5,000** + **$2,000** ECE matching, 2005.

Innovative Instructional Technology Grant: "Freshman Engineering Design with LEGO® Programmable Robots (BE 1200**), $4800**, 2004.

Recruiting Thomas Rumble university Graduate Fellowship (student: Ms. Xiaoyan Mu), AY: 1999-2000.

Smart Sensors and Integrated Devices -- A Program of Research Excellence, (co-PI with G. Auner, P. Siy, L. Schweibert, S. Ng, M. Rathod, R. Naik, L. Wenger, G.-Y. Liu, R. Needleman, L. Rimai, and J. Mantese, funded by WSU's Research Excellence Centers Program, **$1.5M**, for five years starting fall 1997.

Grant for a GRA support, Graduate School, Wayne State University, **$13,900** (plus benefits and tuition), 97-98.

Grant for GRA support, IMR, Wayne State University, **$12,000** (plus benefits and tuition), 96-97 (With Dr. Paul Watta).

A Multimedia Text for the Undergraduate Artificial Neural Networks Course in Electrical Engineering, WSU, New Technology in Learning Grant sponsored by the Dean of University Libraries. Duration: one year, starting May 1996 (**$10,000**). (Paul Watta, co-investigator).

A Multimedia Text for the Undergraduate Artificial Neural Networks Course in Electrical Engineering. WSU, College of Engineering Teaching Innovation Award. One year, starting May 1996. (Note: Proposal funded through the ECE Department at the **$10,000** level).

Grant for GRA support, IMR, Wayne State University, **$12,000** (plus benefits and tuition), 95-96. (With Dr. Paul Watta).

Career Development Chair Award, Wayne State University, **$18,500**, 1993-1994.

Engineering Open House Project: Interactive Training of a Neural Network Controller for a Ball on a Beam ($600), College of Engineering, Wayne State University, winter 1993.

Engineering Open House Project: Fiber Optic Image Scrambling/Unscrambling Bundle ($800), College of Engineering, Wayne State University, winter 1990.

Supplemental Research Equipment Grant (**$12,550**), February , 1990.

Supplemental Research Equipment Grant (**$27,475**), Wayne State University, February 1989.

Small Research Grant ($1000), Wayne State University, March 1989.

Small Research Grant ($900), Wayne State University, 1987.

Small Research Grant ($300), Wayne State University, 1986.

Funded External Research Grants/Contracts

Title: High Performance Associative Memory: Practical Generalizations (with P. Watta, co-PI)
Agency: National Science Foundation (Neurocomputing Program).
Period: Three years, starting September, 1997
Amount: **$301,011.**

Title: Transparent Neural Networks (with Professor Ishwar Sethi, Computer Science).
Agency: Electric Power Research Institute (EPRI)
Period: 1994-1997
Amount: **$199,056**

Title: Presidential Young Investigator Award (ECS 9057896)
Funding: National Science Foundation
Period: October 1990 - October 1995 (extended till September 96)
Amount: **$25,000 base grant per year and up to $37,500 matching grant per year, for five years.**

Title: Lsim Software for MOS VLSI design of Artificial Neural Networks - PYI matching
Agency: Mentor Graphics Corporation
Period: September 1993
Amount: **$94,800**

Title: Unit Commitment Scheduling in Electric Power Systems: A Connectionist Approach
          (Contract RP- 8010-29) - PYI matching
Agency: Electric Power Research Institute (EPRI)
Period: December 1991 - January 1993
Amount: **$37,500**

Title: Design and Characterization of Supervised/Unsupervised Concept-Forming Multiple-
          Layer Neural Network: PYI matching
Agency: Ford Motor Company
Period: September 1991 - September 1992
Amount: **$17,500**

Title: Hybrid Genetic/Gradient Search Algorithm for the Training of Multi-Layer Neural
                  Networks (Contract 4700-942391) - PYI matching
Agency: Ford Motor Company,
Period: May 1991 to April 1992

Amount: **$30,155**

Title: PYI Matching Equipment Grant (four 20 MHz 386 PC's and one 33MHz 386 PC)
Agency: Zenith Data Systems
Period: 1991-1992
Amount: **$13,749** (market value)

Title: PYI Award Matching
Agency: Unisys
Period: November 1990
Amount: **$5,000**

Title: Equipment Proposal: SUN 470 Server - PYI fund matching
Agency: Sun Microsystems, Inc.
Period: July 1990
Amount: **$42,510** (market value)

Title: Research Initiation Award: Artificial Neural Network Architectures Based on High Performance Associative Neural Memories (ANMs) (EET-8808479)
Agency: National Science Foundation
Period: August 1988 - January 1991
Amount: **$59,995**

Title: Support for Women, Minority, and Disabled Engineering Research Assistants, awarded as a supplement to the Research Initiation Award
Agency: National Science Foundation
Period: March 1989
Amount: **$10,000**

Title: A Robust System for the Analysis of the Electromyogram Utilizing a Neural Network Architecture, Co-Investigator with A. R. Spitzer, M.D., Neurology Department.
Agency: Whitaker Foundation
Period: July 1988 - July 1991
Amount: **$180,000**

Recent Research Proposals (Not Funded)
Title: Capacity Analysis of Classification Algorithms for Human Face Image Recognition and Rejection.
Agency: NSF, ECS – Learning and Intelligent Systems.
Period: 09-01-01 to 12-31-03.
Amount: **$327,325**.

Title: A Multimedia Presentation of Artificial Neural Networks Throughout the Electrical and Computer Engineering Curricula.
Agency: NSF, Course, Curriculum and Laboratory Improvement (CCLI).
Period: 1-1-00 to 12-31-02.
Amount: **$337,001**.

Title: A Multimedia Presentation of Artificial Neural Networks Throughout the Curriculum.

Agency: NSF, Combined Research-Curriculum Development (CRCD).
Period: 9-1-98 to 8-31-01.
Amount: $368,157.

Title: A Web-Based Multimedia Presentation of Introductory Electric Circuit Analysis (with
          P. Watta, co-PI).
Agency: National Science Foundation (Course and Curriculum Development Program).
Period: Three years, starting September 1998.
Amount: $440,716

Title: A Multimedia Textbook for Artificial Neural Networks in Undergraduate Computer
          Science, Math, and Engineering Education (with P. Watta, co-PI)
Agency: National Science Foundation (CISE Educational Innovation Program).
Period: Three years, starting August 1996.
Amount: $630,437 ($481,860 NSF; $128,577 WSU/ECE)

Title: Integrated Approach to Intelligent Systems (with G. Auner, P. Watta, P. Siy, and R.
Naik)
Agency: DOD: Army Research Office (FY96 MURI Topic)
Period: Five years starting fall 1996
Amount: $4,177,363

Title: Analysis and Design of Recurrent Neural Networks Using a Dynamical Boolean
          Systems Approach (with P. Watta, ECE).
Agency: National Science Foundation, submitted March 1995
Period: Fall 1995 - Fall 1998
Amount: $271,997

Title: Design of Optimal Electric Motor Controllers Using a Hybrid Genetic Algorithm -
          Neural Network Approach (with J. Meisel, and P. Watta, ECE).
Agency: National Science Foundation, submitted March 1995
Period: Fall 1995 - Fall 1998
Amount: $293,478

Gifts

Delta Neural Network Computer (valued at $25,000), donated to the Computation and Neural
Networks Laboratory, March 1996.

Patents Granted

U.S. Patent #4,729,111 - Optical Threshold Logic Elements and Circuits for Digital
Computation, M. H. Hassoun and R. Arrathoon, Wayne State University. Issue Date: March 1,
1988.

U.S. Patent #5,092,343 - Waveform Analysis Apparatus and Method Using Neural Network
Techniques , M. H. Hassoun and R. A. Spitzer, Wayne State University. Issue Date: March 3,
1992.

Canadian Patent #1,323,662 - Physiologic Waveform Analysis, M. H. Hassoun and A.R.Spitzer,
Wayne State University. Issue Date: October 26, 1993.

Awards

Educator of the Year Award, awarded by the Arab American Anti-Discrimination Committee (ADC), March 2001, Dearborn, Michigan.

Career Development Chair Award, Wayne State University, April 1993.

College of Engineering Excellence in Teaching Award, Wayne State University, November 1992.

President's Award for Excellence in Teaching, Wayne State University, April 1991.

Outstanding Teaching Award, College of Engineering, WSU, April 1991.

Presidential Young Investigator Award, National Science Foundation, May 1990.

Outstanding Teaching Award, College of Engineering, WSU, April 1990.

Outstanding Faculty Service Award, College of Engineering, WSU, April 1989.

Research Initiation Award, National Science Foundation, January 1988.

Outstanding Teaching Award, College of Engineering, WSU, April 1988.

Honors

Listed in 2000 Notable American Men, American Biographical Institute, 1992.

Michigan Legislature, Concurrent Resolution (No. 700) of the Highest Praise and Admiration, June 1990.

Who's Who Among Rising Young Americans, 1990.

Outstanding Young Men of America, 1989.

Professional Societies

American Association for the Advancement of Science, since 1995.

IEEE Circuits and Systems' Neural Systems and Applications Committee, 1990.

ASEE, American Association for Engineering Education, since 1989.

Sigma Xi, The Scientific Research Society, 1988 - 1995.

INNS, The International Neural Network Society, since 1988.

IEEE, The Institute of Electrical and Electronics Engineers, since 1988.

SPIE, The International Society for Optical Engineering, 1987 - 1995.

Tau Beta Pi, The Engineering Honor Society, since 1981.

Community Services

Board Member, Arab Community Center for Economic and Social Services (ACCESS). 1986 - 2003. Served as Chair of ACCESS's Program Committee, 1994 – 1999. Served as ACCESS Treasurer, 2000-2003.

Advisory Committee Member, Arab-American Anti-Discrimination Committee (ADC), January 20001 – 2002.

Planning Committee Member, First National Conference on Health Issues in the Arab American Community: Challenges, Opportunities, and Strategies, April 30 - May 1, 1999. Westin Hotel, Southfield, MI. (conference sponsors: ACCESS, Wayne State University School of Medicine, DMC, Henry Ford Health System, Oakwood Hospital, Beaumont Hospital, Karmanos Cancer Institute, St. John Health System, National Arab American Medical Association, Chaldean Federation of America, Parke-Davis, The Wellness Plan, WWJ 950 Radio.

Planning Committee Member, Third National Conference on Health Issues in the Arab American Community: Challenges, Opportunities, and Strategies, 2003.

Multicultural Immersion, Participated in five full day cultural immersion sessions on African American, Indian American, Hispanic/Latino American, Asian American, and Arab/Caldian American cultures. Sponsored by New Detroit and a number of other local social and humanitarian organizations, Summer 1997 - Fall 1997.

Name: Feng Lin

Office Address:	Home Address:
3129 Engineering Building	346 Ivy Lane
5050 Anthony Wayne Dr.	Troy, MI 48098
Detroit, MI 48202	
Telephone: (313) 5773428	Telephone: (248)7401112

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DEPARTMENT: Electrical and Computer Engineering
PRESENT RANK AND DATE OF RANK: Professor, 2000
WSU APPOINTMENT HISTORY
      Year Appointed/Rank: 1988/Assistant Professor
      Year Awarded Tenure: 1994
      Year Promoted to Associate Professor: 1994
      Year Promoted to Full Professor: 2000

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DATE & PLACE OF BIRTH: March 10, 1960, Shanghai, China
CITIZEN OF: U.S.A.

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EDUCATION (Name of institution, place and date of degree)
High School: Fanyu High School, Shanghai, 1978
Baccalaureate: B.Eng., Shanghai Jiaotong University, Shanghai, 1982
Graduate: M.A.Sc., University of Toronto, Toronto, 1984
                              Ph.D., University of Toronto, 1988
Postgraduate (postdoctoral): Harvard University, Cambridge, 1988

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FACULTY APPOINTMENT AT OTHER INSTITUTIONS: N/A

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PROFESSIONAL SOCIETY MEMBERSHIP(S)
      IEEE, Control Systems Society
      SIAM, The Great Lakes Section
      Fellow, Automotive Industry Research Institute
HONORS/AWARDS
      Open Fellowship, University of Toronto, 1985-1987
      Research Initiation Award, National Science Foundation, 1990-1992
      Outstanding Teaching Award, College of Engineering, Wayne State University,
      1993
      Axelby Outstanding Paper Award for IEEE Transactions on Automatic Control,
      1994, for the paper "Limited lookahead policies in supervisory control of
      discrete event systems," published in 1992
BIOGRAPHICAL CITATIONS (National/Regional or Professional Directories)

I. TEACHING

    A. Years at Wayne State: Since August 1988

    B. Courses Taught at Wayne State

        1. Undergraduate

            ECE 3300, Introduction to Electrical Circuits

            ECE 4330, Linear Network and System Analysis

            ECE 4470, Control Systems I

        2. Graduate

            ECE 5440, Computer Controlled Systems

            ECE 5460, Stochastic Processes in Engineering

            ECE 5470, Control Systems II

            ECE 7430, Control of Discrete Event Systems

            ECE 7470, Signal Analysis and Digital Control

            ECE 7950, Control and Optimization of Flexible Manufacturing
            Systems

        3. Graduate Professional School

    C. Essays/Theses/Dissertations Directed

        Ph.D. student graduated:

        [1] K. S. Song, received his Ph.D. in 2001, now working at Naval Academy, Korea

        Dissertation: A robust adaptive autopilot design for decomposed bank of turn missiles.

        [2] B. M. Badreddine, received his Ph.D. in 2001, now working at Ford

        Dissertation: Active damping of engine idle spped oscillation by applying adaptive PID control.

        [3] G. Saikalis, received his Ph.D. in 2000, now working at Hitachi

        Dissertation: New adaption methodologies applied to adaptive control systems and system identification.

        [4] C. Cao, received his Ph.D. in 1996, now working at General Motors.

        Dissertation: Modeling and control from discrete event systems and real time systems to hybrid systems.

        Also directly involved in supervising the following Ph.D. students:

        [1] Y.-L. Chen, received his Ph.D. in 1997.

        Dissertation: Modular Discrete event systems: modeling, control with priorities, and incremental model evolution.

        [2] N. Ben Hadj-Alouane, received his Ph. D. in 1994.

        Dissertation: Modeling and on-line control of software/hardware systems.

        [3] S.-L. Chung, received his Ph. D. in 1992.

        Dissertation: Control of discrete event systems using limited lookahead policies.

    D. Course or Curriculum Development

        New course developed

        ECE 5460, Stochastic Processes in Engineering: New course developed

ECE 7430, Control of Discrete Event Systems: New course developed
ECE 7950, Control and Optimization of Flexible Manufacturing Systems:
E. Course Materials (Unpublished)
Control of Discrete Event Systems, course material for ECE 7430.

II. RESEARCH
A. Funded Research
1. "Extensions of supervisory control of discrete event systems," National Science Foundation, $45,000, 1990 - 1992.
2. "Contention-based link impact on closed-loop control," Ford Motor Company, $135,000, 1990 - 1993, (with S. M. Mahmud, my share: 50%).
3. "IPA agreement" NASA Ames Research Center, $10,000, 1992, (with H. Mortazavian, my share: 50%)
4. "Development of an embedded controller for building automation systems," Control Pak Corporation, $15,203, 1993.
5. "Development of diagnostic testing strategies," National Science Foundation and Ford Motor Company, $30,000, 1990 - 1993.
6. "On-line diagnostics for remote systems monitored at a central station," ANR Pipeline Company, $12,000, 1993-1994.
7. "Fuzzy control of self-adjusting seats," Johnson Controls, Inc., $59,985, 1993-1994.
8. "Development of a comprehensive theory for discrete event systems," National Science Foundation, $130,000, 1994-1997.
9. "Development of window based software for automation of energy management systems in large building," Control Pak International, $51,679, 1996-1997, (with S. M. Mahmud, my share: 50%).
10. "U.S.-China cooperative research: Modeling and testing software tools for mixed signal circuits," National Science Foundation, $35,520, 1997-1999.
11. "Modeling and verification of hybrid systems," NASA Ames Research Center, $90,000, 1996-1999.
12. "IPA agreement," NASA Ames Research Center, $12,368, 1998.
13. "Development of Tools for global analysis of large air traffic management systems," NASA Ames Research Center, $90,000, 1999-2002.
14. "Agile symbolic mission control and hostile counteraction strategies," DARPA, $1,470,000, 1999-2001 (with J. Lee, Y.-L. Chen, B. Stilman and V. Yakhnis, my share: 20%).
15. " Investigation of automation and optimization of the build authority process," General Motors, $74,200, 2000.
16. " Design of supervisory control software for dynamic systems with decentralized information," National Science Foundation, $500,000, 2000-2003 (with S. Lafortune and D. Teneketzis, my share: 33%).
17. "Multi-Agent Hybrid Control Approach to Air Traffic Control," NASA Ames Research Center, $90,000, 2002-2005.
18. "Analysis of interrupt latency using hybrid machines", National Science Foundation, $31,200, 2002-2005.
19. "A treatment decision modeling and optimizing technolog", National Institute of Biomedical Imaging and Bioengineering, $439,650, 2003-2006 (with Hao Ying, my share: 40%).

B. Fellowships/Grants/Special Awards in Last Five Years
  Research Award from Ford Motor Company, 1990
  Faculty Research Award from ANR Pipeline Company, 1991
  Patent Issued:
  1. Application Independent, Portable Room Temperature and Humidity Controller, United States Patent 5,364,024, November 15, 1994.
  2. Adaptive PID Control Method and System for Internal Combustion Engine Rotation Speed Pulsation Damping, United States Patent 6,591,808, July 15, 2003.

III. PUBLICATION
 A. Scholarly Books Published
  1. Authored
   F. Lin, Robust Control: An Optimal Control Approach, AFT Press, 1997. 119 pages.
 B. Chapters Published
  1. Authored
   F. Lin, "Discrete event systems," Magill's Survey of Science: Applied Science, F. N. Magill (editor), Salem Press, 1993, pp. 674-681.
  2. Co-Authored
   [1] M. Heymann, F. Lin and G. Meyer "Control of rate-bounded hybrid systems with liveness constraints," *Advances in Mathematical Systems Theory, F. Colonius, U. Helmke, D. Pratzel-Wolters and F. Wirth (editors), Brikhauser*, 2001, pp.151-168.
   [2] M. Heymann and F. Lin, "Nonblocking supervisory control of nondeterministic systems," *Operators, Systems, and Linear Algebra, U. Helmke, D. Pratzel-Wolters and E. Zerz (editors), B.G. Teubner Stuttgart,* 1997, pp.96-110.
   [3] S. L. Chung, S. Lafortune and F. Lin, "Supervisory control with lookahead policies: illustrative example," *Discrete Event Systems: Modeling and Control, S. Balemi, P. Kozak and R. Smedinga (editors), Brikhauser Verlag Basel,* 1993, pp. 207-214.
   [4] F. Lin and W. M. Wonham, 1988, "Supervisory control and observation of discrete-event systems," *Analysis and Control of Nonlinear Systems, C. I. Byrnes, C. F. Martin and R. E. Saeks (editors), North-Holland,* pp. 337-348.
 C. Journal Articles Published
  1. Refereed Journals
  Accepted
   [1] M. Heymann, F. Lin, G. Meyer and S. Resmerita, "Analysis of Zeno behaviors in hybrid systems," *IEEE Transactions on Automatic Control*, to appear.
   [2] N. Ben Hadj-Alouane, S. Lafrance, F. Lin, J. Mullins, and M. Yeddes, "Characterizing Intransitive Non-Interference in Security Policies with Observability," *IEEE Transactions on Automatic Control*, to appear.
   [3] F. Lin, "Theorem of Abstraction for equivalent controllers in hybrid systems," *Information Sciences,* to appear.
   [4] C. Ion, G. Yin, F. Lin, and L.Y. Wang, "Continuous-time adaptive filtering algorithms using sign operators," *Dynamical Systems: An*

International Journal, to appear.

Published in 2003

[1] K. Rudie, S. Lafortune, and F. Lin, "Minimal communication in a distributed discrete-event system," *IEEE Transactions on Automatic Control, 48(6)*, 2003, pp.1965-1970.

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[1] D. S. Kim, D. M. Kulkarni and F. Lin, " An upper bound for carriers in a three-workstation closed serial production system operating under production blocking," *IEEE Transactions on Automatic Control, 47(7)*, 2002, pp. 1134-1138.

[2] F. Lin and H. Ying, "Modeling and control of Fuzzy Discrete Event Systems," *IEEE Transactions on Man, Systems and Cybernetics, Part B, 32(4),* 2002, pp. 408-415.

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Published in 2000

[1] F. Lin, "An optimal control approach to robust control design," *International Journal of Control, 73(3),* 2000, pp. 177-186.

[2] Y.-L. Chen, S. Lafortune, and F. Lin, "Incremental model evolution and reusability of supervisors for discrete event systems," *Automatica, 36*, 2000, pp. 243-259.

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D. Papers Published in Conference Proceedings

    1. Refereed Papers

    Accepted

[1] N. Ben Hadj-Alouane, S. Lafrance, F. Lin, J. Mullins, M. Yeddes, "An Algorithmic Approach to Verification of Intransitive Non-Interference in Multiple Level Security Policies," *Proceedings of the 43rd IEEE Conference on Decision and Control*, 2004, to appear.

[2] H. Ying, F. Lin, X. Luan, R.D. MacArthur, J.A. Cohn, D.C. Barth-Jones, and L.R. Crane, "Control of Fuzzy Discrete Event Systems and Its Applications to Clinical Treatment Planning," *Proceedings of the 43rd IEEE Conference on Decision and Control*, 2004, to appear.

Published in 2004

[1] H. Ying, F. Lin, X. Luan, R.D. MacArthur, J.A. Cohn, D.C. Barth-Jones, and L.R. Crane"A fuzzy discrete event system for HIV/AIDS treatment planning," *Proceedings of the IEEE International Conference on Fuzzy Systems*, 2004.

[2] N. Ben Hadj-Alouane, S. Lafrance, F. Lin, J. Mullins, M. Yeddes, "A discrete event systems approach to the verification of the information flow properties in secure protocols," *Proceedings of the IFAC Workshop on Discrete Event Systems*, 2004.

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[10] X. J. Ma and F. Lin, "Nonlinear robust control and its application to manipulators," *Proceedings of the 18th Annual Pittsburgh Conference on Modeling and Simulation*, 1987, pp. 1475- 1480.

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E. Paper presented

1. Invited and/or Refereed Internationally or Nationally

Presented in 2001

[1] "Active damping of engine idle speed oscillation by applying adaptive PID control ," *SAE 2001 World Congress, March 2001, Detroit, MI, USA, Session: Electronic Engine Controls (Part A&B).*

Presented in 1999

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Presented in 1998

    [1] "Interrupt latency problem in automotive component design," *1998 Detroit Automotive Technology Conference*, Detroit, MI, 1998.

Presented in 1997

    [1] "An upper bound for the carrier number in a closed serial production system operating under production blocking," *9th INFORMS Applied Probability Conference*, Boston, MA, 1997.

    [2] "Synthesis and viability of minimally interventive legal controllers for hybrid systems," *Fifth International Conference on Hybrid Systems*, Notre Dame, IN, 1997.

Presented in 1996

    [1] "Robust control of nonlinear systems with uncertainty in input matrix," *MTNS 96*, St. Louis, MO, 1996.

    [2] "A generalized framework for supervisory control of discrete event systems," *MTNS 96*, St. Louis, MO, 1996.

    [3] "Control synthesis for a class of hybrid systems subject to configuration-based safety constraints," *Fourth International Conference on Hybrid Systems*, Ithaca, NY, 1996.

Presented before 1995

    [1] "A discrete event approach to decision making," *ORSA/TIMS Joint National Meeting*, Detroit, MI, 1994.

    [2] "Robust control of nonlinear systems without matching condition and its application to V/STOL aircraft," *International Workshop on Robust Control*, Palm Cove, Queensland, Australia, 1993.

    [3] "Control of discrete event systems using limited lookahead policies," *SIAM Conference on Control and its Applications*, Minneapolis, MN, 1992.

    [4] "Supervisory control using variable lookahead policies," *Joint Workshop on Discrete Event Systems*, Prague, Czechoslovakia, 1992.

    [5] "On optimality of discrete event systems," *The 9th Annual OSU Control Workshop*, Columbus, OH, 1991.

    [6] "Limited lookahead policies in supervisory control," *Workshop on Discrete Event Systems*, Amherst, MA, 1991.

    [7] "Absolute invariants of images under translation," *SIAM Annual Meeting, Chicago*, IL, 1990.

    [8] "That supervisor is best which supervises least," *Workshop on Discrete Event Systems and Artificial Intelligence*, Princeton, NJ, 1990.

    [9] "Supervisory control of discrete event systems," *Optimization Days 89*, Montreal, Quebec, Canada, 1989.

    [10] "A necessary and sufficient condition for correct decision making," *CORS/TIMS/ORSA Joint National Meeting*, Vancouver, BC, Canada, 1989.

    [11] "Supervisory control of stochastic discrete event systems," *SIAM Conference on Control in the 90's*, San Francisco, CA, 1989.

    [12] "Forceful and unforceful control using a simple predicate model," *The Berkeley DEDS workshop*, Berkeley, CA, 1989.

    [13] "Supervisory control of discrete event systems and its applications," *The Systems Research Center Annual Research Review Conference*, College Park, MD, 1988.

2. Invited and/or Refereed Locally/Regionally
"Perturbation analysis of supervised discrete event systems," *The 2nd Annual Meeting of the Great Lakes Section of SIAM*, Detroit, MI, 1989.

F. Invited Seminars or Lectures Presented
Shanghai Tongji University, China, 2004
Shanghai Jiao Tong University, China, 2003
The National School of Computer Sciences, Tunisian, 2003
University of Cincinnati, 2000
University of Tennessee, 2000
University of Arkansas, 1998
National Taiwan University, 1997
National Taiwan Institute of Technology, 1997
General Motors, 1996
University of Western Ontario, 1995.
University of Illinois, 1995.
Anhui University, 1995.
University of Illinois, 1993.
University of Michigan, 1992.
University of Windsor, 1992.
University of Michigan, 1989.
NASA Ames Research Center, 1991.
University of Toronto, 1989.
Arizona State University, 1988.
University of Maryland, 1988.

IV. SERVICE
A. Committee Assignments in Last Five Years
1. University Committees Chaired
2. University Committee Membership
Elected member of Graduate Council
Center and Institute Academic Committee
3. College/Department Committee Chaired
ECE Faculty Search Committee
4. College/Department Committee Membership
College P&T Committee
College Hearing Committee,
College Math Committee,
ECE Graduate Committee,
ECE Undergraduate Committee,
ECE Laboratory Committee,
ECE Chair Search Committee
ECE P&T Committee
D. Positions Held in Professional Associations in Last Five Years
E. Membership/Offices Held in Public or Private Agencies Related to Discipline
F. Professional Consultation
1. Consulting to Private Enterprises
Ford Motor Company
Hitachi America
General Motors

G. Journal/Editorial Activity

    1. Editorships

        Associate Editor, IEEE Transactions on Automatic Control, 1996-1998

    2. Editorial Board Membership

        The Conference Editorial Board, IEEE Control Systems Society, 1994-1996

H. Other Professional Related Service

    Finance Chair of the 36th Midwest Symposium on Circuits and Systems

    Registration Chair of the 33rd IEEE Conference on Decision and Control

    Local Arrangement for 1999 IEEE International Conference on Robotics and Automation

    Session Chairman of many conferences

    Reviewer for many journals and conferences

    Panelist and Reviewer for the National Science Foundation

CURRICULUM VITAE
OF
SYED MASUD MAHMUD

(Last Update on January 13, 2005)

DEGREES:

Ph. D., Electrical Engineering (specialization in Computer Engineering), University of Washington, Seattle Washington, 1984.

B.S., Electrical Engineering, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, 1978.

AREAS OF SPECIALIZATION:

Intelligent Vehicle, Intelligent Transportation System, Computer Architecture, Security of Wireless Networks, Modeling and Performance Analysis of Computer Systems, Microprocessor-based System Design, Embedded System Design, and Digital Signal Processing.

WORK EXPERIENCE

Aug. 91 - Present: Associate Professor, Electrical & Computer Engg. Department, Wayne State University, Detroit, Michigan 48202.

Jan. 91 - May 91: Teaching and Research Assignment at Ford Motor Company in England and Germany.

Aug. 88 - Aug. 91: Assistant Professor, Electrical & Computer Engg. Department, Wayne State University, Detroit, Michigan 48202.

Sept. 86 - Aug. 88: Assistant Professor, School of Engg. and Computer Science, Oakland University, Rochester, Michigan 48309-4401.

Sept. 84 - Aug. 86: Visiting Assistant Professor, School of Engg. and Computer Science, Oakland University, Rochester, Michigan 48309-4401.

June 82 - Aug. 84: Pre doctoral Teaching Associate, Electrical Engg. Department, University of Washington, Seattle, Washington 98195.

Sept. 80 - June 82: Graduate Teaching and Research Assistant, Electrical Engg. Department, University of Washington, Seattle, Washington 98195.

April 78 - Aug. 80: Lecturer, Electrical Engg. Department, Bangladesh University of Engg.& Tech., Dhaka, Bangladesh.

PUBLICATIONS

Books

1. Syed Masud Mahmud, "Lecture Notes On 16- And 32-Bit Microprocessors," Simon & Schuster Custom Publishing, Simon & Schuster Education Group, 160 Gould Street, Needham Heights, MA 02194-2310, Second Edition, 1995, (331 Pages), ISBN: 0-536-59023-0.

2. Syed Masud Mahmud, "Lecture Notes On 16- And 32-Bit Microprocessors," GINN Press, Simon & Schuster Education Group, 160 Gould Street, Needham Heights, MA 02194-2310, 1993, (340 Pages), ISBN: 0-536-58332-3.

Publications in Refereed Journals (Published and Accepted)

1. Ansaf Ibrahem Alrabady and Syed Masud Mahmud," Analysis of Attacks against the Security of Keyless Entry Systems for Vehicles and Suggestions for Improved Designs," *IEEE Transactions on Vehicular Technology,* Vol. 54, No. 1, pp. 1-11, January 2005.

2. Ansaf Ibrahem Alrabady and Syed Masud Mahmud," Some Attacks Against Vehicles' Passive Entry Security Systems and Their Solutions," *IEEE Transactions on Vehicular Technology,* Vol. 52, No. 2, pp. 431-439, March 2003.

3. Syed Masud Mahmud, L. Tissa Samaratunga and Shilpa Kommidi, "Fault Tolerant Hierarchical Networks For Shared Memory Multiprocessors and Their Bandwidth Analysis," *Computer Journal of British Computer Society*, Oxford University Press, Vol. 45, Issue 2, pp. 147-161, April 2002.

4. Syed Misbahuddin, Syed Masud Mahmud and Nizar Al-Holou, "Development and Performance Analysis of a Data-Reduction Algorithm for Automotive Multiplexing," *IEEE Transactions on Vehicular Technology,* Vol. 50, No. 1, pp. 162-169, January 2001

5. Syed Misbahuddin, Nizar Al-Holou and Syed Masud Mahmud, "A Data Reduction Algorithm for Automotive Multiplexing," *Transactions of SAE*, Section 6 – Vol. 107, pp. 1667-1670, 1998.

6. Syed Masud Mahmud and Ansaf I. Alrabady, "A New Decision Making Algorithm for Airbag Control," *IEEE Transactions on Vehicular Technology,* Vol. 44, No. 3, pp. 690-697, August 1995.

7. Sheran Alles, Curtis A. Swick, Mark E. Hoffman, Syed Masud Mahmud, and Feng Lin, "The Hardware Design of a Real-Time HITL For Traction Assist Simulation," *IEEE Transactions on Vehicular Technology,* Vol. 44, No. 3, pp. 668-682, August 1995.

8. S. Alles, C. Swick, M. Hoffman, S. M. Mahmud, and Feng Lin, "A Real-Time Hardware-in-the-Loop Vehicle Simulation for Traction Assist," International J. of Vechicle Design, Vol. 15, No. 6, pp. 597-625, 1994.

9. Syed Masud Mahmud, "Performance Analysis of Multilevel Bus Networks for Hierarchical

Multiprocessors," *IEEE Transactions on Computers,* Vol. 43, No. 7, pp. 789-805, July 1994.

10. Syed Masud Mahmud and L. Tissa Samaratunga, "Memory Bandwidth Analysis of Hierarchical Multiprocessors Using Model Decomposition and Steady-State Flow Analysis," *IEEE Transactions on Parallel and Distributed Systems,* Vol. 5, No. 5, pp. 553-560, May 1994.

11. Syed Masud Mahmud, "Models of Asynchronous Packet-Switched Multiple and Partial Multiple Bus Systems," *Euromicro Journal of Microprocessing and Microprogramming*, 40: 33-42, 1994.

12. Syed Masud Mahmud, "Comments on Synthetic Traces for Trace-Driven Simulation of Cache Memories,"*IEEE Transactions on Computers,* Vol. 43, No. 1, pp. 125-126, January 1994.

13. Syed Masud Mahmud, "A Time-Domain Analysis of a Multiplex-Bus System," *IEEE Transactions on Instrumentation and Measurement*, Vol. 40, No. 6, pp. 936-943, December 1991.

14. Syed M. Mahmud, Nadira B. Mahmud and Sarma R. Vishnubhotla, "Hardware Implementation of a New Phase Measurement Algorithm," *IEEE Transactions on Instrumentation and Measurement*, Vol. 39, No. 2, pp. 331-334, April 1990.

15. Syed Masud Mahmud, "High Precision Phase Measurement Using Reduced Sine and Cosine Tables," *IEEE Transactions on Instrumentation and Measurement*, Vol. 39, No. 1, pp. 56-60, February 1990.

16. Syed Masud Mahmud and John J. McMillan, "A Technique to Teach a Microprogram Controlled Computer with Instruction Pipeline," *International Journal of Applied Engineering Education*, Federal Republic of Germany, vol. 5, No. 5, pp. 545-564, December 1989.

17. Syed Masud Mahmud, "High Precision Phase Measurement Using Adaptive Sampling," *IEEE Transactions on Instrumentation and Measurement*, Vol. 38, No. 5, pp. 954-960, October 1989.

18. Syed Masud Mahmud, "Error Analysis of Digital Phase Measurement of Distorted Waves," *IEEE Transactions on Instrumentation and Measurement*, Vol. 38, No. 1, pp. 6-9, February 1989.

19. Syed Masud Mahmud, "Design and Simulation of Microprogram Controlled Computers," *COMPUTER IN EDUCATION DIVISION OF ASEE JOURNAL* , Vol. VIII, No. 3, pp 24-27, July-September 1988.

20. Syed Masud Mahmud, Andrzej Rusek, and Subramaniam Ganesan, "A Microprocessor-Based Dual Slope Phase Meter," *IEEE Transactions on Instrumentation and Measurement*, Vol. 37, No. 3, pp. 374-378, September 1988.

21. Syed Masud Mahmud, Subramaniam Ganesan, Andrzej Rusek, and Michael L. Hillis, "A

Programmable Self-Adaptive Digital Frequency Multiplier," *IEEE Transactions on Instrumentation and Measurement*, Vol. 37, No. 2, pp. 227-230, June 1988.

22. Syed Masud Mahmud and Andrzej Rusek "A Microprocessor-Based Switched-Battery Capacitance Meter," *IEEE Transactions on Instrumentation and Measurement*, Vol. 37, No. 2, pp. 191-194, June 1988.

23. Andrzej Rusek and Syed Masud Mahmud, "A Switched-Battery Digital Capacitance Meter," *IEEE Transactions on Instrumentation and Measurement*, Vol. 35, No. 4, pp. 551-554, December 1986.

Publications in Refereed Conference Proceedings and Presentations

1. Syed Masud Mahmud and Sheran Alles "In-Vehicle Network Architecture for the Next-Generation Vehicles," accepted for publications in the *Proc. of the SAE 2005 World Congress*, April 11-14, 2005, Detroit, Michigan, USA, Paper Number: 2005-01-1531..

2. Praveen R. Ramteke and Syed Masud Mahmud "An Adaptive Data-Reduction Protocol for the Future In-Vehicle Networks," accepted for publications in the *Proc. of the SAE 2005 World Congress*, April 11-14, 2005, Detroit, Michigan, USA, Paper Number: 2005-01-1540..

3. Srinivas R Mosra and Syed Masud Mahmud "A Secure Wireless Protocol for Intersection Collision Warning Systems," accepted for publications in the *Proc. of the SAE 2005 World Congress*, April 11-14, 2005, Detroit, Michigan, USA, Paper Number: 2005-01-1472..

4. Radovan Miucic and Syed Masud Mahmud "Wireless Multicasting for Remote Software Upload in Vehicles With Realistic Vehicle Movements," accepted for publications in the *Proc. of the SAE 2005 World Congress*, April 11-14, 2005, Detroit, Michigan, USA, Paper Number: 2005-01-0323.

5. Sinan Yaldo and Syed Masud Mahmud "Design and Implementation of a Fault Tolerant Time Triggered CAN System and the Related Issues," accepted for publications in the *Proc. of the SAE 2005 World Congress*, April 11-14, 2005, Detroit, Michigan, USA, Paper Number: 2005-01-1537.

6. Radovan Miucic and Syed Masud Mahmud "An In-Vehicle Distributed Technique for Remote Programming of Vehicles' Embedded Software," accepted for publications in the *Proc. of the SAE 2005 World Congress*, April 11-14, 2005, Detroit, Michigan, USA, Paper Number: 2005-01-0313.

7. Aakash Arora and Syed Masud Mahmud "Performance Analysis of Fault Tolerant TTCAN System," accepted for publications in the *Proc. of the SAE 2005 World Congress*, April 11-14, 2005, Detroit, Michigan, USA, Paper Number: 2005-01-1538.

8. Syed Masud Mahmud, "Communication Networks for the Next-Generation Vehicles," a four-hour talk given at the 4th *Annual Winter Workshop of U.S. Army Vetronics Institute*, U.S. Army Tank-Automotive RD&E Center, January 10 –13, 2005, Warren, Michigan.

9. Syed Masud Mahmud, "Hierarchical Ad-Hoc Wireless Networks for Military Convoy Systems," *Proceedings of the 4th Annual Intelligent Vehicle Systems Symposium of National Defense Industries Association (NDIA), National Automotive Center and Vectronics Technology*, June 22 –24, 2004, Traverse City, Michigan, 29-33.

10. Syed Masud Mahmud, "Peer-to-Peer Distance Measurement among Intelligent Vehicles in a Battlefield," *Proceedings of the 4th Annual Intelligent Vehicle Systems Symposium of National Defense Industries Association (NDIA), National Automotive Center and Vectronics Technology*, June 22 –24, 2004, Traverse City, Michigan, pp. 135-140.

11. Radovan Miucic and Syed Masud Mahmud, "Mobile Multicasting for Remote Software Update in Intelligent Vehicles," *Proceedings of the 4th Annual Intelligent Vehicle Systems Symposium of National Defense Industries Association (NDIA), National Automotive Center and Vectronics Technology*, June 22 –24, 2004, Traverse City, Michigan, pp. 199-207.

12. Srinivas Reddy Mosra, Shobhit Shanker and Syed Masud Mahmud, "An Intelligent Architecture for Issuing Intersection Collision Warnings," *Proceedings of the 4th Annual Intelligent Vehicle Systems Symposium of National Defense Industries Association (NDIA), National Automotive Center and Vectronics Technology*, June 22 –24, 2004, Traverse City, Michigan, pp. 176-183.

13. Praveen R. Ramteke, Aakash Arora and Syed Masud Mahmud, "Feasibility of using Vehicle's Power Line as a Communication Bus," *Proceedings of the 4th Annual Intelligent Vehicle Systems Symposium of National Defense Industries Association (NDIA), National Automotive Center and Vectronics Technology*, June 22 –24, 2004, Traverse City, Michigan, pp. 23-28.

14. Aakash Arora, Praveen R. Ramteke and Syed Masud Mahmud, "A Fault Tolerant Time Triggered Protocol for Drive-by-Wire Systems," *Proceedings of the 4th Annual Intelligent Vehicle Systems Symposium of National Defense Industries Association (NDIA), National Automotive Center and Vectronics Technology*, June 22 –24, 2004, Traverse City, Michigan, pp. 11-15.

15. Syed Masud Mahmud, Shobhit Shanker and Srinivas Reddy Mosra "Secure Inter-Vehicle Communications," *Proc. of the SAE 2004 World Congress,* March 8-11, 2004, Detroit, Michigan, USA, Paper Number: 2004-01-0204.

16. Syed Masud Mahmud, "Ad-Hoc Networks and New GPS Measurement Techniques for Robotic Follower Applications," a four-hour talk given at the *3rd Annual Winter Workshop of U.S. Army Vetronics Institute*, U.S. Army Tank-Automotive RD&E Center, January 12 –16, 2004, Warren, Michigan.

17. Syed Masud Mahmud and Shobhit Shanker, "Security of Wireless Networks in Intelligent Vehicle Systems," *Proceedings of the 3rd Annual Intelligent Vehicle Systems Symposium of National Defense Industries Association (NDIA), National Automotive Center and Vectronics Technology*, June 9 –12, 2003, Traverse City, Michigan, pp 83 – 86.

18. Syed Masud Mahmud and Shobhit Shanker, "An Architecture for Intelligent Automotive

222

Collision Avoidance Systems," *Proceedings of the 3ʳᵈ Annual Intelligent Vehicle Systems Symposium of National Defense Industries Association (NDIA), National Automotive Center and Vectronics Technology*, June 9 –12, 2003, Traverse City, Michigan, pp 183 – 188.

19. Syed Masud Mahmud, "Protocols for Wired and Wireless Networks in Vehicle Systems," a four-hour talk given at the *1ˢᵗ Annual Summer Workshop of U.S. Army Vetronics Institute*, June 2 –5, 2002, Traverse City, Michigan.

20. Syed Misbahuddin, Nizar Al-Holou and Syed Masud Mahmud, "A Data Reduction Algorithm for Automotive Multiplexing," *Proc. of the 1998 SAE International Congress and Exposition, Feb. 23-26, Detroit, MI pp. 981104:1-6.*

21. Syed Masud Mahmud, L. Tissa Samaratunga, and Mircea D. Munteanu, "Multiple Bus-Based Hierarchical Multiprocessors and Their Bandwidth Analysis," *Proc. of the Internatinal Conference on Algorithms and Architectures for Parallel Processing, IEEE*, June 11-13, 1996, Singapore, pp. 311-318.

22. Ansaf I. Alrabady, Syed Masud Mahmud and Vipin Chaudhary, "Placement of Resources In The Star Network," *Proc. of the Internatinal Conference on Algorithms and Architectures for Parallel Processing, IEEE*, June 11-13, 1996, Singapore, pp. 61-67.

23. Syed Masud Mahmud and L. Tissa Samaratunga, "Multiple Bus-Based Hierarchical Multiprocessors and Their Bandwidth Analysis", *Eighth International Conference On Parallel And Distributed Computing Systems*, *The International Society for Computers and Their Applications (ISCA) and IEEE Computer Society*, September 21-23 1995, Orlando, Florida, USA

24. Syed Masud Mahmud and L. Tissa Samaratunga, "A Fault Tolerant Hierarchical Interconnection Network and its Bandwidth Analysis," *Proc. of the Internatinal Conference on Algorithms and Architectures for Parallel Processing, IEEE*, April 19-21, 1995, Brisbane, Australia, pp. 736-745.

25. Ramaraghavan Srinivasan, Vipin Chaudhury, and Syed Masud Mahmud, "Contention Sensitive Fault-Tolerant Routing Algorithms for Hypercubes," *Proc. of the Internatinal Symposium on Parallel Architectures, Algorithms, and Networks, IEEE*, December 14-16, 1994, Kanazawa, Japan, pp. 197-204.

26. L. Tissa Samaratunga, R. Srinivasan, Vipin Chaudhury, and Syed Masud Mahmud, "An Optimal Mapping Algorithm for HIN-Based Systems," *Proc. of the Seventh International Conference on Parallel and Distributed Computing Systems, ISCA,* October 1994, Las Vegas, Nevada, pp 706-711.

27. Syed Masud Mahmud and L. Tissa Samaratunga, "A Hierarchical Multiprocessor System with the Shared Memory Modules at Different Physical Levels*," Proc. of the37th Midwest Symposium on Circuits and Systems, IEEE* , Aug. 3-5, 1994, Lafayettee, Louisiana.

28. Sheran Alles and Syed Masud Mahmud, "Performance of an Asynchronous Packet Switched Generalized Bus Multiprocessor System," *Proc. of the Sixth ISCA International Conference on Parallel and Distributed Computing Systems*," Louisville, Kentucky, October 14-16, 1993, pp. 415-420.

29. Syed Masud Mahmud and Sheran Alles, "A Cache Coherence Protocol for Packet Switched Bus-Based Systems and Its Performance," presented at the Workshop of the Scalable Shared Memory Multiprocessors, *20th International Symposium on Computer Architecture*, San Diego, California, May 14-15, 1993.

30. L. Tissa Samaratunga and Syed Masud Mahmud, "A New Hierarchical Interconnection Network and its Performance Analysis," *Proc. of the 36th Midwest Symposium on Circuits and Systems, IEEE*, Detroit, Michigan, Aug. 16-18, 1993, pp 13-16.

31. Devang G. Sheth, Sheran Alles, and Syed Masud Mahmud, "A Single Chip High-Speed M-to-B Arbiter For Multiple Bus Multiprocessor Systems," *Proc. of the 36th Midwest Symposium on Circuits and Systems, IEEE*, Detroit, Michigan, Aug. 16-18, 1993, pp 284-287.

32. Sheran Alles and Syed Masud Mahmud, "A Cache Coherency Scheme for an Asynchronous Packet-Switched Shared Memory Multiprocessor," *Proc. of the 36th Midwest Symposium on Circuits and Systems, IEEE*, Detroit, Michigan, Aug. 16-18, 1993, pp 173-176.

33. Suresh Thirumalaiswamy and Syed Masud Mahmud, "Design and Analysis of a Generalized Dynamic Pipeline for Scientific Functions," *Proc. of the 36th Midwest Symposium on Circuits and Systems, IEEE*, Detroit, Michigan, Aug. 16-18, 1993, pp 1515-1518.

34. Sheran Alles, Curtis A. Swick, Syed Masud Mahmud and Feng Lin, "An Interactive PC-Based Real-Time Simulator Using an Object-Oriented Approach," *Proc. of IEEE Instrumentation/Measurement Technology Conference*, Irvine, California, May 18-20, 1993, pp 764-769.

35. Ansaf Alrabady and Syed Masud Mahmud, "Development of a Decision Making Algorithm for Airbag Control," *Proc. of IEEE Instrumentation/Measurement Technology Conference*, Irvine, California, May 18-20, 1993, pp 81-84.

36. Chris Philip Karamatas, Syed Masud Mahmud and Sheran Alles, "A Cost-Effective Bus-Based Multiprocessor System," *Proc. of the 35th Midwest Symposium on Circuits and Systems, IEEE,* Washington, D.C., Aug. 9-12, 1992, pp 1028-1031.

37. Sheran Alles, Curtis A. Swick, Syed Masud Mahmud and Feng Lin, "Real Time Hardware-In-The-Loop Vehicle Simulation," *Proc. of IEEE Instrumentation/ Measurement Technology Conference*, Metropolitan New York, May 12-14, 1992, pp 159-164.

38. Syed Masud Mahmud, Suhas Shetty, Chris P. Karamatas and Pattabhiraman Gopalakrishna, "Fault Tolerant Arbiters for Synchronous Multiple Bus System," Proc. of the *1991 International Symposium on Circuits and Systems*, IEEE, Singapore, June 11-14, 1991, pp. 1045-1048.

39. Syed Masud Mahmud, Devang G. Sheth and Sheran Alles, "New Arbitration Circuits for Asynchronous Multiple Bus Multiprocessor Systems," Proc. of the *1991 International Symposium on Circuits and Systems*, IEEE, Singapore, June 11-14, 1991, pp. 1041-1044.

40. Syed Masud Mahmud, Devang G. Sheth and Harpreet Singh, "Analysis of a Multiplex-Bus System,"*Proc. of IEEE Instrumentation/Measurement Technology Conference*, Atlanta, Georgia. May 14-16, 1991, pp 336-340.

41. Syed Masud Mahmud, Suhas Shetty and Chris P. Karamatas, "Design and Analysis of Reconfigurable Synchronous Arbiters for Multiple Bus Systems," presented at the*1991 IEEE Computer Society VLSI Workshop*, Orlando, Florida.

42. Syed Masud Mahmud and Venakt Tiruveedhula, "Hit Ratio and Communication Cost of Shared Data in a Cache-Based System with Multistage Interconnection Network," Proc. of the *1990 International Conference on Parallel Processing*, The Pennsylvania State University Press, University Park and London, August 13-17, 1990, pp. I-173 -I-176.

43. Syed Masud Mahmud, "Performance Analysis of Asynchronous Hierarchical-Bus Multiprocessor Systems Using Closed Queuing Network Models," Proc. of the *1990 International Symposium on Circuits and Systems*, IEEE, New Orleans, Louisiana, May 1-3, 1990, pp. 2689-2692.

44. Syed Masud Mahmud and Md. Showkat-Ul-Alam, "A New Arbitration Circuit for Synchronous Multiple Bus Multiprocessor Systems," Proc. of the 1990 *International Conference on Systems Integration,* IEEE, Morristown, New Jersey, April 23-26, 1990, pp. 57-62.

45. Syed Masud Mahmud and Venakt Tiruveedhula, "Performance Analysis of a Cache-Based Synchronous Multiprocessor System with Multistage Interconnection Network," Proc. of the *Fourth Annual Parallel Processing Symposium,* IEEE, Fullerton, California, April 4-6, 1990, pp. 431-432.

46. Syed Masud Mahmud and Venakt Tiruveedhula, "Hit Ratio Analysis of Shared Data in a Cache-Based System with Multistage Interconnection Network," Proc. of the *Fourth Annual Parallel Processing Symposium,* IEEE, Fullerton, California, April 4-6, 1990, pp. 788-808.

47. Syed Masud Mahmud, "A Distributed Cache Coherence Protocol for a Hierarchical Bus Multiprocessor System," Proc. of the *Third Annual Parallel Processing Symposium,* IEEE, Fullerton, California, March 29-31, 1989, pp 103-117.

48. Syed Masud Mahmud, "Communication Performance In A Hierarchical-Bus System," *Proc. of 1989 International Symposium on Circuits and Systems*, IEEE, Portland, Oregon, May 9-11, 1989, pp 122 - 125.

49. Syed Masud Mahmud, "High Precision Phase Measurement Using Reduced Sine and Cosine Tables," *Proc. of IEEE Instrumentation/Measurement Technology Conference*, Washington D. C., April 25-27, 1989, pp 219 - 222.

50. Sarma R. Vishnubhotla and Syed Masud Mahmud, "A Centralized Multiprocessor-Based Control to Optimize Performance in Vehicles," *Proc. of the 1988 IEEE Workshop on Automotive Applications of Electronics*, Hyatt Regency Hotel, Dearborn, Michigan, October 19, 1988, pp 52-56.

51. Syed Masud Mahmud, "Design of Microprogram Controlled Machines," *1987 ASEE Annual Conference Proceedings*, pp. 301-304.

52. Syed Masud Mahmud and Alistair D. C. Holden, "Tree Structure for a Speaker Identification System," presented at the *3rd International Conference on CAD/CAM Robotics & Factories of the Future*, Southfield Hilton, Southfield, Michigan, August 14-17, 1988.

53. Subramaniam Ganesan, Sarma R. Vishnubhotla, and Syed Masud Mahmud, "Graph models for a cache based multiprocessor fault diagnosis," presented at the *Eleventh Midwest Graph Theory Conference of MIGHTY*, Ypsilanti, Eastern Michigan University, April 10-11, 1987.

54. Subramaniam Ganesan, and Sarma R. Vishnubhotla, Syed Masud Mahmud, "Failsage diagnosable multiprocessor system for robotics applications," presented at the *Second International Conference on Robotics & Factories of the Future*, San Diego, July 28-31, 1987.

55. Sarma R. Vishnubhotla, Subramaniam Ganesan, and Syed Masud Mahmud, "Integrating Failsafe self-checking unit for robot fault recovery management," presented at the *Second International Conference on Robotics & Factories of the Future*, San Diego, July 28-31, 1987.

56. Syed Masud Mahmud and Alistair D. C. Holden, "Search time reduction for speaker identification in a large population," presented at the *Electrical Engineering Industrial Consortium*, Battelle Conference Center, Seattle, February 6, 1984.

EXTERNAL GRANTS (Awarded)

1. Ford Motor Company, " Development of Testing and Debugging Tools for the PTEC Trainer System.," $10,713, 1997.
   Grant Account Number is 4-42298.

2. Control Pak International, "Development of Window-Based Software for Automation of Energy Management Systems in Large Buildings," $26,445, 1997.
   Grant Account Number is 4-42106. (with Co-PI Dr. Feng Lin).

3. Ford Motor Company, " Development of Testing, Trouble Shooting and Debugging Tools for the PTEC Trainer System," $25,000, 1996-1997.
   Grant Account Number is 4-43034.

4. Control Pak International, " Development of Hardware and Software for Automation of Energy Management Systems in Large Buildings," $25,234, 1995-1996.
   Grant Account Number is 4-42906. (with Co-PI Dr. Feng Lin).

5. Ford Motor Company, " Development of a Trainer System for the new Power Train Electronic Control Chip Set System," $25,000, 1995-1996.
   Grant Account Number is 4-42915.

6. Ford Motor Company, " Development of a Real-Time Vehicle-Level E/E System Design

Verification Platform," $104,378, 1993-1995.
Grant Account Number is 4-42518.

7. Ford Motor Company, "Decision Making Algorithm for Airbag Control," $25000, 1992-1993. *Grant Account Number is 4-42354.*

8. Ford Motor Company, "Real Time Simulation and Control of Vehicles," $135000, 1990-1993. (with Co-PI Dr. Feng Lin).
Grant Account Number is 4-44312.

9. Ford Motor Company, "Characteristics of Communication Media for Multiplex-Bus," $74,929, 1990-91. (with Co-PI Dr. Harpreet Singh).
Grant Account Number is 4-43364.

10. Dimango Products Corporation, 5975 Ford Court, Brighton, Michigan 48116, "A Microprocessor-Based High-Performance Supervised Home Security System," $25,807, 1989-90.
Grant Account Number is 4-43325.

EQUIPMENT GRANT (Awarded):

1. Ten microcontroller emulation boards have been received from Motorola. The total cost of these boards is $5,000. (June 89)

INTERNAL GRANTS (Awarded):

1. International Travel Grant, $500, Wayne State University, 1991.

2. Faculty Research Award, $5,500, Wayne State University, 1989-90.

3. Faculty Research Award, $1,000, Oakland University, 1986-87.

4. Educational Development Fund Grant, $600, Oakland University, 1986-87.

TALKS PRESENTED:

1. Title of Talk: A MULTILEVEL BUS NETWORK AND ITS PERFORMANCE
   Invited By: Computer Chapter of IEEE/SEM
   Date: April 10, 1995
   Place: General Motors Management Center,
                                GM Tech Center, Warren, Michigan

2. Title of Talk: PERFORMANCE AND COST ANALYSIS OF A DV-TESTER
   Invited By: Ford Motor Company
   Date: June 22, 1994

Place: Danou Technical Center, Ford Motor Co., Dearborn, Michigan

3. Title of Talk: DEVELOPMENT OF A DISTRIBUTED PROCESSING SYSTEM TO TEST VEHICLE SYSTEMS
Invited By: Ford Motor Company
Date: April 22, 1993
Place: Danou Technical Center, Ford Motor Co., Dearborn, Michigan

4. Title of Talk: A TIME-DOMAIN ANALYSIS OF A MULTIPLEX-BUS SYSTEM
Invited By: Ford Motor Company
Date: November 3, 1992
Place: Electronic Technical Center, Ford Motor Co., Dearborn, Michigan

5. Title of Talk: COMPUTER TECHNOLOGY
Invited By: Michigan Society of Professional Engineers
Date: April 2, 1992
Place: Flint, Michigan

6. Title of Talk: A FAULT-TOLERANT MULTIPROCESSOR ARCHITECTURE TO CONTROL THE OPERATION OF A REAL-TIME SYSTEM (VEHICLE)
Invited By: Ford Motor Company
Date: August 24, 1988
Place: Scientific Research Laboratory, Ford Motor Co., Dearborn, Michigan

HONORS, AWARDS and SOCIETIES :

- President's Teaching Excellence Award, Wayne State University, 2002. *(It's a university wide award)*

- Outstanding Faculty Award, Selected by the Engineering Student-Faculty Board, College of Engineering, Wayne State University, 2002.

- Excellence in Teaching Award, College of Engineering, Wayne State University, 2001. *(In 2001 only one Excellence in Teaching Award was given to the entire college.)*

- Outstanding Teaching Award, Selected by the Engineering Student-Faculty Board, College of Engineering, Wayne State University, 2001.

- Outstanding Teaching Award, College of Engineering, Wayne State University, 1994.

- Nominated for the President's Teaching Excellence Award, Wayne State University, 1991.

- Listed in the *Who's Who in Science and Engineering, Who's Who in Engineering Education, United Who's Who in Empowering Executives and Professionals, Asia/Pacific Who's Who and many others.*

- Outstanding Young Man of America for 1989, selected by the *Outstanding Young*

Americans, Montgomery, Alabama 36177-9641.

- One of the four recipients of Physio Control Fellowship ($14,400) at the University of Washington, Seattle, for the academic years 82-83 and 83-84.

- Secured first position in the B.S. (Electrical Engineering) examination. (1978). Received a **Gold Medal** for securing the highest percentage of marks at Bangladesh University of Engineering and Technology in 1978.

- Received Merit Scholarship for excellence in the national Higher Secondary Certificate Examination. (1972)

- Received Merit Scholarship for excellence in the national Secondary School Certificate Examination. (1970)

- Member - IEEE, IEEE Computer Society, Sigma Xi, Tau Beta Pi, Engineering Society of Detroit

OTHER EXPERIENCE :

Ph. D. Thesis Supervised
1. Ansaf Ibrahem Alrabady, "Security of Passive Access Vehicle". Date of defense: October 25, 2002.

2. Sheran A. Alles, "Performance Analysis of Asynchronous Packet-Switched Bus-Based Multiprocessor Systems". Date of defense: July 27, 1995.

3. L. Tissa Samaratunga, "Performance Analysis of Multiprocessor Systems Based on Hierarchical Interconnection Networks". Date of defense: December 20, 1994.

M.S. Thesis Supervised
1. Srinivas R. Mosra, "Design and Analysis of a Secure Wireless Protocol for Issuing Intersection Collision Warnings," Date of defense: December 13, 2004.
2. John R. Scollard, "Internal Register Monitor Co-Processor Design and Implementation," Date of defense: April 7, 1995.
3. Suresh Thirumalaiswamy, "Design and Analysis of a Generalized Dynamic Pipeline for Scientific Functions". Date of defense: September 21, 1993.
4. Chris P. Karamatas, "A New Bus-Based Processor-Memory Interconnection For Large Tightly Coupled Multiprocessor Systems And Associated Arbitration". Date of defense: June 18, 1992.
5. Devang G. Sheth, "Design and Implementation of Arbitration Circuits for Multiple-Bus Multiprocessors". Date of defense: December 19, 1991.

Current Ph. D. Student
1. Name: Nader Rabadi
   Dissertation Topic: Ad-Hoc Wireless Networking for Vehicular Applications.
   Expected Date of Graduation: Fall 2006.

2. Name: Radovan Miucic
   Dissertation Topic: Mobile Multicasting for Remote Software Update in Vehicles.
   Expected Date of Graduation: Winter 2007.
3. Name: Irina Hossain
   Dissertation Topic: Security for Wireless Multicasting.
   Expected Date of Graduation: Winter 2007.

Current M.S. Students
1. Name: Shobhit Shanker
   Thesis Topic: Secure In-Vehicle Wireless Personal Area Network.
   Expected Date of Graduation: Winter 2005.

2. Name: Aakash Arora
   Thesis Topic: Performance Analysis of a Fault Tolerant TTCAN System.
   Expected Date of Graduation: Winter 2005.

3. Name: Praveen Ramteke
   Thesis Topic: Feasibility of Using a Vehicle's Power Bus as a Communication Bus.
   Expected Date of Graduation: Winter 2005.

4. Name: Sinan Yaldo
   Thesis Topic: Design and Implementation of a Fault Tolerant TTCAN System.
   Expected Date of Graduation: Winter 2005.

5. Name: Edward Gundlach
   Thesis Topic: Performance Analysis of TTCAN and Flexray Protocols.
   Expected Date of Graduation: Fall 2005.

Membership on Master's and Doctoral Committees - Not as Director
                (number, dates, names of students and projects if easily available):

1.   Member of the Ph. D. dissertation committee for Mr. Golum Miran Chowdhury. (Mr. Chowdhury's Ph. D. defense was on Sept. 12, 89)

2.   Member of the Ph.D. Qualifying Examination Committee for Mr. Gautum B. Singh

3.   Member of the Ph.D. Qualifying Examination Committee for Changwei Cao

4.   Member of the Master's Committee for Vikas Gautam (Mr. Gautam's defense was on June 20, 94)

5.   Member of the Master's Committee for Swamy Punyamurtula (Mr. Punyamurtula's defense was on October 12, 94)

6.   Member of the Master's Committee for Subburajan Ponnuswamy (Mr. Ponnuswamy's defense was on July 27, 95)

Reviewer
1. Technical reviewer of the following journals.
    - IEEE Transactions on Vehicular Technology
    - IEEE Transactions on Computers,
    - IEEE Transactions on Parallel and Distributed Systems,
    - IEEE Transactions on Instrumention and Measurements,
    - IEEE Computer Magazine,
    - The Computer Journal

2. Technical reviewer of the following conferences.
    - Vehicular Technology Conference, IEEE.
    - International Conference On Systems Integration, IEEE.
    - International Symposium on Circuits and Systems, IEEE.
    - Parallel Processing Symposium, IEEE.
    - ISCA International Conference on Parallel and Distributed Computing Systems.
    - International Symposium on High-Performance Computer Architecture.

3. Technical reviewer for NSF proposals and NSF Panelist

4. Reviewed a part of the book entitled "ADVANCED MICROPROCESSORS: A SOFTWARE PERSPECTIVE" which is considered by Holt, Rinehart and Winston, INC., 111 Fifth Avenue New York, NY 10003 for publication. (Reviewed in 1987)

5. Reviewed the book "FUNDAMENTALS OF COMPUTER ENGINEERING" by P. P. Silvester and D. A. Lowther which is considered for publication by Computer Science Press, 1803 Research Boulevard, Rockville, Maryland 20850.
(Reviewed in August 1988)

Session Chair and Session Organizer
- Member, Technical Program Committee, Vehicular Electronic Systems Communications and Control, IEEE Vehicular Technology Conference, Orlando, Florida, Fall 2003.

- Chaired a session on Computer-Based Instrumentations at the *1993 IEEE Instrumentation/Measurement Technology Conference,* Irvine, California, May 18-20, 1993.

- Organized two sessions on Parallel and Distributed Multiprocessors at the *36th Midwest Symposium on Circuits and Systems,* Detroit, Michigan, Aug. 16-18, 1993.

Service to Professional Societies
Vice Chair, Computer Chapter of IEEE/SEM Society, 1996-97.
    Counselor, IEEE Student Chapter, Wayne State University, 2001 to 2003.

Administrative Experience

Served for the following committees:

1. Wayne State University, Detroit, Michigan 48202.
   - Member, Academic Operation Committee (AOC), College of Engg. (Fall 2002 to present)
   - Chair, Undergraduate Committee, Department of Electrical and Computer Engg. (Fall 2002 to present)
   - Member, Undergraduate Curriculum Committee, Department of Electrical and Computer Engg. (1989-91, 1994-95, 1995-2002)
   - Chair, Seminar Committee, Department of Electrical and Computer Engg. (Fall 1988 to 2002)
   - Microteaching Leader, GTA Orientation Committee, Wayne State University, (2002 to Present)
   - Member, King Chavez Parks (KCP) Scholarship Committee, Wayne State University, 2002.
   - Member, Faculty Search Committee, Department of Electrical and Computer Engg. (1992-93 and 2000-present)
   - Member, Sabbatical Leave Committee, Wayne State University, (1994-95)
   - Member, Tenure and Promotion Committee, Department of Electrical and Computer Engg. (1994-95).
   - Member, Library Committee, Wayne State University, (1993 - 94)
   - Member, Computer Committee, College of Engineering. (1989-90, 1993-95, and 2000-01)
   - Member, Graduate Committee, Department of Electrical and Computer Engg. (1991-95)

2. Oakland University, Rochester, Michigan 48309-4401.
   - Graduate Committee of the School of Engineering and Computer Science.
   - CAD/CAM Committee of the School of Engineering and Computer Science.
   - Graduate Committee of the Department of Computer Science and Engg.
   - Curriculum Committee of the Department of Computer Science and Engg.
   - Library Committee of the School of Engineering and Computer Science.
   - Academic Computing Committee of the University.

Subjects or Courses Taught/Teaching

Wayne State University, Detroit, Michigan 48202
   - Parallel Processing Hardware, Advanced Graduate Level, 4 Credit Hours. (ECE 7660)
   - Queuing Modeling and Performance Analysis of Computer Systems, Advanced Graduate Level, 4 Credit Hours. (ECE 7950)
   - Switching Circuits, Graduate Level, 4 Credit Hours. (ECE 5680)
   - Advanced Microprocessor Systems, Graduate Level, 4 Credit Hours. (ECE 5620)
   - Logical Design of Computers, Undergraduate Level, 4 Credit Hours, (ECE 4610)
   - Capstone Design I: Design Principles and Embedded System Design, Undergraduate Level, 4 Credit Hours, (ECE 4600)

Oakland University, Rochester, Michigan 48063

- Parallel and Distributed Processing, Advanced Graduate Level, 4 Credit Hours.(CSE-665)
- Switching Theory and Digital Logic, Graduate Level, 4 Credit Hours. (CSE-578)
- Microcomputers and Microprocessors, Graduate Level, 4 Credit Hours. (CSE-570)
- Computer Organization and Architecture, Graduate Level, 4 Credit Hours. (CSE-564)
- Design of Digital Systems, Junior Level, 4 Credit Hours. (ECE-378)
- Introduction to Digital Logic and Microprocessors, Freshmen Level, 4 Credit Hours. (ECE-171)

University of Washington, Seattle, Washington 98195
- Introduction to Computer Organization, Junior Level, 3 Credit Hours. (EE-372)
- Introduction to Logical System Design, Freshmen Level, 4 Credit Hours. (Engr. 190)

Bangladesh University of Engineering and Technology, Dhaka, Bangladesh
- Electrical Circuits
- Electronic Circuits
- Computer Programming

Nabil J. Sarhan

Dept. of Electrical & Computer Engineering
Wayne State University
5050 Anthony Wayne Drive
Detroit, MI 48202

Phone: (313) 577-2860
Fax: (313) 577-1101
Homepage:
http://www.ece.eng.wayne.edu/~nabil
Email: nabil@wayne.edu

Educational Background

Ph.D., Computer Science and Engineering, The Pennsylvania State University, University Park, GPA = 4.0 / 4.0, August 2003.
Dissertation Title: *On the Design of High Performance and Scalable Multimedia Servers*.

M.S., Computer Science and Engineering, The Pennsylvania State University, University Park, GPA = 4.0 / 4.0, May 2003.
Thesis Title: *An Investigation of Scheduling Policies for Multimedia Systems*.

B.S., Electrical Engineering with Computer Engineering specialization, Jordan University of Science and Technology, Jordan, September 1995.
Graduation Project: *Design and Implementation of a Computer-Controlled Vehicle*.

Work Experience

Assistant Professor, Dept. of Electrical and Computer Engineering, Wayne State University, Detroit, August 2003 - Now: I teach undergraduate and graduate computer engineering classes and direct the *Multimedia Systems and Networking Research Lab*. The tought courses include Computer Architecture (ECE 4680) and Special Topics in Multimedia Networking (ECE 7995)

Graduate Researcher, Dept. of Computer Science and Engineering, The Pennsylvania State University, University Park, May 2003 - August 2003.

Instructor, Dept. of Computer Science and Engineering, The Pennsylvania State University, University Park, August 1999 - May 2003: I taught Microcomputer Systems and Programming, Computer Programming for Engineers Using C++, and Introduction to Algorithmic Processes.

Intern, SAMM (System Analysis, Modeling, and Measurement) Group, East Coast Development Center, Unisys, Malvern, Pennsylvania, May 2002 - September 2002: I worked on the design and modeling of multiprocessor systems. I participated in discussions of new architectures, made proposals for new architectures, developed SES models, and fully developed an automatic statistic extraction and post-analysis tool.

Graduate Lecturer, Dept. of Computer Science and Engineering, The Pennsylvania State

University, University Park, June 1999 - August 1999: I assisted in teaching Principles of Programming with Business Applications.

Teaching Assistant, Dept. of Electrical Engineering, Jordan University of Science and Technology, Irbid, Jordan, February 1996 - June 1997:I was responsible for teaching the microprocessor interfacing, the digital design, and the instrumentation labs.

Engineer, Voice Processing Dept., Jordan Computer Center, Amman, Jordan, November 1995 - February 1996: I was responsible for developing phone-bank and voice-mail systems.

Research Areas of Interest

Multimedia systems and networking, high-performance I/O, computer networking, multiprocessing, computer architecture, performance evaluation.

Publications

Referred Papers

Nabil J. Sarhan and Chita R. Das. Caching and Scheduling in NAD-Based Multimedia Servers. *IEEE Transactions on Parallel and Distributed Systems*, Vol. 15, No. 10, pages 921 - 933, October 2004.

Nabil J. Sarhan and Chita R. Das. A New Class of Scheduling Policies for Providing Time of Service Guarantees in Video-On-Demand Servers. To Appear in the *Proceedings of the International Conference on Management of Multimedia Networks and Services*, October 2004.

Nabil J. Sarhan and Chita R. Das. Analysis of Caching Performance in Multimedia Servers. In the *Proceedings of the International Conference on Internet and Multimedia Systems and Applications*, pages 288 - 293, August 2004.

Nabil J. Sarhan and Chita R. Das. An Integrated Resource Sharing Policy for Multimedia Storage Servers Based on Network-Attached Disks. In the *Proceedings of the 23rd International Conference on Distributed Computing Systems* (ICDCS 2003), pages 136 - 143, May 19 - 22, 2003.

Nabil J. Sarhan and Chita R. Das. Providing Time of Service Guarantees in Video-On-Demand Servers. In the *Poster Proceedings of the Twelfth International World Wide Web Conference* (WWW 2003), May 2003.

Nabil J. Sarhan and Chita R. Das. A Simulation-Based Analysis of Scheduling Policies for Multimedia Servers. In the *Proceedings of the 36th Annual Simulation Symposium* (part of the *Advanced Simulation Technologies Conference*), pages 183 - 190, March 30 - April 2, 2003.

Nabil J. Sarhan and Chita R. Das. Adaptive Block Rearrangement Algorithms for Video-On-Demand Servers. In the *Proceedings of the 2001 International Conference on Parallel Processing* (ICPP 2001), pages 452 - 459, September 3 - 7, 2001.

Nabil J. Sarhan and Chita R. Das. A Detailed Performance Evaluation Study of Request Scheduling in Multimedia Systems. Under review.

Technical Reports

Nabil J. Sarhan and Chita R. Das. Provision of Time of Service Guarantees in Video-on-Demand Servers. Technical Report CSE 03-013, Department of Computer Science and Engineering, The Pennsylvania State University, July 2003.

Nabil J. Sarhan and Chita R. Das. A Detailed Study of Request Scheduling in Multimedia Systems. Technical Report CSE-03-002, Department of Computer Science and Engineering, The Pennsylvania State University, January 2003.

Nabil J. Sarhan and Chita R. Das. Caching and Scheduling Techniques for Multimedia Storage Servers Based on Network-Attached Disks. Technical Report CSE-02-013, Department of Computer Science and Engineering, The Pennsylvania State University, September 2002.

Nabil J. Sarhan and Chita R. Das. Proposing Block Rearrangement for VOD Servers. Technical Report CSE-01-019, Department of Computer Science and Engineering, The Pennsylvania State University, June 2001.

Talks

An Integrated Resource Sharing Policy for Multimedia Storage Servers Based on Network-Attached Disks, *International Conference on Distributed Computing Systems* (ICDCS 2003), Providence, Rhode Island, May 20, 2003.

On the Design of Scalable and High Performance Multimedia Servers, University of Arkansas at Little Rock, May 15, 2003.

A Simulation-Based Analysis of Scheduling Policies for Multimedia Servers, *Advanced Simulation Technologies Conference* (ASTC 2003), Orlando, Florida, April 1, 2003.

Analysis of Caching Performance in Multimedia Servers, *International Conference on Internet and Multimedia Systems and Applications*, Kauai, Hawaii, August 17, 2004.

Multimedia Systems and Networking: Challenges, Studies, and Future Work, ECE Seminar, Wayne State University, November 12, 2003 and February 11, 2004.

Research Grants

My research was supported in part by NSF grants MIPS-9634197, CCR-9900701, CCR-0098149, CCR-0208734, and EIA-0202007 and equipment grants from NSF and IBM.

Synergistic Activities

Program Committe Member, International Workshop on Systems and Network Security (SANS 2005)

Program Committee Member, Annual Conference on the Soft Computing for Real World

(NAFIPS-05)

Session Chair, International Conference on Internet and Multimedia Systems and Applications (IMSA'04)

Member, College Computer Advisory Committee, College of Engineering, Wayne State University

Member, Graduate Curriculum Committee, Department of Electrical and Computer Engineering, Wayne State University

Member, Undegraduate Curriculum Committee, Department of Electrical and Computer Engineering, Wayne State University

Paper Reviewer, the IEEE Transactions on Computers, the Journal of Parallel and Distributed Computing (JPDC) , the International Parallel and Distributed Processing Symposium (IPDPS 2003), and the International Conference on Parallel Processing (ICPP 2001)

Awards and General Activities

Received the Penn State's Computer Science and Engineering Teaching Award in 2001.

Received a UN's scholarship for academic distinction.

Was named on the University honor list three times for academic distinction during undergraduate study.

Served as the president of a Penn State graduate student organization for two years.

Skills

Programming Languages and Libraries: C, C++, Java, Pascal, Fortran, STL (Standard Template Library), and MPI (Message Passing Interface)

VLSI Design Tools and Simulators: Verilog HDL, Open Verification Library (OVL), MAX, Sue, IRSIM, HSPICE, PrimeTime, and Silicon Ensemble

Modeling Tools: SES, SimpleScalar, and DiskSim

Biosketch for Donald J. SILVERSMITH

William Foster Visiting Scholar 2004 & 2005 in
Bureau of Verification and Compliance
Office of Nuclear Affairs

Wayne State University
College of Engineering
Detroit, Michigan 48202
Department of Electrical and Computer Engineering
Professor   Appointed: 1988 **(Permanent Position**)

United States Department of State
Office of Nuclear Affairs
Bureau of Verification and Compliance
Washington, DC 20520
2004& 2005 William Foster Visiting Scholar Appointed 2004, 2005

On IPA assignment from:
Department of Electrical and Computer Engineering
Wayne State University, Detroit, MI 48202

United States Department of State
Office of Export Control and Conventional Arms Nonproliferation Policy
Bureau of Nonproliferation
Washington, DC 20520
2003 IEEE Senior Diplomacy Fellow   Appointed 2003

Naval Research Laboratory
Washington, DC
US Navy/ASEE Summer Faculty Research Fellow Appointed 2002

NASA Goddard Space Flight Center
Greenbelt, MD
Sabbatical Year (2000), Visiting Scientist   Appointed: 2000
ASEE Summer Faculty Fellow Appointed 2000 and 2001

Air Force Research Lab at Hanscom AFB
Lexington, MA
AFOSR Summer Faculty Research Associate   Appointed: 1998

Wayne State University
College of Engineering
Detroit, Michigan 48202
Associate Dean of Engineering for Research and Graduate Study 1988-1995
Director, WSU/Ford MS/Electronics and Computer Control Systems Program
Appointed:1988

Current Addresses: (business and home)

VC-NA   HST 3811   3118 Juniper Lane
US Department of State   Falls Church, VA 22044
2201 C St., NW   Phone: (703) 241-1204

Washington, DC 20520   FAX: (703) 241-1925
Phone (202) 647-2792   E-mail: DJSilversmith@juno.com
FAX: (202) 736-7634
E-mail: SilversmithDJ@state.gov

Qualifications:
 B.S., Physics, Massachusetts Institute of Technology, 1964
 M.S., Physics, University of Florida, 1966
 Ph.D., Materials Science, Massachusetts Institute of Technology, 1969
 M.B.A., Public Policy, Western New England College, 1979

Expertise:

Micro-electro-mechanical devices and systems(MEMS);
Digital and analog silicon integrated circuit design and fabrication;
Charge-coupled imaging and signal processing devices;
Silicon wafer fabrication technology and process development.

 Institute of Electrical and Electronics Engineers (IEEE);
    Director of Professional Affairs, Southeastern Michigan Section(1992-1998)
    Treasurer, Southeastern Michigan Section (1988-2000, 2001-2002)

Memberships:
 American Society for Engineering Education (ASEE)
 Institute of Electrical and Electronics Engineers (IEEE)

Short Courses taken while at the Department of State:

Arms Control and Nonproliferation, PP203, DoS/FSI (5 days) Jan. 2003
International Negotiations: Art and Skills, PP201, DoS/FSI (5 days) March 2004
Creative Problem Solving Workshop, PT212, DoS/FSI (2 days)) Jan. 2004
Missile Technology and Proliferation Issues, #1031754, CIA/SAIC (5 days) May 2004
Nuclear Nonproliferation Seminar, NNS, DoE/NNSA (3 days) June 2004
Adversarial Deception Analysis, ADAC, DIA/JMITC (5 days) Sept. 2004
Political and Technical Aspects of Nuclear Nonproliferation Workshop,
        Los Alamos/NTS, DoE/NNSA/LANL (5 days) Dec. 2004
Political-Military Affairs, PP505, DoS/FSI (4 days) Jan. 2005
Intelligence and Foreign Policy, PP212, DoS/FSI (3 days) April 2005
Nuclear Technology Proliferation Workshop, #1034464, CIA (3 days) April 2005

International Negotiation Participation

Wassenaar Agreement Expert Group
        Vienna, April 2003
        London, July 2003
        Vienna, October 2003

Previous Positions:

1988-1995, Wayne State University, Detroit, MI, Associate Dean of Engineering
for Research and Graduate Studies.

1985-1988, National Science Foundation, Washington, DC, Program Director for Solid-State and Microstructures.

1976-1984, M.I.T. Lincoln Laboratory, Lexington, MA, Physicist/Manager Analog IC Facility.

1973-1976, Amperex-NAPC, Slatersville, RI, Manager Silicon Imaging Device Fabrication.

1969-1976, Bell Telephone Laboratories, Murray Hill, NJ, Member of Technical Staff.

Patents: Detection, Inversion and Regeneration in Charge transfer Apparatus, United States of America, 3838438, 1974, owned by Lucent Technologies

Important Representative Publications:

Silversmith, D. J. and Reid, R. J., "Joule Heating of Poly-Silicon Thermal Micro-Actuators," Proceedings of the Int. Conf. On Modeling and Simulation of Microsystems(MSM'99), San Juan, P.R., April 19-21, 1999, p. 413-416

Silversmith, D.J., "The M.S. in Electronics and Computer Control Systems: A Strategic Educational Partnership between Wayne State University and the Ford Motor Company," Proceedings IFAC Symposium on Advances in Control
Education, Tokyo, Aug. 1-2, 1994, p. 123-124.

Lenth, W., Chu, A., Mahoney, L.J., McClennan, R.W., Mountain, R.W., and Silversmith, D.J., "Planar GaAs P-I-N Photodiode with Picosecond Response," Applied Phys. Lett., 46, 191 (1985).

Downey, P.M., Jeffries, A.D., Mayer, S.S., Weiss, R.W., Bachner, F.J., Donelly, J.P., Lindley, W.T., Mountain, R. W., and Silversmith, D.J., "Monolithic Silicon Bolometers," Applied Optics 23, 910 (1984).

Tsaur, B-Y., Fan, J.C.C., Turner, G.W., Geis, M.W., Silversmith, D.J., and Mountain, R.W., "Thin-Film Transistors Fabricated in Solid-Phase-Recrystallized Si Films on Fused Silica Substrates," J. Applied Physics 54, 1151 (1983).

Burke, B. E., Smythe, D.L., Silversmith, D.J., McGonagle, W.H., and Mountain, R.W., "A 10-MHz CCD Time-Integrating Correlator," Digest of Technical Papers, Internat. Solid-State Circuits Conference, New York, N.Y., Feb. 23-25, 1983, p. 256.

WAYNE STATE UNIVERSITY

RESUME

Date Prepared:Oct. 15, 1984
Date(s) Revised:March 13,2004

Name:Harpreet Singh
Office Address: Home Address:
3111 Engineering   5200 Anthony Wayne Dr.
5200 Anthony Wayne Dr.   Apt. #1310
Detroit MI 48202   Detroit, MI 48202

Telephone No.:   (313) 577-3917   Telephone No.:   (313) 833-3764
FAX (313) 577-1101
E-mail: hsingh@ece.eng.wayne.edu

DEPARTMENT: Electrical and Computer Engineering

PRESENT RANK AND DATE OF RANK: Professor, Fall 1984

WSU APPOINTMENT HISTORY:

      Year Appointed/Rank: 1981 Visiting Professor
      Year Awarded Tenure: 1986
      Year Promoted to Associate Professor
      Year Promoted to Full Professor: 1984

DATE & PLACE OF BIRTH: September 19, 1941, Chakwal, W. Pakistan
CITIZEN OF: United States

EDUCATION:
(Give name of institution, place, and date of degree)

High School: Government High School, Fazilka, Pb. University, 1957

Baccalaureate:Thapar Institute of Engg. & Technology Patiala, Punjabi University, 1963

Graduate: M.E., University of Roorkee, 1966
                    Ph.D., University of Roorkee, 1971

Postgraduate (postdoctoral):
FACULTY APPOINTMENTS AT OTHER INSTITUTIONS (Years and Rank)
(Not administrative appointments)

      Technical Teacher Trainee, University of Roorkee, October 1963 to September   1966.
      Lecturer, University of Roorkee, October 1966 to November 1970.
      Reader, University of Roorkee, Roorkee, November 1970 to September 1974.
      Associate Professor, University of Roorkee, October 1974 to April 1976.

Professor, University of Roorkee, April 1976 to September 1981

PROFESSIONAL SOCIETY MEMBERSHIP(S):

Fellow, IETE (India)
Senior Member, IEEE
Member, Sigma Xi
Member, Eta Kappa Nu
Member, System Society of India
Member, Engineering Society of Detroit
Member, American Society of Engineering Education

HONORS/AWARDS:

Khosla Research Award (highest), 1970
gold medals (Joint)
Khosla Research Certificate, 1975 (Joint)
Khosla Medal , 1979 (Joint)
Khosla Medal , 1979 (Joint)
Distinguished Alumni Award, 1983, Awarded by President of India

BIOGRAPHICAL CITATIONS (National/Regional or Professional Directories):

Who's Who in Computer Graphics Directory

I.   TEACHING

A.   Years at Wayne State

        Visiting Professor, September 1981 to August 1984
        Professor, September 1984 to present

B.   Years at Other Colleges/Universities (Please list)

        Technical Teacher Trainee, University of Roorkee, October 1963 to
        September 1966. Electronics, electrical machines.

        Lecturer, University of Roorkee, Roorkee, October 1966 to November
        1970. Switching circuits and computers, networks and transmission lines,
        network synthesis, automatic controls, electrical and electronic circuits.

        Reader, University of Roorkee, Roorkee, November 1970 to September 1974.
        Digital computer principles, computational structures, switching   circuits,
        systems theory.

        Associate Professor, University of Roorkee, Roorkee, October 1974 to April
              1976. Computational structures, digital and analog simulation, digital
              computer principles, computer semantics.

Professor, University of Roorkee, Roorkee, April 1976 to September 1981.
Mini and micro computers, computational structures, computer hardware
design, electronics.

C.   Courses Taught at Wayne State in Last Five Years

    1.   Undergraduate

       Computer Organization, Digital Logic, Introduction to Logical
       Design of Computers, Introduction to Electric Circuits,
       Introduction to Microcomputers.

    2.   Graduate

       Mini Micro Computers, Switching Circuits, Design of Digital
       Systems, Engineering Software Design, Advanced Concepts in
       Computer and Control (special topics).

    3.   Graduate Professional School

       WSU/Unisys Graduate Program

       WSU/FORD Program. Engineering, Software Design, EEC
       Hardware and Software. Mini Microcomputers. Design of Digital
       Systems, Switching Circuits under interactive distance learning
program.

D.   Essays/Theses/Dissertations Directed

    1.   Students by Name, Level, Title of Project, Year

    M.S. Theses Guided: University of Roorkee

       Network Synthesis Using State-Variable Technique - Sekhon, 1968
       Network Realization and Use of Digital Computer - Panwar, 1969
       Irreducible Realization of a Transfer Function Matrix - Puri, 1970
       Memory Systems Using Cellular Arrays - 1970
       Reliability of Digital Systems - Mukerjee, 1971
       Arithmetic Calculations Using Cellular Arrays, 1972
       Sequential Circuit Minimization and the Design of Digital
       Computer - Garg, 1973
       Development of Demonstration Digital Computer with Telprinter
       as I/O Device - Kumar, 1973
       On Flip Flops and Their Input Equations, 1974
       System Design of Controls on Modern Thermal Plants - Singh,   1975
       Realization of Delay Transfer-Function Matrix Over the Binary Field
          - Bector, 1976
       A Servo controlled Voltage Regulator Practical Design and
       Identification - Singh, 1977

Memory Allocation Schemes and Synchronization for Operating System, 1978

Development of Editing and Input Routines - Neeta, 1979

Development of Cross-Software for Intel 8080 on TDC-312 - Neera, 1979

Integrity constraints on Data-Base Management System - Paul, 1980

On Interconnecting of Computers and Computer Networks, 1980

Electronic Mail System, 1981

Data Base Management for Student Environments, 1981

M.S. Theses Guided: Wayne State University

Some Aspects of 3-D Object Recognition Techniques - Salman, 1986

On the Design, VLSI Implementation and Reliability Evaluation of the Digital Circuits - Sanjay Dua, 1987

On the Design of Optoelectronic Circuits and Cellular Arrays - Navjot Singh, 1989

Fractals in Image Compression and Decompression - Jin Soo Kim, 1989

On Some Techniques of Image Compression - VLSI Design and Software Engineering Approach, S. Bajpayee, 1989.

Boolean Neural Networks, A. K. Hundiwal, 1994.

Simulation of generalized pipeline array -Sukhmani Singh   April'01

Linear Sequential Machines- Jaspreet Kaur   Aug'01

New Approaches to Image Fusion-Gulsheen Kaur   April'02

Multiplexing Techniques-M. Alam   July'02

State Table Simulator- Hardarshan Singh   July '02

Ph.D. Theses Guided

Realization of Linear Dynamic Systems and Networks - S.C. Puri, 1974

State Variable Realization of Lumped Networks and Dynamical Systems - K.A. Khan, 1975

State Space Approach to Sensitivity Analysis and Multivariable Network - J.S. Sohal, 1977

Time Varying Convolution Codes - J.S. Bedi, 1978

Some Modern Approaches to Realization and Implementation of Digital Filters - R.C. Joshi

Petri Net Approach Design and Development of Modern Computer Systems, A.A. Khan, 1981

On Petri-Net Approach to Modeling Analysis and Some Design Aspects of Software Systems - G.S. Hura, 1983

System Theoretical Approach to Central Processor Design - D. Grover, 1983

State-Space Family Realizations from Input-Output Characterizations of Linear Systems - Ali Eydgahi, 1986

On the Control of a Compliant Robot Arm - Marianna Forrest, 1987.

Petri Net Approach Towards Software Engineering - N Chamas, 1990.

Petri Net to A Matrix Realization - Lisa Anneberg, 1991.

Neural Networks for Image Modeling by Two Dimensional Random Fields with Applications to Image Compression - S. Bhama, 1993.

Neural Networks for Network Design and System Idetification, J.S. Kim 1993.

Relative Clutter and Probability of Target Detection. - T. Meitlzer 1995.

Generating Otimal Adaptive Fuzzy - Neural models of Dynamical systems with Applications to Control. 1996. -S.Barada.

Software Project Risk Analysis Models with Applications to Embedded Systems, May 1999, Don Neuman

Simulation of an equivalent reduced order system from large uncertain data system using Multistage Multivariate Analysis and neuro fuzzy approach., D. Nam Dec'01

Ph.D. Theses in Progress

Member of Ph.D. Committee for the Following Students:

E. Halabi, 1983
B. Agrawal, 1984
B. Chen, 1985
Zhu Mingfa, 1985
E. Yaprak, 1989
S. Khalef, 1989
M. Chaudhry, 1990
R. Golshen, 1990
M. Hussein, 1991
S. Beydoun, 1991
C. Wang, 1991
J. Song, 1992
M. Hussain, 1992
V. Tiruveedhula, 1992
A. Pebdani, 1993
A. Makki, 1993
Z. Chen, 1994
Eijeer, 1994
S. Sarkar, 1995
H. Munipalli, 1995
B. Mark, 1995.

Tan Guat Yew, Singapore, 1996.
Amer Albadarneh
Hemanth Munipalli
B. Mark
Basem S El-Haik
Guangbin Yang
George Schelis,2001
Attri Sanjay ,2002
Beijing Wang,2002
Singh, Nirmal,2003
Saleh O. Al-Ahmadi , 2003
Madan Mohan Kovur, 2003
Abdullah S. Alwadie, 2003
Michael Lee Johnson, 2003

E.   Course or Curriculum Development
        Initiated Collaborative program IET,Bhaddal India and Wayne State
        University,2002.
        Switching Theory under interactive discuss learning, Program, 1994.
        Jointly developed complete curriculum for Ford/WSU Subsystem
Certificate Program, ECE, 562, ECE 660 for Ford/WSU Master's
        Program, 1984.

        Invited by University of Roorkee for curriculum development, 1991.
        Developed ECE curriculum from time to time as chair of undergraduate
        committee.

F.   Course Materials (Unpublished)

        Responsible for development of the Master's curriculum in Computer
        Science & Technology at Roorkee. Representative of the Department in the
        University Q.I.P. Center for curriculum development.

        Prepared course materials for summer and winter courses organized from
        time to time in Computer Architecture, Advanced Network Design and
Control.

II.   RESEARCH

A.   **Patents**
              ▪ Method of Determining Probability of Target Detection in a Visually
                Cluttered Scene. With T. Meitzler. Patent granted in 2000
              ▪ Fuzzy logic for target detection. with T. Meitzler. Patent granted in 2002

 B.   Research in Progress:

Not Funded
(i)   System Theoretic Approach to Computer Hardware and Software
(ii) Neural Network approach to System and Network design
(iii) Neural Networks for image compression
(iv) VLSI Architectures
(iv) Microprocessor Applications

C.   Funded Research in Last Ten Years

Principal Investigator, "Modern Approaches to Sensor Fusion Problem,:grant from General dynamics, $50,000 for one year, April 1985 to March 1986. Zhu

Mingfa, Ph.D., 8 person months, Santosh Hassani, M.S., 8 person months, T. Kim, Ph.D., 4 person months, Surender Bhattarai, M.S., 5 person months

Principal Investigator, "Guidance and Control of Autonomous Land Vehicles," $25,000 for one semester, January to May 1986; Sanjay Dua, 5 person months, Navjot Singh, 5 person months, Co-Principal Investigator P.Siy

Principal Investigator - Modification of PIPE Computer - General Dynamics, $50,000 January 1986 to December 1987, Co-Principal Investigators P.Siy and R.Barnard

Principal Investigator - Target Recognition - Phase I, General Dynamics, $20,000, September to December 1986, Co-Principal Investigator P.Siy.

Arranged the donation of KAREL robot from GMF Robotics, Market cost $43,000.

Helped in preparing the proposal for undergraduate lab equipment. The proposal resulted in a grant of $250,000 for five years from Detroit Edison, 1985.

Principal Investigator - New Algorithms in Adaptive Routing Networks, $15,000, General Dynamics, July to November 1988

Principal Investigator - Data Compression using Fractals, $10,000, General Dynamics, April 1989. Co-Principal Investigators P.Siy and D.Bedi.

Principal Investigator - Evaluation of the Performance of RISC Machines against CISC Machines, $10,000, General Dynamics, April 1989. Co-Principal Investigator, J.Bedi.

Software Engineering Approach to the Development of Industry-Business Simulator, $13,474, ORSPS, Wayne State University.

Machine Language Implementation for Industry-Business Simulator, $5,414, ORSPS, Wayne State University.

Equipment from IMR, $41,512 Wayne State University.

Principal Investigator - Error detection and correction for Digital Communication $15,000, General Dynamics, May 1989 to Dec. 1989. Co-Principal Investigator J.S. Bedi.

Principal Investigator - Development of an algorithm for Software Security, $10,000, General Dynamics, June 1989 to Dec. 1989. Co-Principal Investigator J.S. Bedi.

Software security algorithms using zero knowledge proofs and interactive password techniques, $10,000, General Dynamics, April 1990 to August 1990. (With J.S. Bedi). 4-44606

Principal Investigator - Algorithms for errors detections and corrections ... frequency .. hopped ... systems, $15,000, General Dynamics, April 1990 to August 1990. (With J.S. Bedi). 4-43594

Principal Investigator - Performance Evaluation of RISC processors, $15,000, General Dynamics, April 1990 to December 1990 (with J.S.Bedi). 4-43576

Co-Principal Investigator - Characteristics of computer communication media, $74,929, Ford Motor Company, June 1990 to February 1991 (with S. Mahmud).

Neural Net Approach For Cylinder to Cylinder Air Fuel Ratio, Ford Motor Company, $ 24,976, May 90 - Oct 91. 443064

Characterization of Clutter and Target Detection - Battelle for TACOM, $15,200 + $16,000 as consulting, December 1992.

Human Observer Model for Multispectral Clutter Definition. Battelle for TACOM, $30,000, April 1993

Development of an Algorithm for Range Estimation for Electric Vehicle, Ford Motor Co. $25,000, June 1993.

Development of Software for Automotive Quality Control, Microsystems, Sterling Heights, MI. $5440, June 1993.

Development of Software for Automotive Quality Control, Phase II, Microsystems, Sterling Heights, MI. $11,000, September 1993.

Silicon Graphics Computer, donation, TACOM, $80,000 (approx.), 1994.

Interdisciplinary research award, WSU, $6,500, 1995.

Development of Software Package fro a Hybrid Control Sytem Design. Ford Motor Company. $25000 ,1995.

Fatigue and fracture behaviour in cast iron (fuzzy logic approach) With S Pututunda, Ford Motor Company, $85,000 (1995-96)

Influence of Microstructure on fracture toughness of Austempered Ductile Iron (with S. Putatunda), Ford Motor Company, $85,600, (1996-97)

Fuzzy logic for input/output data. Ford Motor Company, $25,000.

Fuzzy logic for cutting tool life and selection. Ford Motor Company, $40,000 .

Fuzzy/Neuro Fuzzy Logic Controllers for Robotic and semi-Robotic Ground Vehicle Technology. $40,000. Battelle for TACOM (1998/99).

Austempered Ductile iron research, $45,000 with S.Putatunda (1999-)

On PET scan for small animals.internal WSU grant $20,000.co-investigator,F.Sarkar.(1997.)

Multiplexed wiring for Automobiles, EGS , $63,600, July 1999.
(The above list gives funded research at Wayne State University. This is in addition to funded research before 1981 in India)

Automobile Multiplexing, EGS, 1999-2001, $1,04,449

Management of Client server ,Singh Development,1999-2000, $33,753

Development of Virtual Lab. For Battelle ,2000-2002 , $37,745

Fuzzy Logic Approach to Sensor Fusion , Battelle ,2002-Present $12,496

Fuzzy logic for material processing,WSU ,2001-2002,$10000

Fuzzy Logic for Image Fusion and 3D Displays, TACOM, 08-01-02 to
07-31-03 $20,000

Graduate Research,Singh Development, 01-01-03 to 12-31-03 $25,000

Visiting Research Professorship,Singh Development, 05-15-03 to 9-14-03 $15,000

Students Projects,Brar Circuits, 07-01-02 to 12-31-03, $5,000

Collaboration with IET Bhaddal, IET Bhaddal, India
06-01-02 to 08-31-03 $10,000

Students Projects,New Urban Network, 07-01-02 to 12-31-03, $4,000

Masters Program(with Yang Zhao), General Dynamics , 01-01-02 to 04-30-03 $39,125

Image Segmenetation and ROI similarity estimation, Henry Ford Health

Systems 09-01-03 to 8-31-04 $15,000

Image Fusion for mine and ice detection. TARDEC, TACOM 03-01-04 to 02-28-06 $25,000

Computers in physical therapy. Sunshine Health Services 09-01-03 to 12-31-04 $28,100

D.   Fellowships/Grants/Special Awards in Last Five Years

III.   PUBLICATION

    A.   Scholarly Books Published

        1. Authored

        2. Co-Authored

    B.   Chapters Published

        1.Authored

        2.Co-Authored

        Infrared imaging in Wiley Enclclopedia in Electrical and Electronics Engineering

        Co-authors T.Meitzler and G. Gerhart
        Image processing in Wiley Enclyopedia in Electrical and Electronics Engineering

        Co-authors T. Meitzler, G.Gerhart, Y.Hamzeh, L.Anneberg, S.Altalameh and D.kaur.

        Authored-"Parallel Computing," Macmillan Encyclopedia for Computers, March 1992, Co-authors, L. Anneberg, D. Kaur, E. Yapark.

        Introduction to Circuit Theory, Institution of Electronics & Telecommunication Engineers, N. Delhi, India.

    C.   Editorships of Books/Proceedings

        Proceedings of the National Conference on Mini Micro Computers and Automation, University of Roorkee, March 1978.

        Proceedings of Robotic Intelligence and Productivity Conference (joint), Wayne State University, Detroit, 1983.

    D.   Journal Articles Published

        1.   Refereed Journals

"Realization of a Class of A Matrix," Electronics Letters, IEE 1st Oct. 1970, Vol. 6, No. 20, pp. 658-659, Co-author, M. Lal.

"On the Determination of Markov Parameters for the Realization of a Class of Transfer Function Matrices," Journal ITE, 1970, Vol. 16, No. 12, pp. 895-898. Co-authors, M. Lal and S.C. Puri.

"Computational Procedure for the Minimum Realizations of Linear time-Varying Systems," IEEE Trans. Automatic Controls, Feb. 1971, Vol. AC 16, No. 1, p. 93. Co-author, M. Lal.

"On the State Space Analysis of Linear R.L.C. Networks with Source Derivatives," Int. J. Control, Vol. 14, No. 5, May 1971, pp. 917-927. Co-authors, M. Lal and P.C. Sharma.

"Second Order State-Space Decomposition of Transfer Function Matrices," Journal ITE, Vol. 17, Nov. 1971, p. 403. Co-authors, M. Lal and P.C. Sharma.

"A Note on the Synthesis of Transfer Function Matrices with Multiple Poles," Proc. IEEE, Vol. 59, No. 12, December 1971, p. 1728. Co-authors, M. Lal and S.C. Puri.

"Determination of Impedance Matrix, Given Z(s)+Z(-s) Using State Variable Technique," IEEE Trans. Circuit Theory, Vol. CT-19, January 1972, pp. 80-81. Co-author, M. Lal.

"On Minimal Realization from Symmetric Transfer Function Matrix," Proc. IEEE, Vol. 60, No. 1, January 1972, pp. 139-140. Co-author, M. Lal.

"On the Determination of Transfer Function Matrix from the Given State Equations," Int. J. Control, Vol. 15, No. 2, February 1972, pp. 333-335. Co-author, M. Lal.

"On the Realization of Linear Time Invariant Dynamical Systems," IEEE Trans. Automatic Control, Vol. AC-17, April 1972, pp. 251-252. Co-authors, S.C. Puri and M. Lal.

"A Simplified Minimal Realization Algorithm for Symmetric Transfer Function Matrix," Proc. IEEE, Vol. 61, No. 9, September 1973, pp. 1364-1365. Co-authors, M. Lal and K.A. Khan.

"A Simplified Minimal Realization Algorithm for Symmetric Impulse Response Matrix Using Moments," IEEE Trans. Automatic Control, Vol. AC-18, No. 6, December 1973, pp. 683-684. Co-authors, M. Lal and K.A. Khan.

"Transformation of Time Varying Autonomous System to Companion Form," Electronics Letters, Vol. 10, No. 2, January 24, 1974, p24.Co-authors, M. Lal and S.C. Puri.

"Determination of Impedance Matrix Z(s) from Given Z(s)+Z'(-s),IEEE Trans. Circuit Theory, Vol. CAS-21, No. 3, May 1974, pp. 458-459. Co-authors, S.C. Puri and M. Lal.

"A Generalized Pipelined Cellular Array," IEEE Trans. Computers, Vol. C-23, No. 5, May 1974, pp. 533-536. Co-authors, A.K. Kamal and D.P. Agrawal.

"An Improved Algorithm for State-space Synthesis," Electronics Letters, Vol. 10, No. 13, June 27, 1974, p. 268. Co-author, M. Lal.

"Sturm Test Algorithm for Digital Computer," IEEE Trans. Circuit Theory, Vol. CAS-22, No. 1, January 1975, pp. 62-63. Co-authors, N. Lal and R.S. Panwar.

"Iterative Array for Square-Root, Multiplication and Division," Journal of ITE, February 1975, Vol. 21, No. 2, pp. 43-44. Co-author, D.P. Agrawal.

"A Technique for the Determination of Impedance Matrix Z(s) from Z(s)-Z'(s)," IEEE Trans. Circuit Theory, Vol. CAS-22, No. 2,February 1975. Co-authors, S.C. Puri and M. Lal.

"A Minimal Canonical Realization Algorithm for Impulse Response Matrix Using Moments," Proc. IEEE, Vol. 63, No. 3, March 1974,pp. 538-540. Co-authors, M. Lal and R. Parthasarathy.

"On Continued Fraction Inversion of Routh's Algorithm," IEEE Trans. Automatic Control, Vol. AC-20, No. 2, April 1975, p. 278. Co-author, R. Parthasarathy.

"Comments on Linear System Reduction by Continued Fraction Expansion about a General Point," Electronics Letters, Vol. 11, May 1975. Co-author, R. Parthasarathy.

"On the Evaluation of the Transition Matrix in the Finite Field," Int. J. System Science, Vol. 6, No. 6, pp. 561-564. Co-authors, A.K. Kamal, S.C. Puri and N.K. Nanda.

"Minimal Realization of Symmetric Transfer Function Matrix Using Markey Parameters and Moments," Electronics Letters, Vol. 11, July 1975. Co-author, R. Parthasarathy.

"On the Realization of Linear Sequential Machines from the given Delay Transfer Function Matrix," Int. J. Systems Science, Vol. 6, No. 8, p. 791, 1975. Co-authors, A.K. Kamal, S.C. Puri and

N.K. Nanda.

"On Suboptimal Linear System Reduction," Proc. IEEE, Vol. 63, No. 11, Nov. 1975, p. 1610. Co-author, R. Parthasarathy.

"Determining Elements of Lossy Ladder Networks," Electronics Letters, February 5, 1976, Vol. 12, No. 3, pp. 87-88. Co-authors, J.S. Bajwa and K.J. Khatwani.

"Continuous Equivalent Time Varying Networks in State Space," Journal IETE, vol. 22, No. 2, February 1976, pp. 46-47. Co-authors, M. Lal and J.S. Sohal.

"Sensitivity State Models for Composite Systems," Journal IETE, Vol. 22, No. 3, March 1976, pp. 128-130. Co-authors, M. Lal and J.S. Sohal.

"On Sensitivity Invariants of Multi-input Multi-output Networks," Proc. IEEE, Vol. 64, p. 560, April 1976. Co-author, J.S. Sohal.

"State Equations for Networks Using Superposition Principle," Journal IETE, Vol. 22, No. 4, April 1976, pp. 187-190. Co-authors, M. Lal and J.S. Sohal.

"Inversion of Matrix Continued Fraction in Cauer Second Form," IEEE Trans. Automatic Control, Vol. AC-21, April 1976, p. 283. Co-author, R. Parthasarathy.

"On Continued Fraction Inversion by Routh's Algorithm," IEEE Trans. Automatic Control, June 1976, p. 394. Co-author, R. Parthasarathy.

"Comments: New Method of Obtaining Reduced-Order Model for Linear Multi-variable Systems," Electronics Letters, August 5, 1976, Vol. 12, No. 16, p. 420. Co-author, H. Singh.

"Identification in Canonical Form for Linear Time Invariant Systems for Input-Output Data," Journal IETE, Vol. 22, No. 11, November 1976, pp. 709-711. Co-authors, J.S. Bedi and A.K. Kamal.

Comments on the paper, "Minimal Realization of Linear Systems," Int. J. Control, Vol. 26, No. 3, pp. 491-491, 1977. Co-authors, B.C. Gargash, D.P. Mittal.

"On the Realization of a Class of Time-Varying Impulse Response Matrix," Proc. IEEE, Vol. 65, No. 7, July 1977, pp. 1064-1065. Co-authors, J.S. Bedi and A.K. Kamal.

"On Bounded Real Lemma in Multivariable Networks," Proc. IEEE,Vol.

65, No. 9, September 1977, pp. 1387-1398. Co-author, J.S. Sohal.

"A Mixed Method for the Simplification of Large System Dynamics," Proc. IEEE, Vol. 65, No. 11, November 1977, pp. 1604-1605. Co-author, R. Parthasarathy.

"Inverse of Complex Systems," J. Of Institute of Electronics and Telecommuncation Engineers, New Delhi, Vol. 24, No. 1, pp. 1-3, January 1978. Co-authors, J.S. Bedi and A.K. Kamal.

"On Minimal Realization of Transfer Function Matrices Using Markov Parameters and Moments," Proc. IEEE, December 1977, pp 1717-1719. Co-authors, V. Srikhande and L.M. Ray.

Comments on "Minimal Realization of Transfer Function Matrices Using Markov Parameters and Moments," Proceedings of IEEE, Vol. 66, No. 10, October 1978, pp. 1274-75.

"Minimal Realization of a Class of Time-Varying Dynamical Systems, "Proc. IEEE, February 1978, Vol. 66, No. 2, pp. 250-252. Co-authors, J.S. Bedi and A.K. Kamal.

"Reduced Order Realization of a Symmetric Transfer Function Matrix Using Markov Parameters and Moments," Iranian J. Of Science and Tech., Vol. 8, No. 3. Co-authors, A.K. Kamal and K. Garg.

Correction to "On Minimal Realization of Transfer Function Matrices Using Markov Parameters and Moments," Proc. IEEE, Vol. 66, No. 6, June 1978, p., 703. Co-authors, V. Srikhande and L.M. Ray.

Author's reply on "Minimal Realization of Transfer Function Matrices Using Markov Parameters and Moments," Proc. IEEE, Vol. 66, No. 10, October 1978, pp. 703. Co-authors, V. Srikhande and L.M. Ray.

"On Invertability of Linear Time Invariant Dynamical Systems," Alta Frequenza, Italy, 1978. Co-authors, J.S. Bedi, D.P. Mittal and A.K. Kamal.

"Inversion of a 2-D Continued Fraction," Int. J. Control, 1981, Vol. 34, No. 1, pp. 191-196. Co-author, K. Garg.

"Petri-Net Approach to Enumerate all Simple Paths in a Graph," Electronics Letters, April 1980, pp. 291-293, Co-author, A.A. Khan.

"Two Dimensional Linear Sequential Machines," Digital Processes, Vol. 6, 1980, pp. 315-324. Co-author, K. Garg.

254

"Optimization of Assembly Code Generation Using Petri-Nets," Int. J. Electronics, 1980, Vol 49, No. 5, pp. 427-431. Co-authors, G.S. Hura, A.A. Khan, D. Grover and N.K. Nanda.

"A Petri Net Approach to the Evaluation of the Complexity of a Program," Int. J. Electronics, 1981, Vol. 51, No. 1, pp. 79-85. Co-authors, G.S. Hura and N.K. Nanda.

A Heuristic Approach to the Generation of Tests for Faults on the Intermediate Lines," Computers and Elect. Engg. (U.S.A.), Vol. 9, No. 2, pp. 81-87, 1982.

"A Method for Enumerating Maximal Compatible Classes of Microcommands Using Petri Nets," Int. J. Electronics, Vol. 50, No. 3, pp. 231-234, March 1981. Co-author, A.A. Khan.

"On the Determination of the Solution of a Class of Murata's State Equation of Petri Nets," Proc. IEEE, Vol. 69, No. 4, pp. 466-467, April 1981. Co-authors, A.A. Khan, G.S. Hura and N.K. Nanda.

"Realization of 2-D Second Order All Pass Digital Filters," Digital Processes, Vol. 6, No. 4, 1980, pp. 291-296. Co-authors, R.C. Joshi and S. Rai.

"State Equation Representation of Logic Operations Through Petri Nets," Proc. IEEE, Vol. 69, No. 4, pp. 485-487, April 1981. Co-authors, A.A. Khan, G.S. Hura and N.K. Nanda.

"First Order 2-D All Pass Network Realization," IEEE Trans. on Acoustics, Speed and Signal Processing, Vol. ASSP-29, No. 5, 1981, pp. 1089-91. Co-authors, R.C. Joshi and S. Rai.

"Data Path Optimization in Modern Computers," Int. J. Electronics, 1982, Vol. 53, No. 1, pp. 17-24. Co-authors, D. Grover and N.K.Nanda.

"Some Hardware Realization of Negabinary Arithmetic," Int. J. Electronics, 1983, Vol. 55, No. 2, pp. 235-247. Co-authors, D. Grover and N.K. Nanda.

"Bit Sequential Multipliers Using Carry Look-Ahead Technique," Int. J. Electronics, 1983, Vol. 55. Co-author, R. Donthi.

"Bit Sequential Multiplier Using Right Shift," Int. J. Electronics, 1983, Vol. 55, No. 3, pp. 405-409. Co-author, R. Donthi.

"Petri Net Approach to the Evaluation of Maximum compatible Classes in Data Path Optimization of Modern Computers," Int. J. Electronics, 1983, Vol. 54, No. 4, pp. 577-581. Co-authors, D.

Grover and N.K. Nanda.

"On Negabinary Sign Detectors," Int. J. Electronics, 1983, Vol. 55, No. 6, pp. 875-976. Co-author, J.E. Malik.

"Minimal Realization Algorithm for Impulse Response Matrix Using Modified Moments," Electronics Letters, Vol. 20, No. 18, pp. 742-743, August 1984. Co-author, Ali M. Eydgahi.

"Transfer-Function Matrix Realization Using Taylor Series Expansion About a General Point 'a'," IEEE Trans. on Automatic Control, Vol. 19, No. 9, pp. 829-831, September 1984. Co-author, Ali M. Eydgahi.

"Realization of Transfer Function Matrix by Expanding it About a General Point 'a', Proc. IEEE, Vol. 72, No. 12, pp. 1822-1829, December 1984. Co-author, Ali M. Eydgahi.

"Minimal Realization of a Symmetric Transfer-Function Matrix Using Expansion About a General Point 'a'." Proc. IEEE, Vol 73, No. 3, pp. 487-488, March 1985. Co-author, Ali M. Eydgahi.

"A Modified Procedure for the Realization of Transfer-Function Matrix from Mixture of Markov Parameters and Moments," IEEE Trans. Automatic Control, Vol. 30, No. 3, pp. 299-301, March 1985. Co-author, Ali M. Eydgahi.

"Correction to Transfer Function Matrix Realization Using Taylor Series Expansion About a General Point 'a'," IEEE Trans. Automatic Control, Vol. AC-30, No. 7, July 1985, p. 704. Co-author, Ali M. Eydgahi.

"A Simplified Minimal Realization of Transfer Function Matrix Using its Modified Markov Parameters," IEEE Trans. Automatic Control, Vol. AC-30, No. 8, August 1985. Co-author, Ali M. Eydgahi.

"Some Design Aspects of Data Bases Through Petri Net Modeling," IEEE Trans. Software Engg., Vol. SE-12, No. 4, pp. 505-510, April 1986. Co-authors, G.S. Hura and N.K. Nanda.

"Computing 2-D Transfer Function Matrix from State-Space Equations," IEEE Trans. Automatic Control, Vol. AC-31, No. 4, pp. 359-360, April 1986. Co-author, Ali M. Eydgahi.

"Family Realizations of Transfer-Function Matrix in Canonical Forms," International Journal of System Science, Vol. 17, No. 6, June 1986.

"VLSI Design Using Apple MacIntosh," Microelectronics and Reliability, Vol. 27, No. 2, pp. 229-235, February 1987. Co-authors, Steve Rohen and Lisa Anneberg.

"Two-Dimensional State-Space Model for Bilateral Linear Image Processing," Int. J. System Science, Vol. 19, No. 4, pp. 621-628, April 1988. Co-author, Salman Talahmeh.

"Determination of Minimal Number of Busses for Mini Microcomputer," Int. J. Mini Microcomputers, Vol. 10, No. 1, pp. 27-30, January 1988. Co-author, P. Goel.

"Computational Algorithm for State-Space Approach to Circuit Realization of a Transfer Function Matrix," Int. J. Circuit Theory and Applications, Vol. 16, pp. 97-99, January 1988.

"Family of Reduced Order Models for Linear Multivariable Systems," Electronics Letters, Vol. 23, No. 22, pp. 1178-1180, October 22, 1987. Co-author, Ali M. Eydgahi.

"Systolic Array for VLSI Implementation of Realization Techniques," Microelectronics and Reliability, Vol. 28, No. 3, pp. 363-367, May 1988. Co-author, Ali M. Eydgahi.

"State Space Models of 3-D Transfer Function Matrix," Int. J. System Science, Vol. 20, No. 1, pp. 19-32, January 1989. Co-author, Ali M. Eydgahi.

"Implementation of Optical and Optoelectronics Circuits," Applied Optics, Vol. 8, No. 1, pp. 178-181, January 1989.

"Pattern Recognition with Moment Invariants on a Machine Vision System," Pattern Recognition Letters, Vol. 9, No. 3, pp. 175-180, April 1989. Co-authors, Zhu Mingfa, Santosh Hasani, S. Bhattarai.

"New Models for Optical Storage, their analysis and Performance Evaluation", Optical Engineering, SPIE, Vol. 30, No. 9, Sept. 1991. Co-author, B. Behera.

"Digital Simulation of System Theoretic Algorithms Applied to Image Compression," International Journal of System Sciences, Vol. 23, No. 7, pp. 1155-1166, 1992, Co-author, S. Bhama.

"Dynamic Image Modeling by Hopfield Network," under publication in International Journal of System Sciences, Dec. 1991, Co-author, S. Bhama.

"New Formulation for State Equation Representation for Petrinets," Micro Electronics and Reliability, 1991, co-author, R. Kaushal.

"Single layer neural networks (SLNN) for Linear System Identificatin Using Gradient Descent Technique," IEEE Trans. on Neural Networks, pp. 884--886, Sept. 1993, co-author S. Bhama.

"Parallesim for the Faster Implementation of the K-L Transform for Image Compression," Pattern Recognition Letters, pp. 651-659, Aug. 1993, co-author S. Bhama.

"Dynamic image modeling by Neural Network", Int. Journal System Sc., Vol. 25, No. 4, April, 1994, co-authors S. Bhama and D. Kaur.

"Boolean Neural Network Realization of an Adder-Subtractor Cell," International Journal of Microelectronics and Reliability., Vol. 36, No. 3, pp. 367-369, 1996, co-authors H. S. Bawa, L. Anneberg.

"Terminal Reliability Using Binary Decision Diagrams," International Journal of Microelectronics and Reliability., Vol. 36, No. 34, pp. 363-365, 1996, co-authors S. Vaithilingam, A. Ratna and L. Anneberg.

"On modification of Relative Complexity Metric," International Journal on Microelectronics and Reliability, vol.36, No.4, pp.469-476, April 1996, co-authors T. Meitzler, G.Gerhart.

"Wavelet Transforms of Cluttered Images and their Application to Computing the Probability of Detection," Optical Engineering vol. 35(10), pp.3019-3025 Oct. 1996, co-author T.Meitzler,G.Gerhart,R. Karisen, Z. Sohn.

"Fuzzy Logic Approach for Computing the Probability of Target Detection in Cluttred Scenes," Optical Engineering, vol. 35 (12) pp.3623-3636 Dec. 1996, co-author T.Meitzler, G.Gerhart, L. Arafeh.

Generating Optimal,adaptive fuzzy neural models of dynamical systems.Accepted for publication in IEEE Trans. on systems,man and cybernaetics. - Co-author,S.Barada.

A Relative Clutter Metric, IEEE Trans on Aerospace electronics. Vol. 34, No. 3, July 1998, pp 968-976. Co-authors-T.Meitzler,G.Gerhart.

2- D Wavelet Image Transforms Extended to 3-D with applications IEEE Trans. on Aerospace Electronics Vol. 34, No. 3, July 1998, pp 955-961.co-authors- T.Meitzler and G.Gerhart.

A Neuro_fuzzy Logic Approach to Material Processing. To appear in August 1999 issue of IEEE Trans. On Systems, Man and Cybernetics, Part C.

"Predicting the probability of target detection in static infrared and visual scenes using the fuzzy logic approach." Co-authors: T. Meitzler, Labib Arefeh, E. Sohn, and G. Gerhart. Optical Engineering, Jan. 1998, pp. 10-17.

"Generating Optimal,adaptive fuzzy neural models of dynamical systems with applications to control". IEEE Trans. on systems, man and cybernaetics. - Co-author: S. Barada. Vol. 28, No. 3, August1998, pp371-391.

A Relative Clutter Metric. Accepted for publication in IEEE Trans on Aerospace electronics. Co-authors: T. Meitzler, G. Gerhart. IEEE transaction on aerospace and electronic systems, Vol. 34, No. 3, July 1998, pp968-976.

2-D Wavelet Image Transforms Extended to 3-D With applications, IEEE Trans. on Aerospace Electronics, co-authors: T. Meitzler. Vol. 34, No.3 July 1998, pp963-967.

Detection Probability Using Relative Clutter in Infrared Images.   IEEE transaction on Aerospace Electronics. Co-authors: T. Meitzler, G. Gerhart, E. Sohn.   Vol. 34, No. 3, July 1998, pp955-962.

"Neural networks for image compression in target detection." To appear in July 1998 issue of Optical Engineering. Co-author: S. Bhama. Society of Photo-Optical Instrumentation Engineers, Vol. 37(7), pp2029-2042 (July 1998).

"Positron emission tomography" Co-authors: Jia Wu, F Sarkar and Shishir Shah. IEEE potentials Dec98/Jan99. Pp13-16.

A Neuro Fuzzy logic approach to material processing, IEEE Transactions on Systems, man and cybernetics part C: Applications and reviews, Vol. 29, No. 3, August 1999, pp362-370.Co-author Labib Arefeh and S. Pututunda

Predicting search times in visually cluttered scenes using Fuzzy Logic Approach. Co-author T. Meitzler, E. Sohn , A. Elgarhi and D. Nam ,Optical Engineering,Vol 40,No 9, Sep 2001. pp 1844-1851,

Ph.D. Thesis: "State-Space Approach to Network Synthesis," University of Roorkee, Rorkee, 1971.

M.E. Thesis: "Network Synthesis Using Digital Computer, University of Roorkee, Roorkee, 1966.

2.	Invited Review Articles

3.	Nonrefereed Journals

"New Approach to Optical Storage Modeling Performance Analysis and Evaluation." Proceeding SPIE Optical Engineering, Sept. 1991, pp.   , Co-author B. Behera.

"Optical storage performance modeling and evaluation," Optical Information Systems, co-author B. Behera, Sep 1990.

E.	Papers Published in Conference Proceedings

1.	Refereed Papers

"Network Design Using Digital Computer," 10th Technical Convention,   ITE (India), 1966. Co-author, M. Lal.

"Computer Algorithm for the Synthesis of N port LC Networks - A State   Model Approach," Int. Symp. Network Theory, U.K., 1971. Co-author,   M. Lal.

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      2.   Nonrefereed Papers

F.   Translations of Other Authors Published

      1.   Books

      2.   Articles or Creative Works

G.   Abstracts Published in Academic Journals

H.   Book Review Published

      1.   Academic Journals
      2.   In Magazine/Newspaper

I.   Creative Shows/Exhibits

      1.   Refereed or Judged:
            National Competition

      2.   Refereed or Judged:
            Local/Regional Competition

      3.   Not Refereed

J.   Creative Performances

      1.   Outside Metropolitan Area

      2.   Metropolitan Area

      3.   Campus

K.   Instruction Materials Formally Published

      1.   Textbooks

2.   Study Guides/Laboratory Workbooks

3.   Other Published Materials

L.   Papers Presented

1.   Invited and/or Refereed Internationally or Nationally

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"Petri-Net Approach to Computer Hardware and Software," Presented at 3rd Polish-English Seminar on Real time Systems, May 20-23, 1980, Jadvisin, Warsaw. Co-authors, A.A. Khan, N.K. Nanda and D. Grover.

"On Transfer Function Matrix and State-Space Representation of Systems," Invited Paper presented at the Polish Conference on Mathematical Techniques, Electrical Engineering, Ogonapalskic Symposium Metody Matenatyozne W. Elektrotechniel MME-9 Pokrzywna K. Gluckolazaw, May 26-31, 1980, held near Opole, Poland.

"A Petri-Net Approach to Compute the Terminal Reliability of a Communication Network," Proc. Pacific Telecomm. Conf., Honolulu, HI, pp. A5-13 to A5-17, January 12-14, 1981. Co-authors, A.A. Khan, G.S. Hura and N.K. Nanda.

"A Petri Net Approach for the Minimization of Sequential Machines," presented at the International Conference on Modelling and Simulation, Paris, July 1-3, 1982. Co-authors, D. Grover and N.K. Nanda.

"On the Identification of Parallelism in Cross Assembler Using Petri Nets," presented at the International Conference on Modelling and Simulation," Paris, July 1-3, 1982. Co-authors, G.S. Hura and N.K. Nanda.

"Petri Net Approach to Evaluate Maximum Compatible Classes in Data Path Organization of Modern Computers," presented at the 25th Midwest Symposium on Circuits and Systems, Houghton, August 30-31, 1982. Co-authors, D. Grover and N.K Nanda.

"On Bit Sequential Multiplier," Presented at 6th Symposium on Computer Arithmetic, June 20-22, 1983, Aarhus, Denmark. Co-authors, R. Donthi and M. Saleem.

"Probabilistic Conflict Petri Nets," 31st Midwest Symposium on Circuits and Systems, St. Louis, MO, August 9-12, 1988. Co-author, N. Chames.

"Software Engineering approach to Software Security." IASTED International Conference on Modelling and Simulation, Santa Barbara, Nove. 13-15, 1989. Co-authors S. Bhama and D. Kaur.

"Petri Net approach in determining adaptive routes for Hypercube Network" Twentieth Annual Pittsburgh Conference on Modelling and Simulation, May 4-5, 1989. Co-authors J.S. Kim, D. Kaur, and G. Azar.

273

"Two Dimensional Clutter: A New Definition. 36th Midwest Symposium on Circuits and Systems, Detroit, MI, August 16-18, 1993. Co-authors M. Bhaskara, V. Gautam, S. Singh, T. Meitzler and G. Gerhart.

"Fuzzy Logic Approach in determining the range of electric vehicle," Proc. of 37th Midwest Symposium on Circuits and Systems, Louisiana, pp. 1519-1522, Aug. 1994, co-authors H. S. Bawa, S. Barada, B. Bryant and L. Anneberg.

"Fuzzy Logic in Control of Microstructure and Mechanical properties of Austempered Ductile Iron (ADI)," International Conference on Automation, Indore, Dec. 12-14, 1995, co-authors H. S. Bawa, S. Barada and S.Putatunda.

"Relative Clutter Metric: A new Tool for Image Analysis," International Conference on Automation, Indore, Dec. 12-14, 1995, co-authors Chen, T. Meitzler and G. Gerhart.

"Boolean Neural Network Realization of Pipelined Array Adder-Subtractor Cell," International Conference on Automation, Indore, pp. 71-73, Dec. 12-14, 1995, co-authors H. S. Bawa, L.Arafeh, L.Anneberg and E.Yapark.

"Relative Clutter Metric," Second Asian Conference on Computer Vision, N.T.U Singapore, pp. 804-809, Dec 5-8, 1995, co-authors T.Meitzler and G. Gerhart.

"Terminal Reliability of Distributed Computer Systems using Binary Decision Diagram," International Conference on Automation, Indore, pp. 89-91, Dec. 12-14, 1995, co-authors S. Vaithilingam, R.Anne, L.Anneberg and G.Mann.

"Distributed Processing Techniques for Generation of Dertouzos Tables," Proceedings of the ISCA International Conference on Parellel and Distributed Computing Systems, Orlando, Florida, pp. 337-342, Sep 21- 23,1995.

(Invited Paper) Scaling a Neuro Fuzzy Systems and applications to 3-D Visualization and robot path planning, Co-authors: Deok Nam, Steven Muench-Casanova, Grant Gerhart, Rich Goetz, IFSA/NAFIPS 2001, Vancouver , Canada, July 25-28 ,2001.

Fuzzy logic based sensor fusion for Mine Detection and Concealed Weapon Detection.Co- authors T. Meitzler, E.J.Sohn,D.Bryk, Kimberly Lane, Jyoti Raj. Aerosense 2003, April21-24 Orlando, 2003

2. Invited and/or Refereed Locally/Regionally

3. Textbook Citations of Author's Publications

"Architecture of Pipeline Computers," P.M. Kogge, McGraw-Hill, 1981.

"Computer Arithmetic," K. Hwang, John Wiley, 1979.

"Computer Architecture," translation in Chinese, 1980.

"State Space Approach," T. Kaczorek, in Polish.

"Linear Systems," T. Kaczorek, in Polish.

M.   Invited Seminars or Lectures

"Mini Microcomputers," Institution of Engineers, India.

"State Space Approach to Circuits and Systems," Delhi College of Engg.

"Microcomputer Applications," GNE College, Ludhiana.

"Modern Development in Electrical and Computer Engineering," Wayne State University.

"State-space Approach in Computers and Controls," Coordinated Science Laboratory, University of Illinois, Urbana.

"Software Engineering and VLSI Design," Central Scientific Instruments Organization, Chandigarh, India.

"An Overview of Software Engineering," University of Roorkee, India.

"System Theoretic Approaches to Computer Hardware and Software," Wright State University, Dayton, OH.

"Scientific Directions in Computer Hardware and Software," Central Scientific Instruments Organization, Chandigarh, India.

"Software Engineering," Guru Nanak Engineering College, Ludhiana.

"Research Directions in Autonomous Land Vehicles and Robotics," University of Roorkee.

"New Developments in Software Engineering," Panjab Engineering College, Chandigarh, May 1988.

"Boolean Neural Networks", Panjab Engineering College, Chandigarh, Dec. 1991.

"Software Maintenance", Winter School participants, Panjab Engineering College, Chandigarh, Dec. 1992.

"Neural Network for target Detection", Panjab Engineering College, Chandigarh, Jan. 1994.

"Interactive Distance learning", Panjab Engineering College, Chandigarh, Jan. 1995.

"Fuzzy Logic Applications", Panjab Engineering College, Chandigarh, Dec 1996.

"Fuzzy Logic Applications", University of Roorkee, Roorkee, Jan. 1997.

Distance Learning in Teaching and Research. Punjab Engineering College, Chandigarh, January 1998.

N.   Other Scholarly Work

Attended summer college in "Advanced Software Engineering," at M.I.T. Cambridge in 1975.

Developed the syllabi and subsystem certificate course at FORD.

Coordinated writing of new texts for the courses for which texts are not available for certificate program at FORD.

Chaired a session on "Real-Time Processing" in the Intelligent Systems and Machines Conference, Oakland University, Rochester, MI, April 1984.

Chaired a session on "Real-Time Processing" in the Intelligent Systems and Machines Conference, Oakland University, Rochester, MI, April 1975.

Chaired a session on "Real-Time Processing" in the Intelligent Systems and Machines Conference, Oakland University, Rochester, MI, April 1976.

Organized a session on "State-Space System" for 30th Midwest Symposium on Circuits and Systems, August 17-18, 1987, Syracuse University, Syracuse, NY.

Organized a seminar on "Engineering Computing Needs," March 27, 1987, Wayne State University.

Organized a seminar "Engineering computing Needs - Mini and Micros", March   1988, Wayne State University.

Chaired a session on "Electro-Optics" at the 31st Midwest Symposium on Circuits and Systems," August 9-12, 1988, St. Louis, MO.

Organized and chaired sessions on Parallel Processing for Software Engineering at 21st Pittsburgh Conference on Modelling and Simulation May 3-4, 1990.

Organized and chaired sessions on Neural Nets and Multiprocessor Architecture at 22nd Pittsburgh Conference on Modelling and Simulation May 1-2, 1991.

Organized and chaired a session on Real Time Processing in 23rd Annual Modeling and Simulation, Pittsburgh Conference, April 30, May 1, 1992.

Organized and Chaired a session on Neural Net Application, 36th Midwest Symposium on Circuits and Systems, Detroit, MI, August 16-18, 1993.

Chaired a session on VLSI Multiple Valued Logic, 36th Midwest Symposium on Circuits and Systems, Detroit, MI, August 16-18, 1993.

Chaired a session on 37th Midwest symposium on Circuits and Systems,   Louisiana, Aug. 1994.

Chaired a special session on International Conference on Automation, Indore, India, Dec 12-14., 1995.

Member ,Organizing Committee of Robotic and semi-robotic ground Vehicle technology conference April 15-16, 98, Orlando

Member ,Organizing Committee of Robotic and semi-robotic ground Vehicle technology conference April 7-8, 99, Orlando

Member,Organizing Committee of Robotic and semi-robotic ground Vehicle technology conference April 22-24, 00, Orlando

Member,Organizing Committee for 7th International Conference of advanced computing Dec. 20-22, Roorkee India.

Member,Advisory Committee for 8th International Conference of advanced computing December 2000, India.

Member,Organizing Committee of unmanned ground Vehicle technology conference April 16-20 , 01 , Orlando.

Session Chair of Video Session on mobile robots and Member,Organizing Committee of unmanned ground Vehicle technology conference April 2-5, 02 , Orlando

Session Chair of Video Session on mobile robots and Member,Organizing Committee of unmanned ground Vehicle technology conference April 2003 , Orlando

Session Chair of Video Session on mobile robots and Member Organizing Committee of unmanned ground Vehicle technology conference April 12-15, 2004, Orlando

Member of Organizing Committee SPIE Conference Apirl 1998.

Member of Organizing Committee on International conference on Advanced Computing December 1997, Madras, India.

Member of Organizing Committee SPIE Conference Apirl 1999.

Participated in UPCADEM Conference, 1984, 1986.

Took practical training on MEDUSA CAD.CAM System, 1985.

IV.   SERVICE

A.   Administrative Appointments at Wayne State University

       Associate Chairman ECE Department, December 1982-May 1989

B.   Administrative Appointments at Other College/University

       Member, Roorkee University Senate
       Member, Roorkee University Syndicate
       Member, Computer Advisory Committee
       Member, Advisory Committee for University Services and Instruments
Center
       Worked as Convenor Academic Committee, Department of Electronics and
       Communication Engineering, University of Roorkee
       In charge, Computer Group and Post Graduate Diploma Course in
Computer Science and Technology, University of Roorkee
       Worked as Convenor, Purchase Committee, Dept. of Electronics and
       Communication Engg., University of Roorkee
       Coordinator, Q.I.P. Winter Course on Computer Architecture, December 1-21,
       1977
       Member, Board of Studies, Punjab University
       Member, Board of Studies, Kurukshetra University
       Member of high-powered committee to recommend starting a B.E. Program at
       Regional Engineering College, Srinagar

C.   Committee Assignments in Last Five Years

       1.   University Committees Chaired

       2.   University Committee Membership

             Member Academic senate
             Member Research committee Academic senate

       3.   College/Department Committees Chaired

             Chairman, College Computer Committee
             Chairman, Undergraduate Committee

       4.   College/Department Committee Membership

             Chairman, Undergraduate Committee
             Member, College Tenure and Promotion Committee
             Member, Graduate Committee
             Member, Lab Committee

Member, of AOC
Member, Personnel Committee
Coordinator, FORD/WSU program from the Department
Member, Chairman - Search Committee
Member, Salary Committee
Member,University Sabbatical Committee

D.   Positions Held in Professional Associations in Last Five Years

Branch Advisor IEEE Computer Society, Wayne State University.

E.   Membership/Offices Held in Public or Private Agencies Related to Discipline

Secretary, Roorkee University Alumni Association, North America.
Member, Detroit Science Center

Bhartiya Family Services, Detroit.

F.   Professional Consultation

1.   Public Presentation as an Expert in Discipline

2.   Testimony Before Public Bodies

3.   Consulting to Public Agencies, Foundations, Professional Associations

4.   Consulting at TACOM through Battelle, Summer assignment 1992, and consulting during Fall 1992, Winter 1993, and Summer 1994, consulting during year 1998.

5.   Consulting to Private Enterprises

G.   Journal/Editorial Activity

1.   Editorships
Guest editor in special Issue of Optical Engineering, July 1998, on Infrared Imaging.

2.   Editorial Board Membership

3.   Reviewerships

Worked as reviewer: National Science Foundation IEEE Trans. on computers, IEEE. Trans. Software Engineering, IEEE Computer,IEEE Trans. Automatic Controls, IEEE Trans. Circuits and Systems, IEEE

Trans. on Neural Networks, IEEE Trans. onSystem Man and Cybernetics, IEEE Trans. on Fuzzy Logic, Int. J. Computer-Aided VLSI, Design, Int. J. Control, Midwest Symposiums, CDC Conference, National Computer and Robotic Conferences, IETE, McGraw-Hill. American Control Conference,SIAM review text on Petri Nets

Journal of Pattern Recognition

International Journal of System Science

H.   Other Professional Related Service

Member organizing committee of SPIE conference on Unmanned Ground vehicles 1999 - 2003 and organized and chaired Video Sessions.

Member organizing committee of a conference on Semi Autonomous vehicles -Orlando,April 1998.

Member organising committee for 5th International Conference of Advanced Computing. Dec. 15-17, Madras, India.

Member organising committee of joint conference on information sciences held in Nov. 1994 in Duke University.

Dr. Labib Arareh(Chariman ECE dept. College of Engg. and Tech., Hebron and West Bank) as a Fulbright fellow work with me at Wayne State University for 9 months.

Dr. H.S.Sekhon (Chairman of EE dept. Now Dean of College of Engineering PAU Ludhiana, India) worked with me at Wayne State Unversity for 6 months.

Dr. Kyung -Jae Ha (Professor Computer Eng. Dept., Kyungnam University, Korea) worked with me at Wayne State University for 1 Year.

Member organinising committee of International Conference on Automation, Dec. 12-14 1995, Indore, India.

Member organizing committee 36th Midwest Symposium on Circuits & Systems, August 16-18, Detroit, MI 48202

Member Organizing Committee of the Robotic Intelligence and Productivity Conference, Nov. 1983.

Organized National level symposium on Mini and Microcomputers and Automation.

Organized seminar on "Engineering Computing Needs," Wayne State University, March 27, 1987 and March 1988.

Worked as Chief Advisor, Cultural Society, University of Roorkee

Worked as President, Arts Club, University or Roorkee.

Worked as Deputy President, Engineering Students Club.

Worked as Secretary and Vice-President, Society of Electronics and Communication Engineers.

Worked as President Staff Club and Vice-President Staff Association, University of Roorkee.

Professor of the Week, The South End, January 16, 1990.

A. **PROFESSIONAL RECORD**

NAME: Pepe Siy

DEPARTMENT/COLLEGE:
        Department of Electrical and Computer Engineering
        College of Engineering

PRESENT RANK & DATE OF RANK:
        Professor , Sept 2002

WSU APPOINTMENT HISTORY:
        Year Appointed/Rank : 1981/Assoc. Prof
        Year Awarded Tenure : 1988

DATE & PLACE OF BIRTH:
        6/30/42 - Philippines

CITIZEN OF:
        U.S.

EDUCATION:
        Doctoral:
                Univ. of Akron, Akron, Ohio, PhD, 1973

        Graduate:
                Univ. of California, Berkeley, Cal, MSEE, 1967

        Bacclaureate:
                Mapua Inst. of Technology, Philippines, BSEE, 1965

FACULTY APPOINTMENTS AT OTHER INSTITUTIONS:
        Instructor, 1966, Mapua Inst of Technology, Philippines

PROFESSIONAL SOCIETY MEMBERSHIPS(S):
        IEEE
        ETA KAPPA NU
        SIGMA XI

HONORS/AWARDS:
        Recipient of Mapua School President's Gold Scholarship Medal
        Outstanding Teaching Award - 1996

I. TEACHING

Years at Wayne State : 22
Years at Other Colleges/Universities: 1

Courses Taught at Wayne State in Last Five Years

1. Undergraduate

- ECE 460 Microcomputer Interfacing

2. Graduate

- ECE 657/ECE595/ECE5995/BME6470 Smart Sensor Technology I
- ECE 7570/ECE7995/BME7470 Smart Sensor Technology II
- ECE 6660 Digital System Design Using VHDL
- ECE 7530 Advance Digital VLSI Using VHDL

D. Essays/Theses/Dissertation Directed

Ph.D. Students Graduated:

- Emad Attalla, Ph.D., "Shape Based Digital Image Similarity Retrieval," March 2004.

- Abdulaziz Saleh Alraddadi, Ph.D., "Building Multi-Search Engines for E-Commerce: A Data Mining Approach for Knowledge Discovery," September 2003.

- Majed Marji, Ph.D., "On the Detection of Dominant Points on Digital Planar Curves," June 2003.

- Saleh O. Al-ahmadi, Ph.D., "Design of A Self-Tuning Fuzzy Logic Controller for System with Variable Time Delay," March 2002.

- Eid Alradadi, Ph.D. , " RNS Non-Modular Operations Efficient Implementation Based on Chinese Remainder Theorem II (CRTII)," December 2001.

- Grama Y. Chethan, Ph.D, "Efficient Representation Techniques for Object Recognition," March 2001.

- Eep Muhammad Setiaarif, Ph.D, "Residue Number System Arithmetic Logic Unit (ALU) With General Division Based on a New Technique in Moduli Set Selection," December 2000. Employed at Sun Microsystems

- Byoung-moon You, Ph.D, "In-Vivo Measurement of 3D Skeletal Kinematics from High-Speed Sequences of Biplane Radiographs: Application to Knee Kinematics," August 2000.

- Hussein Dourra, Ph.D, "Fuzzy Logic Modeling of Human Behavior in the Finance Field," Aug 2000. Employed at Daimler Chrysler

- Talameh, Salman, Ph.D, " High-Performance Parallel Computing Using Residue Number Systems (RNS) and Parallel Decomposition," Dec 1996. Employed at City of Detroit.

- Seetamraju, S, Ph.D, "The Theory of Tessellation and its applications to hierarchical signal matching," 1995.

- Wang, R, Ph.D, "Parallel decomposition algorithm by integer modular arithmetic and its application," 1995.

- Hu, Joe E, Ph.D, "Stereo CorrespondenceUsing An Ordering-Oriented Hopfield Network," 1993. Employed at Bell Lab.

- Makki, Asaad, Ph.D., "Variable Structure Controllers Design with Sliding Modes," 1993. Employed at Ford Motor Co.

- Saleh, Khalaf, Ph.D., "Application of Graph Theory and the Theory of Evidence to Three-Dimensional Object Recognition," 1989

-
  Hassan, Mohammad H., "An AI Approach for Object Recognition," 1988. Employed at Lawrence Institute of Technology

- Zhu, Mingfa, Ph.D., "Planning and Scheduling Using Temporal Logic," 1985. Employed at Institute of Computing Tech, Chinese Academy of Sciences

- Chen, B.D. Ph.D., "Image Segmentation With Local Feedback At Low- and High-Level Processing," 1985. Employed at Ford Motor Co.

- Salari, E.. Ph.D., "Skeletonization of Gray Scale Images," 1982. Employed at University of Toledo

Ph.D. Students in Progress:

- Wei Zhang, Ph. D. candidate, " RNS modulo set selection"

- Nabil Abu-Khader, Ph.D. candidate, "Galois Polynomial Fields GF(2n) For Logic Design"

- Mohammad Ismail Talukder, Ph.D. candidate, "Artificial Vision Restoration by Image Reproduction Through Wireless Neural Implant Microsystems"

- Mehrdad Abtahi, "Core Function of Residue Number System (RNS)"

- Mohammad Akkal, Ph.D. candidate, "RNS to Decimal Converter efficient

Implementation"

- Omar Dajani, Ph.D. student, "RNS Arithmetic Logic Unit"

M.S. Students Graduated:

- Nabil Abu-Khader, MSc, " Viterbi Algorithm FPGA Implementation", 2002.

- Sasidhar Saladi, MSc candidate, "Delta Modulation AD Converter" 2002.

- V. Murali, "50 MHz Analog to Digital Converter" 2002

- Amrita Baliga, "FIR Filter FPGA Implementation" 2002.

- Madan mohan Kovur, MSc candidate, " Jpeg Compression FPGA Implementation" 2002.

- Santosh Shreinivasan, MSc. candidate, "Simple Computer FPGA Implementation" 2002.

- Desmond Cicero, MSc. "A Study of State Machine Modelling and Synthesis For A Serial Data Transmitter Controller", May 2000. Employed at Cadence Corp.

- Nader M. Rabadi, MSc. "Test Bench Creation and Simulation of Synthesized VHDL-Based VLSI Design," May 1998.

- Siegfried Hart, MSc, "Design of a CMOS Multichannel Charge Sensitive Preamplifier/Shafer Chip for Silicon Drift Detector," May 1997. Employed at Siemens Corp.

- Praveen Kumar Kolli, MSc. "Digital Cmos IC Design Using Mentor Falcon Framework," 1995. Employed at Sony Corp.

M.S. Students in Progress:

- Zhen Yang, MSc. candidate, "RSA Algorithm FPGA/CPLD Implementation"

- Rajesh Kanaparti, MSc. candidate, "PLL VLSI Chip Implementation"

- Abhishek Jindal, MSc candidate, "Automatic Call Rejection System"

- Mahendra Parasmal, MSc candidate, "Cross Bar ATM Switch"

- Anukul Rangarajan, MSc candidate, "Montgomery Algorithm and RSA"

- Dheeraj Agarwal, MSc candidate, " Fuzzy Controller Using FPGA"

E. Course or Curriculum Development

- ECE 6570 - Smart Sensor Technology I
- ECE 7570 – Smart Sensor Technology II
- ECE 7680 - Robotics and Machine Intelligence.
- ECE 4600 - Microprocessor Interfacing
- ECE 7470 - Digital Control (Ford UK/Wayne MS Program)
- ECE 7620 - Real-Time Programming (Ford/Wayne MS Program)
- ECE 6660/7530 – Advance Digital VLSI Using VHDL

F. Course Materials (Unpublished)

- ECE 6570 Course Pack
- ECE7530 Course Pack
- ECE7570 Course Pack

II. RESEARCH

B. Funded Research

- G. Auner, P. Siy, L. Wenger, and R. Naik, "REU Site for Smart Sensors and Integrated Microsystems Research," National Science Foundation, **$299,625**, Jun 2001 – Jun 2003. (25% share and efforts)

- L. Schwiebert, G. Auner, P. Siy, R. Izzi, and S. Gupta, "ITR: Wireless Networking Solutions for Smart Sensor Biomedical Applications," National Science Foundation, **$1,797,351**, Sep 2000 – Sep 2004. (20% share and efforts)

- P. Siy, "In-Vivo 3D Knee Kinematics Following ACL Injury Using High Speed Biplane Radiography--   Continuation," Henry Ford Health Sciences Center, **$20,331**, Jan 1999 – Aug 1999. (100% share and efforts)

- G. Auner, P. Siy, G. Liu, R. Naik, and L. Wenger, " IGERT FORMAL PROPOSAL: Smart Sensors and Integrated Devices," National Science Foundation, **$2,628,110**, June 1, 1998 for 5 years. (20% share and efforts)

- G. Auner, P. Siy, and R. Naik, "REU Site for Smart Sensors and Integrated Devices," National Science Foundation, **$224,100**, June 1, 1998 – June 1, 2000. (33% share and efforts)

- P. Siy, "In-Vivo 3D Knee Kinematics Following ACL Injury Using High Speed Biplane Radiography," Henry Ford Health Sciences Center, **$20,110**, May 1998 – Dec 1998. (100% share and efforts)

- G. Auner, P. Siy, and R. Naik, "Integrated Technology in Microelectronic Materials and Smart Devices REU Supplemental," National Science Foundation, **$5000**, Sept 1996 – Sept 1997. (33% share and efforts)

- G. Auner, P. Siy, and R. Naik, "Integrated Technology in Microelectronic Materials and

Smart Devices," National Science Foundation, **$311,247**, Sept 1994 – Sept 1997. (33% share and efforts)

- R. Bellwied, G. Auner, and P. Siy, "SVT Activities At Wayne State University," Brookhaven National Laboratory, **$34,151**, May 25, 1995 – July 30, 1996. (33% share and efforts)

- P. Siy, "Graduate Recruiting via Internet," WSU 1994-1995 Graduate School Recruiting Funds, **$5000**, 1994-1995. (100% share and efforts)

- R. Bellwied, G. Auner, and P. Siy, "ASIC Development STAR Project," Brookhaven National Laboratory, $134,000, Oct 1993-Sept 1994

- P. Siy, "Expert Tank Recognition System," General Dynamics, $30,003, August 1990-Dec 1990.

- P. Siy, "Traction Control," Ford Motor Co. U.K., $40,265, June 1990-Dec 1990

- H. Singh, P. Siy, and D.S. Bedi, "Data Compression Using Fractals," General Dynamics, $10,000, April 1989-April 1990.

- H. Singh, P. Siy, and R. Barnard, "Modification of PIPE Computer," General Dynamics, $50,000, 1987-1988.

- H. Singh and P. Siy, "Target Recognition," General Dynamics, $20,000, 1986.

- H. Singh and P. Siy, "Autonomous Land Vehicle Project," General Dynamics, $25,000, 1985.

Total Funding: **$ 5,654,293**

 III. PUBLICATION

C. Editorship of Books/ Proceeding

"Proceedings Robotics Intelligence and Productivity Conference," Nov.18-19,1983, Wayne State Univ.

D. Journal Articles Published

Refereed Journals Published

M. Marji and P. Siy, "Polygonal representation of digital planar curves through dominant point detection- a nonparametric algorithm," *Pattern Recognition Journal* , 2004, (Accepted)

E. Al_Radadi and P. Siy, "RNS Sign Detector Based on Chinese Remainder Theorem II (CRT II)," *International Journal of Computer and Mathematics with Applications*, 46, 2003, pp1559-

1570.

M. Marji and P. Siy, "A new algorithm for dominant points detection and polygonization of digital curves," *Pattern Recognition Journal* , 2003, (Accepted)

E. Al-Radadi and P. Siy, "A- moduli set $(2, 2^n – 1, 2^n + 2^{n-1} –1, 2^{n+1} + 2^n –1)$ Simplify The Residue to Binary Converters Based on CRT II," *International Journal of Computer & Mathematics with Applications*, 44, 2002, pp 1581-1587.

B. You, P. Siy, W. Anderst, and S. Tashman, "In-vivo measurement of 3D skeletal kinematics from sequences of biplane radiographs: application to knee kinematics, " *IEEE Trans on Medical Imaging*, Vol. 20, No.6, June 2001, pp514-525.

H. Dourra and P. Siy, "Investment Using Technical Analysis and Fuzzy Logic," *Fuzzy Sets and Systems*, 127, 2002, pp 221-240.

H. Dourra and P. Siy, "Stock Evaluation Using Fuzzy Logic," *International Journal of Theoretical and Applied Finance*, IJTAF Vol 4 No3, July 2001, pp 585-602

S. Talameh and P. Siy, "Arithmetic Division in RNS Using Galois Field GF(p)," *Computer & Mathematics with Applications*, 39 (2000), pp 227-238.

S. Talameh and P. Siy, "Enhancing Mersenne Transforms by RNS with Application to Discrete Convolution," *International Journal of Systems Science*, 1997, volume 28, number 4, pp. 423-427.

R. Wang and P. Siy, "Parallel-decomposition algorithm for discrete computational problems and its application in developing an efficient discrete convolution algorithm," *IEE Proceedings-I, Communications, Speech and Vision*, Vol 142, No1, Feb. 1995, pp40-46.

S. Khalaf, P. Siy, and M. Abdelguerfi, "Modeling a class of 3-D objects using cycles of a graph," *Computers in Industry*, Elsevier Science Pub., Vol 12, No.3 Jul., 1989.

H. Huang and P. Siy, "High-speed division unit using asymmetric neural network architecture," *Electronics Letters*, Vol. 25, No. 5, Mar., 1989, pp344-345.

S, Khalaf, M. Zhu, P. Siy, and M. Abdelguerfi, "A Real-Time Industrial Pattern Classification System," *IEEE Trans of Industrial Electronics*, Vol. 36, No. 1, Feb., 1989, pp84-85.

M. Hassan and P. Siy, "Thresholding Based on Learning Theory," *IEEE Proc*., Vol. 76, No. 10, Oct., 1988. pp1379-1391.

M. Zhu, N. Loh and P. Siy, "Toward The Minimum Set of Primitive Relations in Temporal Logic," *Information Processing Letters*, Vol. 26, No. 2, Oct., 1987, pp121-126.

M.H. Hassan and P. Siy, "Polygonal Approximation for Image Segmentation," *Electronics Letters*, Vol. 23, No. 19, Sept., 1987.

B.D. Chen and P. Siy,"Forward/Backward Contour Tracing with Feedback," *IEEE Trans on*

PAMI, May 1987, pp438-446.

M.H. Hassan and P. Siy, "Real-time thresholding technique," *Electronics Letters*, Vol. 23, No. 7, Mar., 1987.

S. Khalaf, P. Siy, M. Zhu and N. Loh, "A Parallel Architecture for Prototype Training," *Electronics Letters*, Oct., 1986.

E. Salari and P. Siy, "Ridge Seeking Method for Obtaining the Skeleton of Digital Images," *IEEE Trans. Syst. Sci. Cybern*, Vol. SMC-14,No. 3, pp. 524-528, May/June 1984.

Pepe Siy and C.S. Chen,"Fuzzy Logic for Handwritten Numeral Character Recognition," *IEEE Trans. Syst. Sci. Cybern*., Vol. SMC-4, No. 6, pp. 570-575, Nov. 1974.

Pepe Siy and C.S. Chen, "Minimization of Fuzzy Function," *IEEE Trans. Comput*., Vol. C-21, No. 1,pp 100 -102, Jan. 1972.

Journal Articles Submitted/Pending

A. Rosenfeld, M. Marji, and P. Siy, "Dominant Points For Shape Representation – A Survey," submitted to Pattern Recognition Journal, 2003.

M. Marji, A. Rosenfeld, P. Siy, "Corner Detection and Curve Partitioning Using Arc-Chord Distance," submitted to Pattern Recognition Journal 2003.

A.Alraddadi and P. Siy, "Automatic Website Search Syntax Retrieval Algorithm," submitted to Elsevier, 2003

A. Alraddadi and P. Siy, "Data Mining Approach for Information Extraction or Knowledge Discovery," submitted to Elsevier, 2003.

Conference Articles Submitted/Pending

E. Attalla and P. Siy, "Adaptive Shape Contour Tracing Algirthm," submitted to ACM Multimedia 2004 conference.

E. Attalla and P. Siy, "A Multi-resolution Dual Stage Shape Similarity Retrieval Algorithm," submitted to ACM Multimedia 2004 conference.

E. Papers Published in Conference Proceedings

Refereed Conference Papers

1. T. M. Raza, R. Iezzi, G.W. Auner, P. Siy, et. al. ,"Design of a High-channel-count Current Source for Use in Retinal and Cortical Visual Prostheses," Association for Research in Vision and Ophthalmology, May 4-9, 2003, Ft. Lauderdale, Florida.

2. A. Alraddadi and P. Siy, "Multi-search Engine For Internet Electronic Commerce," Proceedings of the IASTED International Conference Communications, Internet, &

Information Technology, Nov. 18-20,2002, St. Thomas, US Virgin Islands.

3. E. Al-radadi and P. Siy, "Modulo 2n – a RNS Arithmetic Adder and Multiplier Implementation," *18th Annual Mentor Graphics User Group Conference*, MUG 2001, Feb 24-27, 2002, Denver, Colardo.[Conference date was moved from Oct, 2001 to Feb, 2002 After 9/11/01].

4. E. Al-radadi and P. Siy, "A New Technique for Fast Number Comparison in the Residue Number System Based on Chinese Remainder Theorem II," *18th Annual Mentor Graphics User Group Conference*, MUG 2001, Feb 24-2, 2002, Denver, Colardo. [Conference date was moved from Oct, 2001 to Feb, 2002 After 9/11/01].

5. G. Auner, M. R. Safadi, P. Siy, R. Iezzi, G.W. Abrams, and P. McAllister, "Nano- and Micro- System Neuro Interfacing Electrode Arrays for the Retina," *ARVO* 2001.

6. B. You, P. Siy, and S. Tashman, "3D Knee-Motion Tracking From Sequences of Radiographs," *SPIE-The International Society for Optical Engineering*, Bellingham, WA, Feb 20-26, 1999, pp479-487.

7. E. Setiaarif and P. Siy, "4 Moduli Binary to RNS and RNS to Binary Conversion," 1998 Mentor Graphics Users Group International Conference, Oct 5-8, 1998, Portland, Oregon

8. G. Auner, P. Siy, and R. Naik, "Smart Sensor Technology: A Multidisciplinary Course Sequence - Integrating Solid State and VLSI Technology," *Engineering Education Innovators Conference/CRCD Grantees Conference*, Arlington, VA, April 1997.

9. G. Auner , P. Siy, and R. Naik, "Integrated Technology in Microelectronic Material and Smart Devices." *ASEE Annual Conference*, Anaheim, CA June 1996.

10. S. R. Wang and P. Siy, "Parallel decomposition algorithm using decimation operation for two-dimensional discrete convolution operation", *IS&T/SPIE Symposium on Electronic Imaging: Science & Technology* Vol 2421-24, February 1995, pp216-227.

11. G. Chethan and P. Siy, "Effective Object Representation Technique For Recognition," Intelligent Robots and Computer Vision. *SPIE International Symposium on Photonics for Industrial Applications*, Boston., Oct 31- Nov 4, 1994, pp33-42.

12. J. Hu and P. Siy, "The Ordering Hopfield Network," *IEEE World Congress on Computation Intelligence*, Orlando, FL, June 26-July 2, 1994, vol 7, pp4693-4698.

13. S. Sarma and P. Siy, "Fourier Based Tools for Parallel Image Analysis," *Third International Workshop on Parallel Image Analysis*, Univ of MD, June 7-9, 1994.

14. G. Chethan and P. Siy, "Massively Parallel Technique for Feature Extraction," *SPIE International Symposium on Optical Engineering and Photonics in Aerospace Sensing*, Orlando, FL, April 4-8, 1994, pp167-177.

15. S. Sarma and P. Siy, "Fourier Based Tools for Compression and Vector Quantization," DCC'94 *Data Compression Conference'94*, SnowBird, UTAH, March 29-31, 1994.

16. S. Sarma and P. Siy, "Transformed Based Tools for Design Optimization," *ISSAT International Conference on Reliability and Quality in Design RQD `94 Proceeding*, Seattle, WA, March 16-18, 1994.

17. S. Sarma and P. Siy, "Transformed Based Tool for Compression and Signal Processing," *Tenth Annual Conference on Applied Mathematics*, Univ of Central Oklahoma, Feb 4-5, 1994.

18. G. Y. Chethan and P. Siy, "Hough Space Based Highly ParallelObject Recognition Scheme," *The 36th MWSCAS*, Detroit, MI Aug 16-18, 1993, vol 2, pp998-1001.

19. A. Makki and P. Siy, " A Robust Vehicle Traction Controller Using the Theory of Variable Structure Systems," *The 36th MWSCAS* , Detroit, MI Aug 16-18, 1993.

20. A. Makki and P. Siy, " A Neural Based Self Optimizing Control System, " *Proc. WNCC*, July 93.

21. J. Hu and P. Siy, "A Multiple Constraints Neural Network Solution for Edge-Pixel-Based Stereo Correspondence Problem," *Proc. SPIE, Applications of AI 1993: Machine Vision and Robotics, in SPIE International Symposium on Intelligent Information Systems*, Vol 1964, Orlando, Florida, April 12-16, 1993, pp124-134.

22. J. Hu and P. Siy, "The Ordering-Oriented Hopfield Network and Its Application in Stereo Vision," *Proc. SPIE, Applications of Artificial Neural Networks IV, in SPIE International Symposium on Intelligent Information Systems*, Vol 1965, Orlando, Florida, April 12-16, 1993, pp556-557.

23. J. Hu and P. Siy, "Stereo Correspondence through Multiple Constraint Neural Networks," *Proc. IEEE International Conference on Neural Network*, San Francisco, Cal, March 28-April 1, 1993, vol 1, pp126-131.

24. P. Siy and J. Hu, "Edge-Pixel-Based Stereo Correspondence through Ordering-Oriented Neural Network," *Proc. SPIE, Stereoscopic Displays and Application IV, in IS&T/SPIE 1993 International Symposium on Electronic Imaging Science & Technology*, San Jose, Cal, Jan 31-Feb 4, 1993, pp123-131.

25. A. Makki and P. Siy, "Hopfield Neural Network Control for Optimal Solutions," *Proc. International Joint Conference on Neural Networks*, Vol. 4. Baltimore, MD, June 8-11, 1992, vol 4, pp462-467.

26. A. Makki and P. Siy, "Optimal Solutions By Modified Hopfield Networks," *Proc. Modeling and Simulation Conference*, April 30-May 1, 1992, Univ. of Pittsburgh, Penn.

27. J. Hu and P. Siy, "A Neural Network Model for Feature Based Stereo Correspondence Problem with built-in Ordering Constraint," *International Joint Conference on Neural Networks*, June 8-11, 1992, Baltimore, MD.

28. P. Siy and H. Huang, "Computation and Decomposition Capabilities of An Asymmetric Neural Network," *International Joint Conference on Neural Networks*, June 8-11, 1992, Baltimore, MD.

29. A. Makki and P. Siy, "Theory of Variable Structure in Neural Networks," *First International Conference on Neural Networks in Engineering* Nov 10-11, 1991 Univ of Mo., Rolla.

30. S. Khalef and P. Siy; M. Abdelguerfi, and A.R. Ashrafzadeh "2-D and 3-D touching part recognition using theory of evidence," *International Conference on Computing and Information (ICCI90)*,Niagara Fall, Ontario, Canada, May 23-26, 1990, vol 2, pp992-994.

31. S. Khalef and P. Siy, "2D-3D Recognition of Touching Objects," *International Symposium on Circuits and Systems*, New Orleans, Louisiana, May 3-5, 1990.

32. H. Huang, P. Siy, G. Liu, and M. Polis, "An Asymmetric Neural Network Successive Approximation A/D Converter," *International Joint Conference on Neural Networks*, June 18-22, 1989, Washington, D.C., vol 2.

33. S. Khalef, P. Siy, and M. Abdelquerfi, "Graph Theoretical Approach to 3-D Object Representation," *31 st Midwest Symposium on Circuits and Systems*, St. Louis, Mo., Aug. 1988.

34. M. Hassan and P. Siy, "Recognizing Occluded Objects Using Dempster Shafer Theory of Evidence," *3rd International Conference on Applications of Artificial Intelligence in Engineering*, Aug. 1988.

35. M. Hassan and P. Siy, "Real-Time Signal and Image Segmentation Using Low-Pass Filtering," *SPIE Vol. 977 Real Time Signal Processing XI*, 1988.

36. M. Hassan and P. Siy, "An Optical AI Approach for Object Recognition Using Dempster Shafer Theory of Evidence," *SPIE Vol. 977 Real Time Signal Processing XI*, 1988.

37. S. Khalef, M. Zhu, P. Siy, and M. Abdelquerfi, "VLSI Architecture for Parametric Classification Systems," *30th Midwest Symposium of Circuits and Systems*, Aug 16-18, 1987.

38. S. Khalaf, P. Siy, M. Zhu, and N. Loh, "VLSI Architecture for Machine Learning*," Second International Conference on Robotics and Factories of the Future*, San Diego, CA, July 28-31, 1987.

39. S. Khalef, P. Siy, and M. Zhu, "A Parallel Architecture for Pattern Recognition," *The Fourth Annual Conference on Intelligent Systems and Machines*, April 29-30, 1986.

40. S. Khalef and P. Siy, "Contour-Based Corner Detection," *The Fourth Annual Conference on Intelligent Systems and Machines*, April 29-30, 1986.

41. M. Zhu and P. Siy, "Robotic Planning with Time," *The 1985 Conference on Intelligent*

Systems and Machines, April 23-24, 1985.

42. R. Bazzi and P. Siy, "Angular Optical Scanning Sensor for Autonomous Vehicle Self Location in Constrained Environment," *The 1985 Conference on Intelligent Systems and Machines*, April 23-24, 1985.

43. M. Zhu and P. Siy, "Interval-Based Time Reasoning and Its Application to Planning," *The 1985 Conference on Intelligent Systems and Machines*, April 23-24, 1985.

44. M. Zhu and P. Siy, "General Knowledge Representations of Road Maps and Their Applications," *International Conference on Robotics and Factories of the Future*, North Carolina, December 4-8, 1984.

45. B.D. Chen and P. Siy, "Image Segmentation - The Boundary Region Extraction Approach," *Proceeding of Conference of Intelligent Systems and Machines*, Oakland University, April 1984.

46. M. Zhu and P. Siy, "A Knowledge-Based Matrix Representation Method for a Class of Road Maps and Its Applications to Goal Achieving," *Proceeding of Conference of Intelligent Systems and Machines*, Oakland University, April 1984.

47. P. Siy, "Road Map Production System For Intelligent Mobile Robot," *International Conference on Robotics*, March 12-15, 1984, Atlanta, Georgia.

48. G. Kumar, J. Yoo, B.D. Chen, and P. Siy, "Intelligent Mobile Robot System," *Robotic Intelligence and Productivity Conference*, Nov. 18-19, 1983, Wayne State University, pp149-152.

49. S. Khalef and P. Siy, "Intelligent Robot Wheelchair," *Robotic Intelligence and Productivity Conference*, Nov. 18-19, 1983, Wayne State University, pp145-148.

50. P. Siy, "Mobile Robots in Productivity," *Robotic Intelligence and Productivity Conference*, Nov. 18-19, 1983, Wayne State University, pp128-134

51. B. D. Chen and P. Siy, "A New Contour Extraction Algorithm For Gray Scale Digital Images," Conference on Artificial Intelligence, April 26-27, 1983, Oakland Univ., Rochester, MI, pp621-631.

52. E. Salari and P. Siy, "A Skeleton Algorithm for Gray Pictures," 1982, IEEE International Conference on Cybernetics and Society, Oct. 28-30, 1982, Seattle, Washington.

53. E. Salari and P. Siy, "A New Technique for Image Enhancement of Line-Like Patterns,"*25th Midwest Symposium on Circuits and Systems* Aug. 30-31, 1982, Houghton, MI.

54. E. Salari and P. Siy, "A Thinning Algorithm Using Contextual Information," *Phoenix Conference on Computers and Communications*, May 9, 1982, Phoenix, Az.

55. Pepe Siy and C.S. Chen, "Modeling of System with Ill-Defined Attributes,"*IEEE Conference on Decision and Control*, pp. 225-226, Dec 15-17, 1971.

56. Pepe Siy and C.S. Chen,"Fuzzy Logic Approach to Handwritten Character Recognition Problem," 1971, *IEEE Systems, Man and Cybernetics Group Symposium*, Pub. 71 C 46-SMC, pp. 113-117.

F. Translations of Other Authors Published
G. Abstracts Published in Academic Journals
H. Book Reviews Published
I. Creative Shows/Exhibits

   Refereed or Judged:
    Local/Regional Competition

Science and Engineering Fair of Metropolitan Detroit, Grand Award Judge 1982-1987.

Science and Engineering Fair of Metropolitan Detroit, Senior Judge 1988.

Science and Engineering Fair of Metropolitan Detroit, Grand Award Judge, 1989

J. Creative Performances
K. Instructional Materials Formally Published
L. Papers Presented

Invited and/or Refereed Internationally or Nationally

P. Siy, "Residue Number System Arithmetic Logic Unit," IEEE Southeastern Michigan Section, Spring Section Meeting, March 27, 2002

S. Khalaf, P. Siy, M. Zhu, and N. Loh, "VLSI Architecture for Machine Learning," Second International Conference on Robotics and Factories of the Future, San Diego, CA, July 28-31, 1987.

S. Khalef, M. Zhu, P. Siy, and M. Abdelquerfi, "VLSI Architecture for Parametric Classification Systems," *30th Midwest Symposium of Circuits and Systems*, Aug 16-18, 1987.

S. Khalef, P. Siy, and M. Abdelquerfi, "Graph Theoretical Approach to 3-D Object Representation," *31 st Midwest Symposium on Circuits and Systems*, St. Louis, Mo., Aug. 1988.

M. Hassan and P. Siy, "Recognizing Occluded Objects Using Dempster Shafer Theory of Evidence," *3rd International Conference on Applications of Artificial Intelligence in Engineering*, Aug. 1988.

M. Hassan and P. Siy, "Real-Time Signal and Image Segmentation Using Low-Pass Filtering," *SPIE Image Processing VI Conference*, San Diego, CA, Aug.1988.

M. Hassan and P. Siy, "An Optical AI Approach for Object Recognition Using Dempster Shafer Theory of Evidence," *SPIE Image Processing VI Conference*, San Diego, CA, Aug., 1988.

S. Khalef, P. Siy, and M. Zhu, "A Parallel Architecture for Pattern Recognition," *The Fourth Annual Conference on Intelligent Systems and Machines*, April 29-30, 1986.

S. Khalef and P. Siy, "Contour-Based Corner Detection," *The Fourth Annual Conference on Intelligent Systems and Machines*, April 29-30, 1986.

M. Zhu and P. Siy, "Robotic Planning with Time," *The 1985 Conference on Intelligent Systems and Machines*, April 23-24, 1985.

R. Bazzi and P. Siy, "Angular Optical Scanning Sensor for Autonomous Vehicle Self Location in Constrained Environment," *The 1985 Conference on Intelligent Systems and Machines*, April 23-24, 1985.

M. Zhu and P. Siy, "Interval-Based Time Reasoning and Its Application to Planning," *The 1985 Conference on Intelligent Systems and Machines*, April23-24, 1985.

M. Zhu and P. Siy, "General Knowledge Representations of Road Maps and Their Applications," *International Conference on Robotics and Factories of the Future*, North Carolina, December 4-8, 1984.

B.D. Chen and P. Siy, "Image Segmentation - The Boundary Region Extraction Approach," *Proceeding of Conference of Intelligent Systems and Machines*, Oakland University, April 1984.

M. Zhu and P. Siy, "A Knowledge-Based Matrix Representation Method for a Class of Road Maps and Its Applications to Goal Achieving," *Proceeding of Conference on Intelligent Systems and Machines*, Oakland University, April 1984.

P. Siy, "Road Map Production System For Intelligent Mobile Robot," *International Conference on Robotics*, March 12-15, 1984, Atlanta, Georgia.

G. Kumar, J. Yoo, B.D. Chen, and P. Siy, "Mobile Robot System," *Robotic Intelligence and Productivity Conference*, Nov. 18-19, 1983, Wayne State University.
S. Khalef and P. Siy, "Intelligent Robot Wheelchair," *Robotic Intelligence and Productivity Conference*, Nov. 18-19, 1983, Wayne State University.

P. Siy, "Mobile Robots in Productivity," *Robotic Intelligence and Productivity Conference*, Nov. 18-19, 1983, Wayne State University.

B.D. Chen and P. Siy, "A New Contour Extraction Algorithm For Gray Scale Digital Images," *Conference on Artificial Intelligence*, April 26-27, 1983, Oakland Univ., Rochester, MI.

Salari and P. Siy, "A Skeleto Algorithm for Gray Pictures," 1982*, IEEE International Conference on Cybernetics and Society*, Oct. 28-30, 1982,Seattle, Washington.

Salari and P. Siy, "A New Technique for Image Enhancement of Line-Like Patterns,"*25th Midwest Symposium on Circuits and Systems* Aug. 30-31, 1982, Houghton, MI.

Salari and P. Siy, "A Thinning Algorithm Using Contextual Information," *Phoenix Conference on Computers and Communications*, May 9, 1982, Phoenix, Az.

Pepe Siy and C.S. Chen, "Modeling of System with Ill-Defined Attributes,"*IEEE Conference on Decision and Control* ,pp. 225-226, Dec 15-17, 1971.

Pepe Siy and C.S. Chen,"Fuzzy Logic Approach to Handwritten Character Recognition Problem," *1971, IEEE Systems, Man and Cybernetics Group Symposium*, Pub. 71 C 46-SMC, pp. 113-117.

2. Invited and/or Refereed Locally/Regionally

(Sole Author) P. Siy, "Mobile Robots in Productivity," *Robotic Intelligence and Productivity Conference*, Nov. 18-19, 1983, Wayne State University.

M. Invited Seminars or Lectures   Presented in Last Five Years

N. Other Scholarly Work

1. Technical Reports

P. Siy and S. Setumraju, "Traction Control," Ford Motor Technical Project Report, May 1991.

P. Siy, P. Chandrupatla, and K. Chugh, " Tank Expert Recognition System Based on Pyramidal Data Structure," General Dynamics, Feb 1991.

P. Siy and P. Chandrupatla, " Interim Report on Expert Tank Recognition Syatem Based on Pyramidal Data Structure," General Dynamics. Oct 1990.

P. Siy and S. Setumraju, " Interim Report on Traction Control," Ford Motor Technical Project Report, Sept 1990.

P. Siy and J. Young, "Geometric Recognition for Unconstrained Handwritten Courtesy Amount," Burroughs Corp., Small System Group, Wayne Plant, Wayne, MI, Nov. 1979.

P. Siy, "Check Signature Verfication System," Burroughs Corp., Character Recognition Systems, Tireman Plant, Detroit, MI, April 1978.

(Sole Author) P. Siy, "Video Processor for Solid State Photodiode Scanners Operating in the Current Mode," Burroughs Corp., Character Recognition Systems, Tireman Plant, Detroit , MI, Feb. 6, 1978.

P. Siy, "Interim Report on Check Signature Verification," Burroughs Corp., Character Recognition Systems, Tireman Plant, Detroit, MI, Aug. 1977.

P. Siy and D. Filpus, "Veripen Signature Algorithm in House Evaluation, Modification, and

Improvement," Burroughs Corp., Character Recognition Systems, Tireman Plant, Detroit, MI, April 25, 1977.

S. Kuzara and P. Siy, "Phase I Evaluation of Veripen Signature Verification Algorithm," Burroughs Corp., Character Recognition Systems, Tireman Plant, Detroit, MI , 1976.

P. Siy, "Hand-printed Character Recognition Techniques," Burroughs Corp., Character Recognition Systems, Tireman Plant, Detroit, MI, Jan. 1976.

P. Siy, "Feature Extraction Techniques, for Optical Character Recognition," Burroughs Corp., Document Recognition System, Tireman Plant, Detroit, MI, Jan. 1975.

P. Siy, "Digital Imaging Techniques," Burroughs Corp., Document Recognition Systems, Tireman Plant, Detroit, Michigan, Feb. 1974.

P. Siy, "Fuzzy Logic for Handwritten Character Recognition," PhD. Dissertation, Department of Electrical Engineering, Univ of Akron, Akron, Ohio, June 1973.

 PATENTS

P. Siy, "Signature Verification Method and Apparatus," U.S. Patent, 4,286,255, Aug. 25, 1981.

P. Siy and J. Brown, "Signature Verification Pen," U.S. Patent, 4,131,880, Dec. 26, 1978.

IV. SERVICE

   A. Administrative Appointments at Wayne State in Last Five Years.
   B. Administrative Appointments at Other College/University in Last FiveYears.
   C. Committee Assignments in Last Five Years
     1. University Committees Chaired

     2. University Committee Membership
Ph.D Study Commission

     3. College/Department Committees Chaired
Graduate Committee Chair, 1995 – present.

     4. College/Department Committeed Membership
ECE Representative to College Science Library Committee
The Word Processing Committee for the College Level
Engineering Technology Director Search Committee
Faculty Assembly Executive Committee
ECE representative on Academic Standards Committee(ASC)

Positions Held in Professional Associations in Last Five Years.

Memberships/Offices Held in Public or Private Agencies Related to Discipline in Last Five

Years.

F. Professional Consultation
    1. Public Presentations as an Expert in Discipline
    2. Testimony before Public Bodies
    3. Consulting to Public Agencies, Foundations, Professional Associations
    4. Consulting to Private Enterprises
Burroughs Corp., MI, 1981-1982 - Consultant in the application of pattern recognition technology.

    G. Journal/Editorial Activity
      1.   Editorships
Editorial Board Memberships

H. Other Professionally Related Service

Session Co-Chair, The 36th Midwest Symposium on Circuits and Systems, Aug. 1993.

Co-organizer, Summer Workshop of Knowledge-Based Expert Systems inEngineering and Manufacturing Automation, Wayne State University, Aug 11-13, 1987.

Session Chairman, The Fourth Annual Conference on Intelligent Systems and Machines, Oakland University, April 28-30, 1986.

Session Chairman, The 1985 Conference on Intelligent Systems and Machines, Oakland University, April 1985.

Session Chairman , Conference on Intelligent Systems and Machines, Oakland University, April 1984.

Co-Organizer and Session Chairman of the Robotic Intelligence and Productivity Conference, Nov. 18-19, 1983, Wayne State University.

Curriculum Vitae

Le Yi Wang

Professional Data

Telephone: 313-577-4715. Fax: 313-577-1101. Email: lywang@ece.eng.wayne.edu

Faculty Appointment at the Current Institution

1. April 5, 1990 - August 21, 1995: Assistant Professor, Department of Electrical and Computer Engineering, Wayne State University

2. August 21, 1995 - August 21, 2001: Associate Professor, Department of Electrical and Computer Engineering, Wayne State University

3. August 21, 2001 - Present: Professor, Department of Electrical and Computer Engineering, Wayne State University

Faculty Appointment at Other Institutions

1. Sept. 1982 - Sept. 1983: Lecturer, Department of Computer Science and Automation, Shanghai Institute of Mechanical Engineering, Shanghai, China.

2. Sept. 1975 - Sept. 1979: Lecturer, Department of Automation, Shanghai Institute of Power Engineering, Shanghai, China.

Education

1. Ph.D. Degree: January 1990, in Control Systems. Department of Electrical Engineering, McGill University, Montreal, Canada. Supervisor: George Zames

2. Master's Degree: February 1982, in Computer-Controlled Systems. Department of Computer Science and Automation, Shanghai Institute of Mechanical Engineering, Shanghai, China.

Professional Society

1. Communication Systems Society of IEEE

2. Control Systems Society of IEEE

3. Biomedical Engineering Society of IEEE

4. American Association for the Advancement of Science

5. Society for Industrial and Applied Mathematics

Awards and Honors

1. 1985-1989: Dalbir Bindra Major Fellowship, McGill University

2. 1990: Dean's Honor List, McGill University

3. 1992: Faculty Research Award, Wayne State University

4. 1992: Research Initiation Award of the National Science Foundation

5. 1994: Faculty Internship Award of the National Science Foundation

6. 1995: Outstanding Teaching Award, College of Engineering, Wayne State University

7. Plenary Speaker: Conference on Feedback Control, Nonlinearity, and Complexity, Montreal, Canada, May 6-7, 1994.

8. Plenary Speaker: 2000 Chinese Control Conference, Hong Kong, December 6-8, 2000.

9. Associate Editor, IEEE Transactions on Automatic Control

10. Editor, Journal of System Sciences and Complexity

11. Associate Editor, International Journal of Control and Intelligent Systems

12. Associate Editor, Journal of Control Theory and Applications
13. Panelist: Panel Workshop on "Trend in Robust Control and Identification", Siena, Italy, 1998.
14. Panelist: Mathematics Information and Signal Processing Committee, International Federation of Automatic Control, 1999-present
15. Panelist: Transportation Panel, Dynamic System and Control Div. of ASME, 1999-present.

Teaching

1. ECE 2620: Introduction to Microprocessors

2. ECE 4330: Signals and Systems

3. ECE 4470: Control systems I

4. ECE 5440: Computer-controlled Systems

5. ECE 5460: Probability and Stochastic Analysis

6. ECE 7420: Nonlinear Control Systems

7. ECE 7440: Optimal Control

8. ECE 7450: System Identification and Adaptive Control

9. ECE 7480: Advanced Control Design

10. ECE 5330: Dynamics and Control of Fuel Cell and Power Electronics Systems

Funded Research Projects

1. NSF Research Initiation Award (ECS-9209001), 9/1/92 - 2/29/96. Title: "H-infinity Design in Interconnected and Slowly Time-varying Systems."

2. NSF REU Supplement of the NSF RIA, 9/1/93 - 2/29/96.

3. NSF Engineering Faculty Internship (ECS-9412471), 9/1/94 - 9/1/95.Title: "Automotive Control Systems."

4. NSF GOALI Award (ECS-9634375), 9/1/96 - 8/31/2000. Title: ``Optimal Hybrid Control and Coordination of Engine and Transmission Systems''.

5. Ford University Research Program, 4/1/2000 - 12/31/2003. Title: ``Optimal adaptive lean NOx trap control for direct injection and lean burn engines.''

6. (Simon Ng, PI) Michigan Economic Development Council, 9/1/2003-8/31/2004, Title: ``Master's Program Development on Alternative Energy Technology.''

7. National Science Foundation (ECS-0329597), 9/1/2003-8/31/2006, Title: ``Multi-Sensor Information Processing with Automotive Applications.''

8. Ford Motor Company, 9/1/1993 - 8/31/1994. Title: ``Automotive generic powertrain control.''

9. Micro-Systems, 5/4/94 - 5/4/95. Title: ``Development of software for automotive quality control.''

10. Ford Motor Company, 9/1/94 - 8/31/95. Title: ``Robust control of vapor running losses.''

11. Ford Motor Company, 9/1/95 - 9/1/96. Title: ``Control and coordination of automotive engine and transmission systems.''

12. Ford Motor Company, 1/1/96 - 12/1/1996. Title: ``Optimal decoupling for modular design of engine control systems.''

13. Ford Motor Company, 7/1/97 - 8/31/98. Title: ``Cross engine modeling of transient fuel.''

14. Ford Motor Company, 9/1/2000-12/31/2004. Design of Electrical Power Assist Steering Control Systems.

15. Ford Motor Company, 1/1/2001-No expiration date. Unrestricted Research Support

16. WSU ``Faculty Research Award'', 1992,

17. WSU ``International Collaboration'', 9/1/99 - 12/31/2000,

18. Wayne State University Research Enhancement Program, 9/1/2003-8/31/2005, Title: ``Real-Time Medical Information Processing: Smart Anesthesia Monitoring, Diagnosis, Decisions, and Beyond.''

Industry Consultation

1. Ford Motor Company, SRL and AVT, 1997-2003

2. Analog Technologies, Inc., 2000.

Patents

1. U.S. Patent No.6188944, Torque control strategies for engines with continuously variable transmission, 2001.

2. U.S. Patent No.6293366, Vehicle electric power assist steering system and method using angle based torque estimation, 2001.

3. U.S. Patent No.6250419, Vehicle electric power assist steering system and method using H-infinity control, 2001.

4. US Patent 6425454, Vehicle EPAS systems and method using velocity based torque estimation, July 30, 2002.

5. International Patent 1125823 (France, Germany, UK), Vehicle EPAS systems and method using velocity based torque estimation, September 17, 2004.

6. US Patent 6826902, Prediction of oxygen storage capacity and stored NOx by HEGO sensors for improved LNT control strategies, Dec. 7, 2004.

7. US Patent Pending, Knowledge-Based Real-Time Learning via Stochastic Approximation for Smart Anesthesia Decision Assistance Systems, filed 2004.

Publications

Journal Papers

1. **Han Zheng, Hong Wang, Le Yi Wang, and George Yin, "Time-Shared Channel Identification for Adaptive Noise Cancellation in Breath Sound Extraction", Journal of Control Theory and Applications, December 2004.**
2. **G. Yin, C.Ion, F.Lin, and L.Y. Wang, Continuous-Time Adaptive Filtering Algorithms Using Sign Operators, Dynamic Systems and Applications, Jan. 2005.**
3. **L.Y. Wang, G. Yin, and H. Wang, Identification of Wiener Models with Anesthesia Applications, Intern. J. Pure Appl. Math. Sci., Dec. 2004.**
4. H. Wang, L.Y. Wang, H. Zheng, R. Haladjian, M. Wallo, Lung sound/noise separation in anesthesia respiratory monitoring, WSEAS Transactions on Systems, Vol. 3, pp. 1839-1844, June 2004.

5. Jing Sun, K. Yong, HEGO signal processing and strategy adaptation for improved performance in lean burn engines with a lean NOx trap, Int. J. of Signal Processing and Adaptive Control, 2004

6. L.Y. Wang, J.F. Zhang, G. Yin, System Identification Using Binary Sensors, IEEE Trans. Automat. Contr., Vol. 48, pp. 1892-1907, 2003.

7. G. Yin, C. Xu, and L. Y. Wang, Optimal remapping in dynamic bulk synchronous computations via a stochastic control approach, IEEE Transactions On Parallel and Distributed Systems , Vol. 14 (1): pp. 51-62, January 2003.

8. L.Y. Wang and G. Yin, Closed-loop persistent identification of linear systems with unmodeled dynamics and stochastic disturbances. Automatica , Vol. 38 (2002), 1463-1474.

9. C. Xu, L. Y. Wang, and N.-T. Fong, Stochastic prediction of execution times for dynamic bulk synchronous computations, Journal of Supercomputing , 21, pp. 91-103, 2002.

10. J.F. Zhang and L.Y. Wang, Performance Lower Bounds in Stochastic Robust and Adaptive Control, IEEE Trans. Automat. Contr. , Vol. 46, No. 7, pp. 1137-1140, July 2001.

11. L.Y. Wang, Information and complexity in control systems: A tutorial, Journal of Systems Science and Complexity , Vol. 14, No. 1, pp. 1-16, Jan. 2001.

12. L. Schweibert and L.Y. Wang, Robust control and rate coordination for efficiency and fairness in ABR traffic with explicit rate marking, Computer Communications , 24, pp. 1329-1340, 2001.

13. R. Chabaan and L. Y. Wang, Control of electrical power assist systems: H-infinity design, torque estimation and structural stability, JSAE Review , 22, pp. 435-444, 2001.

14. L.Y. Wang and L. Lin, Information-based complexity of uncertainty sets in feedback control, IEEE Trans. Automat. Contr. , Vol. 46, No. 4, pp. 519-533, April 2001.

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Curriculum Vitae

James Robert Woodyard

Office Department of Electrical and Computer Engineering, College of Engineering, Wayne State University, Detroit, Michigan 48202
Telephone: Voice (313) 577-3758, FAX (313) 577-1101
E-mail: woodyard@wayne.edu

Home 1030 South Highland, Dearborn, Michigan 48124
Telephone: (313) 563-3186

Educational Background

B. Ed., Duquesne University, Secondary Education, Math Major, Physics Minor

M.S., University of Delaware, Physics Major, Math Minor

Ph.D., University of Delaware, Physics Major, Math Minor

Experience

Teaching Assistant, Physics Department, University of Delaware, Newark, Delaware, 1960-61.

Physicist, Thiokol Chemical Corporation Research Laboratory, Elkton, Maryland, Summer, 1961.

Research Assistant, Physics Department, University of Delaware, Newark, Delaware, 1961-65.

Atomic Energy Commission Postdoctoral Fellow, Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, 1965-67.

Assistant Professor, Department of Physics and Astronomy, University of Kentucky, Lexington, Kentucky, 1967-69.

Member of the Technical Staff, General Telephone and Electronics Laboratories, Inc., Bayside, New York, 1969-71.

Instructor in Teacher Corps/Peace Corps Program and Assistant Professor, Physics Department, University of Hartford, West Hartford, Connecticut, 1971-72.

Assistant Professor, Physics Department, Trenton State College, Trenton, New Jersey,1972-75.

Associate Professor, Division of Science and Technology, College of Lifelong Learning, Wayne State University, Detroit, Michigan, 1975-83.

Associate Professor, Department of Electrical and Computer Engineering, College of Engineering, Wayne State University, Detroit, Michigan, 1983-Date.

Honors

Atomic Energy Commission Postdoctoral Fellowship, 1965-67

Danforth Foundation Associate, 1977-86

Sigma Pi Sigma Physics Honorary Society

Sigma Xi Scientists Honorary Society

Tau Beta Pi Engineering Honorary Society

Elected Senior Member of the Institute of Electrical and Electronics Engineers, 1992

Best Poster Paper Award in the Space Applications Area of the Twenty Third Photovoltaic Specialists Conference, Institute of Electrical and Electronics Engineers, 1993

Institute of Electrical and Electronics Engineers Southeastern Michigan Section 1993 Outstanding Section Involvement Award

1999 Wayne State University President's Service Award

Recipient of the Institute of Electrical and Electronics Engineers Third Millennium Medal

Professional Societies

American Association for the Advancement of Science

American Association of Physics Teachers

American Association of University Professors

American Physical Society

American Vacuum Society

Institute of Electrical and Electronic Engineers

Materials Research Society

Michigan Chapter of the American Vacuum Society

Michigan Section of the American Association of Physics Teachers

Southeastern Section Michigan Section of the Institute of Electrical and Electronics Engineers

Theses

Design and Construction of a Mass Spectrometer for Low Energy Sputtering Studies, M.S. Degree, University of Delaware

Low Energy Sputtering Studies, Ph.D. Degree, University of Delaware

Referred Scholarly Activities

Mass Spectrometric Study of Neutral Particles Sputtered from Cu by 0 to 100 eV Argon Ions, James R. Woodyard and C. Burleigh Cooper, Journal of Applied Physics 35 1107-1117 (1964).

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Air Mass Zero Calibration of Solar Cells Using Aircraft and Balloon Methods, Ali Mirza, James R. Woodyard and David B. Snyder, Thirty-First IEEE Photovoltaic Specialists Conference Proceedings, 2005, In press.

Curricular Scholarly Activities

Nuclear Waste Management, Developer of the Conference Course and Materials for the Summer
1976 Energy, Technology and Society Quarter, Weekend College Program Wayne State University, 1976.

Electricity I, Instructional Television Program and Study Guide for the Energy, Technology and Society Television Course, Center for Instructional Technology, Wayne State University, 1977.

Electricity II, Instructional Television Program and Study Guide for the Energy, Technology and Society Television Course, Center for Instructional Technology, Wayne State University, 1977

Principles of Lasers, A Study Guide for the Energy, Technology and Society Television Course, Center for Instructional Technology, Wayne State University, 1977.

Laser Applications to Energy Problems, A Study Guide for the Energy, Technology and Society Television Course, Center for Instructional Technology, Wayne State University, 1977.

Solar Electricity, A Study Guide for the Energy, Technology and Society Television Course, Center for Instructional Technology, Wayne State University, 1977.

Nuclear Waste Management, Developer of the Conference Course and Materials for the Spring 1977 Energy, Technology and Society Quarter, Weekend College Program, Wayne State University, 1977.

Coal, Producer of the Instructional Television Program for the Energy, Technology and Society Television Course (with John J. Juskevice, Curriculum Developer) Center for Instructional Technology, Wayne State University, 1978.

Computer Activity Sheets, Materials for the Workshop of the Values, Technology and Society Course, Division of Science and Technology, Wayne State University, 1979.

Electromagnetic Radiation I (with John J. Juskevice), Instructional Television Program and Study Guide for the Energy, Technology and Society Television Course, Center for Instruction al Technology, Wayne State University, 1980.

Electromagnetic Radiation II, Instructional Television Program and Study Guide

for the Energy, Technology and Society Television Course, Center for Instructional Technology, Wayne State University, 1980.

Solar Isolation: Latitudinal Effects, Instructional Television Program and Study Guide for the Energy, Technology and Society Television Course, Center for Instructional Technology, Wayne State University, 1981.

Solar Isolation: Seasonal Effects, Instructional Television Program and Study Guide for the Energy, Technology and Society Television Course, Center for Instructional Technology, Wayne State University, 1981.

Solar Insolation: Clear Atmosphere Effects, Instructional Television Program and Study Guide for the Energy, Technology and Society Television Course, Center for Instructional Technology, Wayne State University, 1981.

Invited Papers

Investigation of the Interaction of Monoenergetic Argon Ions (0 to 8 keV) with Copper Targets: Sputtering and Ion Scattering, invited paper presented at the Symposium on "Interaction of Ions with Solid Surfaces" during the Fifteenth Annual Conference on Mass Spectrometry and Allied Topics, Denver, 1967.

Interaction of Inert Gas Ions of 0.5 to 8 keV Energy with Copper Monocrystalline Targets, invited paper presented at the Gordon Research Conference on Particle-Solid Interactions, Kimball Union Academy, Meridan, New Hampshire, 1968.

The American Vacuum Society Visual Aids Project: Residual Gas Analysis and Capture Pumping, invited paper presented at the Seventh International Vacuum Congress and the Third International Conference on Solid Surfaces, Vienna, Austria, 1977.

Science Instruction for Adults Matriculating in an Outreach Bachelor of General Studies Program, invited paper presented at the Annual Meeting of the American Association of Physics Teachers, New York, 1979.

Radiation Damage in Thin Film Solar Cells, James R. Woodyard and Geoffrey A. Landis, invited review article published in Solar Cells, 1991, Volume 31, page 297.

High-Altitude Air Mass Zero Calibration of Solar Cells, Proceedings of The Great Lakes Photonics Symposium, 2004, In press.

Referred Conference Presentations

Design and Construction of a 90 Sector Field Mass Spectrometer for Low Energy Sputtering Studies, James R. Woodyard and C. Burleigh Cooper, American Journal of Physics 30, 943 (1962).

Investigation of Neutral Cu^2 Sputtered from Polycrystalline Cu Low Energy Ar^+ and Ar^{2+}, C. Burleigh Cooper and James R. Woodyard, Bulletin of the American Physical Society 9 53 (1964).

Many-Body Effects in Low Energy Sputtering, James R. Woodyard, Bulletin of the American Physical Society 12 80 (1967).

Interaction of Inert Gas Ions of 0.5 to 8 keV Energy with Copper Monocrystalline Targets, Invited paper presented at the Gordon Research Conference on Particle-Solid Interactions, Kimball Union Academy, Meridan, New Hampshire, 1968.

Energy Spectra and Inelastic Energy Loss of Monoenergetic Ar+ and Ne+ (0.5-8.0 keV) scattered from Cu (100), James R. Woodyard, Bulletin of the American Physical Society <u>14</u> 90 (1969).

Correlation of Inelastic Energy Loss Data with Secondary Electron Yields, James R. Woodyard, 30th Annual Conference on Physical Electronics, Milwaukee, Wisconsin, 1970.

PSNS: A Mastery Oriented Group Approach, James R. Woodyard, AAPT Announcer <u>2</u> 8 (1973).

The American Vacuum Society Visual Aids Project: Residual Gas Analysis and Capture Pumping, Invited paper presented at the Seventh International Vacuum Congress and the Third International Conference on Solid Surfaces, Vienna, Austria, 1977.

Science Instruction for Adults Matriculating in an Outreach Bachelor of General Studies Program, Invited paper presented at the Annual Meeting of the American Association of Physics Teachers, New York, 1979.

Physics in Space, T. C. Campbell, R. G. Fuller, J. R. Woodyard and D. Zollman, AAPT Announcement <u>10</u> 97 (1980).

Hydrogen Diffusion in UHV Evaporated a-Si, S. C. Lee, D. Martin, R. Tsu, J. Woodyard and D. Bowen, Bulletin of the American Physical Society <u>28</u> 295 (1983).

Dehydrogenation Mechanisms in Amorphous Silicon, J. R. Woodyard, J. Gonzales-Hernandez and D. Martin, Bulletin of the American Physical Society <u>30</u> 354 (1985).

Radiation Hardness of Amorphous silicon and Silicon-Germanium Alloy Solar Cells to 1 MeV Protons, J. J. Hanak, A. Myatt, P. Nath and J. Woodyard, 18th IEEE Photovoltaic Specialist Conference, Las Vegas, Nevada, October 21-26, 1985.

Post-Hydrogenation Studies of Germanium Films, J. R. Woodyard, J. Gonzales-Hernandez, R. T. Young, J. Piontkowski and R. J. Kopf, March 1986 Meeting of the American Physical Society, Las Vegas, Nevada, March 31-April 4, 1986.

Properties of Post-Hydrogenated Amorphous and Microcrystalline Germanium Films, J. Gonzales-Hernandez, R. T. Young, J. Piontkowski and J. R. Woodyard, Materials Research Society, 1986 Spring Meeting, Palo Alto, California, April 15-19, 1986.

Ultralight Amorphous Silicon Alloy Photovoltaic Modules for Space and Terrestrial Applications, J. J. Hanak, C. Fulton, A. Myatt, P. Nath and J. Woodyard, 21st Intersociety Energy Conversion Engineering Conference, San Diego, California, August 25-29, 1986, page 1436.

Ultralight Amorphous Silicon Alloy Photovoltaic Modules for Space Applications, J. J. Hanak, Englade Chen, C. Fulton, A. Myatt, and J. R. Woodyard, NASA Eighth Space Photovoltaic Research and Technology (SPRAT) Conference, Cleveland, Ohio, October 7-9, 1986.

Radiation Resistance Studies of Amorphous Silicon Alloy Photovoltaic Cells, J. R. Woodyard, J. J. Hanak, E. Chen and A. Myatt, Materials Research Society, 1987 Spring Meeting, Anaheim, California, April 21-25, 1987.

Radiation Resistance of Amorphous Silicon Alloy Solar Cells. J. J. Hanak, E. Chen, A. Myatt, and J. R. Woodyard, 19th IEEE Photovoltaic Specialists Conference, New Orleans, Louisiana, May 4-8, 1987.

Radiation Resistance Studies of Amorphous silicon Films, James R. Woodyard and J. C. Scott Payson, NASA Ninth Space Photovoltaic Research and

Technology Conference, Cleveland, Ohio, April 19-21, 1988.

Radiation Resistance Studies of Amorphous Silicon Films, 20th IEEE Photovoltaic Specialists Conference, Las Vegas, Nevada, September 26-30, 1988.

Radiation Effects on the Optical and Transport Properties of Amorphous Silicon, Spring Meeting of the Materials Research Society, San Diego, California, April 24-29, 1989.

Annealing Characteristics of Irradiated Hydrogenated Amorphous Silicon Solar Cells, Tenth Space Photovoltaic Research and Technology (SPRAT) Conference, NASA Lewis Research Center, Cleveland, Ohio, November 7-10, 1989.

1.00 MeV Proton Induced Defects in a-Si:H Thin Films and Solar Cells, Materials Research Society, J. Scott Payson, Salman Abdulaziz, Yang Li and James R. Woodyard, 1990 Spring Meeting, San Francisco, California, April 16-21, 1990.

Annealing Characteristics of Amorphous Silicon Films and Solar Cells Irradiated with 1.00 MeV Protons, Salman Abdulaziz, J. Scott Payson, Yang Li and James R. Woodyard, 21st IEEE Photovoltaic Specialists Conference, Kissimmee, Florida, May 21-25, 1990.

Annealing Characteristics of Amorphous Silicon Alloy Solar Cells Irradiated with 1.00 MeV Protons, S. Abdulaziz and J. R. Woodyard, NASA Eleventh Space Photovoltaic Research and Technology (SPRAT) Conference, NASA Lewis Research Center, Cleveland, Ohio, May 7-9, 1991.

Annealing Studies of Damage Produced by 1.00 MeV Proton Irradiation of a-Si:H and a-Si,Ge:H Solar Cells, Materials Research Society, 1991 Spring Meeting, Anaheim, California, April 29-May 4, 1991.

Investigation of Solar Cell Thickness on MeV Proton Radiation Resistance, S. Abdulaziz and J. R. Woodyard, 22nd IEEE Photovoltaic Specialists Conference, Las Vegas, Nevada, October 7-11, 1991.

Dependence of 1.00 MeV Proton Radiation Resistance of a-Si:H Alloy Solar Cells on Cell Thickness, Salman S. Abdulaziz and James R. Woodyard, Materials Research Society, 1992 Spring Meeting, San Francisco, California, April 27-May 1, 1992.

Investigation of the Radiation Resistance of Triple-Junction A-Si:H Alloy Solar Cells Irradiated with 1.00 MeV Protons, Kenneth R. Lord II, Michael R. Walters and James R. Woodyard, NASA Twelfth Space Photovoltaic Research and Technology Conference, Cleveland, Ohio, October 20-22, 1992.

Investigation of Light and Dark Characteristics of a-Si:H Alloy Cells Irradiated with 1.0 MeV Protons, Kenneth R. Lord II, Michael R. Walters and James R. Woodyard, Twenty Third IEEE Photovoltaic Specialists Conference, Louisville, Kentucky, May 10-14, 1993.

Investigation of Shunt Resistances in Single-Junction a-Si:H Alloy Solar Cells, Kenneth R. Lord II, Michael R. Walters and James R. Woodyard, Materials Research Society, 1994 Spring Meeting, San Francisco, California, April 4-8, 1994.

Investigation of the Stability and 1.0 MeV Proton Radiation Resistance of Commercially Produced Hydrogenated Amorphous Silicon Alloy Solar Cells, Kenneth R. Lord II, Michael R. Walters and James R. Woodyard, NASA Thirteenth Space Photovoltaic Research and Technology (SPRAT) Conference, NASA Lewis Research Center, Cleveland, Ohio, June 14-16, 1994.

Investigation of Current Mechanisms in a-Si:H Alloy Cells, Kenneth R. Lord II, Fazal UrRahman Syed, Michael R. Walters and James R. Woodyard, First World Conference on Photovoltaic Energy Conversion, Waikoloa, Hawaii, December 5-9, 1994.

Laboratory Instrumentation and Techniques for Characterizing Multi-Junction Solar Cells, James R. Woodyard, NASA Fourteenth Space Photovoltaic Research and Technology Conference 1995, Cleveland Ohio, October 24-26, 1995.

Analysis of LIPS III a-Si:H Alloy Solar Cell Space Data, James R. Woodyard, Twenty-Fifth IEEE Photovoltaic Specialists Conference, Washington, D.C., May 13-17, 1996.

Laboratory Instrumentation and Techniques for Characterizing Multi-Junction Solar Cells, James R. Woodyard, Twenty-Fifth IEEE Photovoltaic Specialists Conference, Washington, D.C., May 13-17, 1996.

$QE(8,V_F)$ and $I(V_F)$ Measurements on Single and Triple-Junction a-Si:H Solar Cells, James R. Woodyard, Twenty-Sixth IEEE Photovoltaic Specialists Conference, Anaheim, CA, September 29-October 3, 1997.

AM1.5 Light and Dark $QE(8,V_F)$ Investigations of the Stability of Single and Multi-junction a-Si:H Solar Cells, James R. Woodyard, Kenneth R. Lord II and Qianghua Wang, Proceedings of the Second World Conference and Exhibition on Photovoltaic Solar Energy Conversion, Vienna, Austria, July 6-10, 1998.

Investigation of the Carbon Arc Source as an AM0 Solar Simulator for Use in Characterizing Multi-junction Solar Cells, Jianzeng Xu and James R. Woodyard, NASA Sixteenth Space Photovoltaic Research and Technology Conference, Cleveland Ohio, August 31-September 2, 1999.

Investigations to Characterize Multi-junction Solar Cells at the Edge of Space, Glenroy A. Bowe, Qianghua Wang, Richard R. Johnston, William J. Brown and James R. Woodyard, NASA Sixteenth Space Photovoltaic Research and Technology Conference, Cleveland Ohio, August 31-September 2, 1999.

Effects of 40 keV Electron Irradiation on Dark I-V Characteristics of Single-Junction a-Si:H Solar Cells, Qianghua Wang, Kenneth Lord and James R. Woodyard, Twenty-Eighth IEEE Photovoltaic Specialists Conference, Anchorage, AK, September 18- 22, 2000.

Investigation of the Carbon Arc Source as an AM0 Solar Simulator for Use in Characterizing Multi-junction Solar Cells, Jianzeng Xu and James R. Woodyard, Twenty-Eighth IEEE Photovoltaic Specialists Conference, Anchorage, AK, September 18-22, 2000.

Investigations to Characterize Multi-junction Solar Cells in the Stratosphere Using Low-Cost Balloon and Communication Technologies, Glenroy A. Bowe, Qianghua Wang and James R. Woodyard, Twenty-Eighth IEEE Photovoltaic Specialists Conference, Anchorage, AK, September 18-22, 2000.

Report on Project to Characterize Multi-junction Solar Cells in the Stratosphere Using Low-Cost Balloon and Communication Technologies, Ali Mirza, David Sant, James R. Woodyard, Richard R. Johnston and William J. Brown, NASA Seventeen Space Photovoltaic Research and Technology Conference, Cleveland, OH, September 11-13, 2001.

Measured and Simulated Dark J-V Characteristics of a-Si:H Single Junction p-i-n Solar Cells Irradiated with 40keV Electrons, Kenneth Lord and James R. Woodyard, NASA Seventeen Space Photovoltaic Research and Technology Conference, Cleveland, OH, September 11-13, 2001.

Measured and Simulated Dark J-V Characteristics of a-Si:H Single Junction p-i-n Solar Cells Irradiated with 40 keV Electrons, Kenneth Lord and James R. Woodyard, Twenty-Ninth IEEE Photovoltaic Specialists Conference, New Orleans, LA, May 20-25, 2002.

High-Altitude Air Mass Zero Calibration of Solar Cells (Invited), Great Lakes Photonics Symposium, Cleveland, OH, June 8-11, 2004.

High-Altitude Air Mass Zero Calibration of Solar Cells, James R. Woodyard and David B. Snyder, Eighteenth Space Photovoltaic Research and Technology Conference, Cleveland, OH, September 16-18, 2004.

Investigation of Proton Radiation Resistance of CIGS Solar Cells, James R. Woodyard, Thirty-First IEEE Photovoltaic Specialists Conference, Orlando, FL, January, 3-7, 2005.

Air Mass Zero Calibration of Solar Cells Using Aircraft and Balloon Methods, Ali Mirza, James R. Woodyard and David B. Snyder, Thirty-First IEEE Photovoltaic Specialists Conference, Orlando, FL, January, 3-7, 2005

Internal Reports

Measurements of the Acoustic Impedance of Burning Solid Rocket Propellant, James R. Woodyard, Thiokol Chemical Company, Technical Report 614, September 1961.

Analysis of Gases in Thin Films by Laser-Assisted Mass Spectrometry, James R. Woodyard, General Telephone and Electronic Laboratories, Technical Report, 71-151.4, August 1971.

Funded Research

WSU/Energy Conversion Devices, Inc. University/Industrial Research Program, 1980-1986, Cumulative Amount $114,733.

Instructional Media Development for the Teaching of an Undergraduate Course in Solid State Electronic Devices ($2,250), Wayne State University 1983-84 Educational development Grant.

Ion Implantation and Ion Beam Analysis Studies ($25,000), the Standard Oil Company, 1984-85 with K. R. Padmanabhan, WSU Physics Dept.).

Amorphous Semiconductor Materials Research, State of Michigan Research Excellence and Economic Development Fund, WSU Institute for Manufacturing Research, 1986-87 funding level approximately $20,000.

High Energy Ion Beam Induced Spectrometries ($31,250), Wayne State University Supplemental Research Equipment Fund, 1986.

Instructional Media Development for the Teaching of an Undergraduate Course on Solid State Electronic Devices ($1,391), Wayne State University 1985-86 Educational Development Grant Award.

Amorphous Semiconductor Materials Research, State of Michigan Research Excellence and Economic Development Fund, WSU Institute for Manufacturing Research, 1987-88 funding level approximately $52,000.

Radiation Resistance Studies of Amorphous Silicon Alloy Photovoltaic Materials ($39,960), National Aeronautics and Space Administration, 1987-88

Thin Film Plasma Deposition System ($8,000 Award, $8,000 Matching), Wayne State University Supplemental Research Equipment Fund, 1987-88.

Electrical and Optical Characterization Apparatus for Amorphous Semiconductor Research, Engineering Building New Equipment Fund, Wayne State University ($35,000), 1988.

Radiation Resistance Studies of Solar Panel Encapsulations, Sovonics Solar Systems ($18,000), 1988-89.

Radiation Resistance Studies of Amorphous Silicon Alloy Photovoltaic Materials

($39,998), National Aeronautics and Space Administration, 1988-89.

Amorphous Semiconductor Materials Research, State of Michigan Research Excellence and Economic Development Fund, WSU Institute for Manufacturing Research, 1988-89 funding level approximately $25,000.

Photoluminescence Spectrometer ($31,000 Award, $14,000 Matching), Wayne State University Supplemental Research Equipment Fund, 1988-89.

Amorphous Semiconductor Materials Research, State of Michigan Research Excellence and Economic Development Fund, WSU Institute for Manufacturing Research, 1989-90 funding level approximately $30,000.

Radiation Resistance Studies of Amorphous Silicon Alloy Photovoltaic Materials ($25,000), National Aeronautics and Space Administration, 1990-91.

Solar Simulator and Gas Handling System ($21,000 Award, $21,000 Matching), Wayne State University Supplemental Research Equipment Fund, 1990-91.

Amorphous Semiconductor Materials Research, State of Michigan Research Excellence and Economic Development Fund, WSU Institute for Manufacturing Research, 1990-91 funding level approximately $30,000.

Investigations of a-SiN:H Thin Films and m-I-m Devices Produced by Ovonic by Ovonic Imaging Systems ($20,000), Ovonic Imaging Systems, Inc., Troy, Michigan, 1990-91.

Investigation of the Radiation Resistance of Amorphous Silicon-Based Alloy Solar Cells ($36,000), TRW Engineering and Test Division, Space and Technology Group, 1991.

Investigation of the Radiation Resistance of Amorphous Silicon-Based Alloy Solar Cells ($4,000), TRW Engineering and Test Division, Space and Technology Group, 1991.

Instructional Media Development for the Teaching of an Undergraduate Course on Solid State Electronic Devices ($3,000), Wayne State University 1991-92 Educational Development Grant Award.

Radiation Resistance Studies of Amorphous Silicon Alloy Photovoltaic Materials ($10,000), National Aeronautics and Space Administration, 1991-93.

Analysis of Materials Used in the Advanced Photovoltaic Experiment, ($25,000), National Aeronautics and Space Administration, 1991-92.

Amorphous Semiconductor Materials Research, State of Michigan Research Excellence and Economic Development Fund, WSU Institute for Manufacturing Research, 1991-92 funding level approximately $30,000.

Investigation of the Radiation Resistance of Amorphous Silicon-Based Alloy Solar Cells ($60,000), TRW Engineering and Test Division, Space and Technology Group, 1992.

Amorphous Semiconductor Materials Research, State of Michigan Research Excellence and Economic Development Fund, WSU Institute for Manufacturing Research, 1992-93 funding level approximately $30,000.

Investigation of the Radiation Resistance of Amorphous Silicon-Based Alloy Solar Cells ($60,000), TRW Engineering and Test Division, Space and Technology Group, 1993.

Amorphous Semiconductor Materials Research, State of Michigan Research Excellence and Economic Development Fund, WSU Institute for Manufacturing Research, 1993-94 funding level approximately $30,000.

Design, Construction and Calibration of a Quantum Efficiency Instrumentation System for the Testing of Multi-Junction Cells ($71,000), TRW Engineering and

Test Division, Space and Technology Group, 1993-94.

Amorphous Semiconductor Materials Research, State of Michigan Research Excellence and Economic Development Fund, WSU Institute for Manufacturing Research, 1993-94 funding level approximately $30,000.

Engine Sensor Development ($30,000), Chrysler Corporation, Advanced Powerplant Electronics, January 1, 1996 through January 31, 1997.

Characterization of Multi-Junction Solar Cells ($75,000), National Aeronautics and Space Administration, June 18, 1998 through June 17, 1999.

Characterization of Multi-Junction Solar Cells ($75,000), National Aeronautics and Space Administration, June 18,1999 through January 4, 2001.

Characterization of Multi-Junction Solar Cells ($75,000), National Aeronautics and Space Administration, January 5, 2001 through August 1, 2002.

Characterization of Multi-Junction Solar Cells in the Stratosphere ($96,000), National Aeronautics and Space Administration Grant, August 1, 2002 through April 14, 2004.

Characterization of Multi-Junction Solar Cells in the Stratosphere ($120,000), National Aeronautics and Space Administration Grant NAG3-3019, April 15, 2004 through April 14, 2005.

Positions in Professional Associations, Conference Committee Service and Session Chairs

Served on the National Education Committee of the American Vacuum Society, 1975-80.

Served on the Education Committee of the International Union of Vacuum Techniques and Applications, 1977-80.

Served on the Board of Directors and as Secretary of the North Central Chapter of the American Vacuum Society, 1977-81.

Served on the Energy Educator's Forum 1978-81 (Steering Committee, 1980-81).

Served on the Program Committee for the 26th National Symposium of the American Vacuum Society, New York, 1979.

Served on the Program Committee for the 27th National Symposium of the American Vacuum Society, Detroit, 1980.

Served on the Local Arrangement Committee for the 27th National symposium of the American Vacuum Society, Detroit, 1980.

Served on the Committee for Instructional Media, American Association of Physics Teachers, 1981-84 (Chairperson, 1983-84).

Served on the Planning Committee for the Danforth Associate Regional Conference, Angola Indiana, October 1983.

Served as Chair of the Program Committee for the Fall 1987 Conference of the Midwest Associates in Higher Education.

Served on the Executive Committee of the Midwest Associates in Higher Education, 1987-89.

Served on the Technical Program Committee, Reviewer of Papers and Session Chair for the 22nd IEEE Photovoltaic Specialists Conference, Las Vegas, 1991.

Served as Workshop Chair, Eleventh Space Photovoltaic Research and Technol-

ogy (SPRAT) Conference, Cleveland, 1991.

Served on the Technical Program Committee, Reviewer of Papers and Session Chair for the 23rd IEEE Photovoltaic Specialists Conference, Louisville, 1993.

Served on the IEEE Committee on U. S. Competitiveness, 1995

Served on Executive Committee of the Southeastern Michigan Section of the Institute of Electrical and Electronics Engineer, 1988-96.

Served as Editor of Wavelengths, the Newsletter of the Southeastern Michigan Section of the Institute of Electrical and Electronics Engineer, 1988-96.

Served on the Technical Program Committee, Reviewer of Papers and Session Chair for the 25th IEEE Photovoltaic Specialists Conference, Washington, D.C., 1996.

Served as Treasurer and Member of Executive Committee of the Southeastern Michigan Section of the Institute of Electrical and Electronics Engineer, 1996-97.

Served as a Member of the Executive Committee and Chair of Tutorial Program for the 26th IEEE Photovoltaic Specialists Conference, Anaheim, CA, 1997.

Served on the Technical Program Committee and Reviewer of Papers for the 2nd World Conference and Exhibition on Photovoltaic Solar Energy Conversion, Vienna, Austria, July 6-10, 1998.

Served as Secretary and Member of Executive Committee of the Southeastern Michigan Section of the Institute of Electrical and Electronics Engineer, 1997-1998.

Served as Vice Chair and Member of Executive Committee of the Southeastern Michigan Section of the Institute of Electrical and Electronics Engineer, 1998-1999.

Served as Chair of the Program Committee for the Fall '98 Meeting of the Southeastern Michigan Section of the Institute of Electrical and Electronics Engineer, 1998.

Served as Chair of the Program Committee for the Spring '99 Meeting of the Southeastern Michigan Section of the Institute of Electrical and Electronics Engineer, 1998.

Serving as a Member of the Executive Committee and Chair of the Poster Program for the 28th IEEE Photovoltaic Specialists Conference, Anchorage, Alaska, 2000.

Served as Chair and Member of Executive Committee of the Southeastern Michigan Section of the Institute of Electrical and Electronics Engineer, 1999-2000..

Served as Member of Executive Committee of Region 4 of the Institute of Electrical and Electronics Engineer, 1999-2000.

Served as Junior Past Chair, Chair of the Nominations and Awards Committees, Chair of Communications Committee and Member of Executive Committee of the Southeastern Michigan Section of the Institute of Electrical and Electronics Engineer, 2000-2001.

Served as Senior Past Chair, Chair of Communications Committee and Member of the Executive Committee of the Southeastern Michigan Section of the Institute of Electrical and Electronics Engineer, 2001-2002

Serving as Chair of Communications Committee and Member of the Executive Committee of the Southeastern Michigan Section of the Institute of Electrical and Electronics Engineer, 2001-2005

Professional Consultation

Served as Consultant to the Michigan Energy Administration, 1980.

Served as Consultant to Energy Conversion Devices, Inc., 1982-87.

Served as Consultant to the Standard Oil Company, 1984-85.

Other Professionally Related Service

Served as Vacuum Materials Short Course Coordinator, 1979 Spring Symposium of the North Central Chapter of the American Vacuum Society, Southfield, Michigan, May 1979.

Served as Principal Designer and Leader of a Workshop: Media Preproduction, American Association of Physics Teachers, Summer 1981 Meeting, Stevens Point, Wisconsin.

Served as Principal Designer and Leader of a Workshop: Instructional Media in Physics Teaching, American Association of Physics Teachers, Summer 1982 Meeting, Ashland, Oregon.

Served as Principal Designer and Leader of a Workshop: Instructional Media in Physics Teaching, American Association of Physics Teachers, Summer 1983 Meeting, Memphis, Tennessee.

Conducted a Computer Literacy Workshop for the Danforth Associate Regional Conference, Angola, Indiana, October 1983.

Served as Reviewer for the National Science Foundation, 1986.

Served as Reviewer for Amorphous Silicon Semiconductors-Pure and Hydrogenated, Materials Research Society Symposia Proceedings, 1987.

Served as Reviewer for Business Proposals for the Michigan Department of Commerce, 1987-93

Serving as Reviewer for the Journal of Vacuum Science and Technology, 1992-date.

Served as Wayne State University IEEE Student Branch Counselor, 1996-1998.

Served as Wayne State University IEEE Student Branch Advisor, 1998-2000.

Invited Seminars or Lectures

Photovoltaic Devices and Ion Beam Spectroscopies: RBS, PIXE and PIGE, Department of Electrical and Computer Engineering, Wayne State University, 1982.

High Energy Ion Beam Analysis of Materials", the Standard Oil Company Corporate Research Laboratory, 1984.

Radiation Resistance Studies of Amorphous Silicon Alloy Based Materials and Photovoltaic Cells, NASA Lewis Research Center, 1987.

Radiation Resistance Studies of Amorphous Silicon Based Alloy Photovoltaic Cells, TRW Engineering and Test Division, Space and Technology Group, 1991.

Radiation Resistance Studies of Amorphous Silicon Based Alloy Photovoltaic Cells, Oakland University, 1992.

Radiation Resistance Studies of Amorphous Silicon Solar Cells, National Aeronautics and Space Administration, Lewis Research Center, 1993.

Space Applications of a-Silicon Solar Cells, Solarex Thin Film Division, Solarex Corporation, 1993.

Radiation Resistance Studies of Amorphous Silicon Solar Cells, TRW Space and Technology Division, 1994.

Investigation of Current Mechanisms in a-Si:H Alloy Solar Cells, Scientific Research Laboratories, Ford Motor Company, 1994.

Investigation of a-Si:H Alloy Solar Cells, General Motors Research Laboratories, 1995.

Solar Cell Calibration Using Balloon and Communication Technology, NASA Glenn Research Center, 2002.

Solar Cell Calibration Using Balloon and Communication Technology, NASA Goddard Space Flight Center, 2003.

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Community Service

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Served as Treasurer and a Member of the Executive Committee of Save Rouge Woods, A Community Organization Founded to Protect Wooded and Wetland Areas in Dearborn, 1988-1994.

Member of United States Coast Guard Auxiliary and Weather Instructor in the ***Basic Skills and Seamanship Course***, 1990-1994.

Mr. CHENG-ZHONG XU

Department of Electrical and Computer Engineering

Wayne State University, Detroit, Michigan 48202

Phone: (313) 577 3856, FAX: (313) 577 1101

Email: czxu@ece.eng.wayne.edu

Http://www.ece.eng.wayne.edu./~czxu

EDUCATION:

- November 1993, Ph.D. in Computer Science, The University of Hong Kong, Hong Kong

- July 1989, M. Sc. in Computer Science, Nanjing University, Nanjing, China

- July 1986, B. Sc. in Computer Science, Nanjing University, Nanjing, China

PROFESSIONAL EXPERIENCE:

- August 2001 -- present, Associate Professor with Tenure,

  Director of Cluster and Internet Computing Laboratory,

  Department of Electrical & Computer Engineering, Wayne State University

- February 1995 – August 16, 2001, Assistant Professor,

  Department of Electrical & Computer Engineering, Wayne State University

- January 1994 – February 1995, Visiting Professor,

  Department of Computer Science and Paderborn Parallel Computing Center (PC^2),

  The University of Paderborn, Paderborn, Germany.

RESEARCH INTERESTS

- Security and Resource Management in Grid and Distributed Systems.

- Scalable and Secure Internet Service and Architecture.

- Security in Mobile Codes.

- Operating Systems and Run-time Support for Parallel and Distributed Computing.

HONORS/AWARDS:

- "President's Award for Excellence in Teaching", Wayne State University, 2003

- "Career Development Chair Award", Wayne State University, 2003-2004

- "Outstanding Teaching Award", College of Engineering, WSU, 2002

- "Faculty Research Award", Wayne State University, 2000.

- "IFIP World Computer Congress 2000 Award", ACM/IEEE Computer Society, 2000

RESEARCH GRANTS

1. NASA, "Real-time Augmented Reality Development and Human Factors Assessment for the Special Purpose Dexterous Manipulator", $1,591,915, 4/1/2004—3/31/2007. (PI: A. Pandya. co-PIs: C. Xu, G. Auner, and E. Richard).

2. Hong Kong Research Grant Council, "Middleware support for mobile agent-enabled mobile computing", 9/1/2004—8/31/2006, HK$339,414. (PI: J. Cao, co-I: C. Xu, A. Chan , and J. Lu)

3. NSF, "Adaptive scheduling for bulk synchronous computations and its application in molecular dynamics". Principal Investigator, ACI-0203592, $238,270, 5/1/2002—4/30/2005.

4. Hong Kong Research Grant Council, "Design of fault tolerant agent systems", HK$ 413,404, 9/1/2002—8/31/2004. (PI: J. Cao, co-I: C. Xu)

5. NSF, "Scheduling proxy and adaptive algorithms for irregular applications on SMP clusters", sole Principal Investigator, CCR-9988266, $120,157, 9/1/2000—8/31/2002.

6. Henry Ford Hospital System, "Information technology support", $10,000, 6/1/2002—10/31/2002.

7. Engineering Global Solutions, Inc., "Web-based Software Tools in Support of Automobile Multiplexing", co-PI, $31,000, 9/1/2000—5/31/2000. (With H. Singh).

8. NSF, "REU Site for Parallel and Distributed Applications", CDA-9619900, $224,100, 6/1/1997—1/31/2001. (With V. Chaudhary and L. Schwiebert)

9. NSF, "High Performance Computing on an ATM-Connected Cluster of Symmetric Multiprocessors", EIA-0729828, $102,004, 1/98 – 12/98 (With V. Chaudhary and L. Schwiebert).

10. Sun Microsystems, Inc., "High Performance Computing on an ATM-Connected Cluster of Symmetric Multiprocessors", $100,000 equivalent extra discounts on Sun Servers, 1/98—12/98 (With V. Chaudhary and L. Schwiebert)

11. Cray Research, Inc., "Real-Time Optimization of 3-D Conformal Radiation Therapy Treatment Planning", $30,000, 9/96-8/97. (With V. Chaudhary and G. Ezzel)

12. NSF, "IGERT: Interdisciplinary Traineeship in High Performance Computing Applications", co-Investigator, DGE-9987598, 8/1/2000—7/31/2005, $1,611,928. My contributions are in the aspect of high performance computing software tools. (PI: Bill Hase)

WSU INTERNAL GRANTS:

13. L.Y. Wang, C. Xu, H. Wang, G. Yin, H. Normile, "Real-time medical information processing: Smart monitoring, diagnosis, decisions, and beyond", Wayne State University, Research Enhancement Program, 9/2003-8/2005, $432,000

14. R. Naik, G. Auner, C. Xu, H. Ying, and M. Klein, "Database development and computer analysis of Raman spectra for real-time identification of cancer tissue", Wayne State University, Research Enhancement Program, 9/2003-8/2005, $245,000.

15. C. Xu. "Mobile agent technologies for high performance computing on the Internet", Career Development Chair Award, $16,000 (unrestricted), 7/1/2003-6/30/2005.

16. C. Xu. "Mobile agent based framework for high performance computing services on distributed servers", WSU Faculty Research Award , $7,000, April 1, 2000—March 20, 2001.

PUBLICATIONS (See Publication List)

- Two books

- Three book chapters,

- 70+ journal and conference papers

PROFESSIONAL SERVICE

- **Journal Editorial Activity:**

  o   Guest Co-Editor, Special Issue on "Scalable Internet Services and Architecture" in the Journal of Parallel and Distributed Computing, October 2003.

  o   Guest Co-Editor, Special Issue on "Security in Distributed Systems and Networks" in the Journal of Network and Computer Applications, Fall 2005

  o   Guest Co-Editor, Special Issue on "Parallel/Distributed Computing and Networking" in the IEICE Transactions on Information and Systems, February 2006

  o   Editor, International Journal of Parallel, Emergent and Distributed Systems (IJPEDS, formerly Parallel Algorithms and Applications), starting in January 2005

  o   Editor, International Journal of Computers and Applications, since December 2004.

  o   Editor-in-Chief, International Journal of Computational Intelligence, since February 2004

- **General Chair or Program Committee Chair of Workshops:**

  o   The Int'l Workshop on Mobile Distributed Computing (MDC'05), in conjunction with IEEE ICDCS'05, Columbus, Ohio, May 2005.

  o   The Int'l Workshop on Network and Systems Security (SNS'05), in conjunction with IEEE IPDPS'05, Denver, Colorado, April 2005

  o   The Int'l Workshop on Security in Networks and Distributed Systems (SNDS'05), in conjunction with IEEE ICPADS'05, Fukuoka, Japan, July 2005

- **PC Member of Conferences/Symposiums/Workshops:**

  o   The Seventh Asia Pacific Web Conference (APWeb'2005), March 2005.

  o   The 24th Int'l Conference on Distributed Computing Systems (ICDCS-2004), April 2004, Tokyo, Japan

  o   The Int'l Conference on Parallel Computing (ICPP-2004), August 2004, Montreal, Canada.

  o   Int'l Workshop on Mobile Distributed Computing (MDC'2004), MDC'2003,

  o   The 4th Workshop on Parallel and Distributed Scientific and Engineering Computing with Applications, 2003.

Other Professionally Related Service (cont.)

- o   The Fifth Asia Pacific Web Conference (APWeb'2003), Xi'an, China, April 2003.

- o   The 2004 International Symposium on Parallel and Distributed Processing and Applications (ISPA'2004), Hong Kong; ISPA'2003, Aizu-WAkamatsu, Japan.

- o   The Fifth International Workshop on Advanced Parallel Processing Technologies (APPT'2003), Ilmenau, Germany, September 2003.

- o   The Third International Workshop on Internet Computing and E-Commerce (ICEC'03), Nice, France, April 2003; ICEC'2002 (Fort Lauderdale, April 2002); ICEC'2001 (San Francisco, April 2001)

- o   The Int'l Workshop on Performance Modeling, Evaluation, and Optimization of Parallel and Distributed Systems (PMEO-PDS'05); PMEO-PDS'2003; PMEO-PDS'2002.

- o   The International Workshop on Grid and Cooperating Computing (GCC'2002); GCC'2003, GCC'2004.

- o   The 2002 IEEE International High Performance Computing Conference (HiPC'2002), Bangalore, India, Dec18-21, 2002.

- o   Program Committee Member, The 21st IEEE Int'l Conference on Distributed Computing Systems (ICDCS-2001), April 16—19, 2001, Phoenix, Arizona.

- o   Program Committee Member, The 2001 Int'l Workshop on Cluster Infrastructure for Web Server and E-Commerce Applications, May 16—18, 2001, Brisbane, Australia.

- o   The Int'l Conference on Parallel and Distributed Computing and Systems, PDCS'99 (Cambridge, MA), PDCS'00 (Las Vegas, NV), PDCS'01 (Anaheim, CA) PDCS'02 (Cambridge, MA), PDCS'03, PDCS'04

- NSF panelist for Distributed System Program and Advanced Computing Research Program.

- Review research proposals for Hong Kong Research Council since 1999.

PUBLICATION LIST

Scholarly Books

1. C. Xu and F. Lau*, Load Balancing in Parallel Computers: Theory and Practice*, Kluwer Academic Pub. Boston, 1997, ISBN 0-7923-9819-X, (pp.225+xv).

2. C. Xu, *Scalable and Secure Internet Service and Architecture,* Chapman & Hall/CRC Press, July 2005, ISBN 1-58488-377-4 (pp.450)

Invited Book Chapters

1. S. Fu and C. Xu. *Mobile Codes and Security.*, The Handbook of Information Security (Editor Hossein Bidgoli), John Wiley & Sons, 2005.

2. H. Shen, A. Brodie, C. Xu and W. Shi. *Scalable and Secure Peer-to-Peer Overlay Networks*. Theoretical and Algorithmic Aspects of Sensor Ad Hoc Wireless and Peer-to-Peer Networks. Editor Jie Wu, CRC Press, 2005.

3. J. Wei, C. Xu, and X. Zhou, *Load balancing on the Internet*. The Internet Encyclopedia, John Wiley & Sons, 2003.

Refereed Journal Articles Published

1. H. Shen, C. Xu, and G. Chen, "Cycloid: A scalable constant-degree lookup-efficient P2P overlay network", *Performance Evaluation: An International Journal*, 2005 (accepted).

2. X. Zhong and C. Xu, "Reliable connection migration in persistent communication in mobile computing", *Int'l Journal on Wireless and Mobile Computing*, 2005 (accepted).

3. S. Fu and C. Xu, "Distributed shared array with mobility support for reconfigurable distributed virtual machine", *Journal of Cluster Computing, 2004* (accepted).

4. R. Basharahi, B. Wims, and, C. Xu, "Distributed shared array: An integration of message passing and multithreading on SMP clusters", *Journal of Supercomputing* (In Press).

5. C. Xu and T. Ibrahim, "Semantics-based speculative prefetching to improve web performance", *IEEE Transactions on Data and Knowledge Engineering*, Vol.16(5):601-611, May 2004.

6. X. Zhou and C. Xu, "Harmonic bandwidth allocation for service differentiation on streaming servers ", *IEEE Transaction on Parallel and Distributed Computing*, Vol.15(9):835—848, Sept. 2004.

7. C. Xu, H. Jin and P. Srimani, "Scalable web services and architecture: Guest editorial", *Journal of Parallel and Distributed Computing*, Vol.63(10):913--915, October 2003.

8. N. Fong, C. Xu, and L. Wang, "Optimal periodic remapping of dynamic bulk synchronous computations in multi-programmed distributed systems", *Journal of Parallel and Distributed Computing*, Vol.63(11):1036-1049, November 2003.

9. G. Yin, C. Xu, and L. Y. Wang, "Optimal remapping in dynamic bulk synchronous computations via a stochastic control approach", *IEEE Transactions On Parallel and Distributed Systems*, Vol.14(1):51-62, January 2003 .

10. C. Xu, L. Y. Wang, and N.-T. Fong, "Stochastic prediction of execution times for dynamic bulk synchronous computations", *Journal of Supercomputing,* Vol. 21(1): 91—103, January 2002..

11. C. Xu and V. Chaudhary, "Time stamp algorithms for run-time parallelization of DOACROSS loops with dynamic dependencies", *IEEE Transactions on Parallel and Distributed Systems*, Vol. 12(5), May 2001, pages 433—450.

12. C. Xu and B. Wims, "Mobile agent based push methodology for global parallel computing", *Concurrency: Practice and Experience*, Vol. 14(8), July 2000, pages 705—726.

13. C. Xu, F. Lau, and R. Diekmann, "Decentralized remapping of data-parallel computations in distributed memory multiprocessors", *Concurrency: Practice and Experience*, John Wiley Publishers, Vol.9 (12), December 1997, pages 1351-1376.

14. C. Xu and F. Lau, "Efficient distributed termination detection for loosely synchronous applications in multicomputers", *IEEE Transactions on Parallel and Distributed Systems*. Vol.7(5), May 1996, pages 537---544.

15. C. Xu, B. Monien, R. Lueling, and F. Lau, "Nearest neighbor algorithms for load balancing in parallel computers", *Concurrency: Practice and Experience*, Vol.7 (7), Oct. 1995, pages 707--736.

16. C. Xu and F. Lau, "The generalized dimension exchange method for load balancing in k-ary n-cubes and variants", *Journal of Parallel and Distributed Computing*, Vol.24 (1), January 1995, pages 72--85.

17. C. Xu and F. Lau, "Iterative dynamic load balancing in multi-computers", *Journal of Operational Research Society*, Stockton Press, Vol. 45, No. 7, July 1994, pages 786—796.

18. C. Xu and F. Lau, "Optimal diffusion parameters for load balancing in mesh networks", *Parallel Processing Letters*, World Scientific Publishers, Vol.4, No. 1&2, June 1994, pages 139—147.

19. C. Xu and F. Lau, "Optimal parameters for load balancing using the diffusion method in k-ary n-cube networks", *Information Processing Letters*, Vol.47, No. 4, 1993, pages 181—187.

20. C. Xu and F. Lau, "Analysis of the generalized dimensional exchange method for dynamic load balancing", *Journal of Parallel and Distributed Computing*, Vol. 16, No. 4, Dec 1992, pages 20—24.

21. <u>C. Xu</u> and S. Chai, "UIMS --- An automatic user interface generating system", *Journal of Computer Engineering* (in Chinese). Vol. 4, 1989, pages 20—24.

22. <u>C. Xu</u> and D. Zhang, "TRANSCUBE --- A multiprocessor in the hypercube network", *Journal of Mini-micro systems* (in Chinese). Vol. 12, No. 1, 1991, pages 26—32.

23. D. Zhang and <u>C. Xu</u>, "An effective algorithm for task assignment", *Journal of Computers*, Vol.15, No. 4, April 1992, pages 304 – 307.

24. <u>C. Xu,</u> D. Zhang, and Z. Sun, "A dynamic and distributed algorithm for load balancing on multiprocessors", *Journal of Software* (In Chinese). Vol. 4, No. 1, Feb. 1993, pages 22—28.

Refereed Conference Papers

1. Y.-S. Jeong and C. Xu, "Performance evaluation of a grid computing architecture using real-time network monitoring", Proc. of the Int'l Symposium on Parallel and Distributed Processing and Applications (ISPA), December 2004, Hong Kong.

2. J. Wei, <u>C. Xu</u> and X. Zhou, "A robust packet scheduling algorithm for proportional delay differentiation services", *Proc. of IEEE Globecom'2004*, November 2004 (accepted).

3. Z. Liu, G. Chen, C. Yuan, S. Lu, and C. Xu, "Fault resilience of structured P2P systems", Proc. of the 5th Int'l Conference on Web Information Systems Engineering (WISE), LNCS 3306, pages 736-741, November 2004.

4. X. Zhong and <u>C. Xu</u>, "A reliable connection migration mechanism for synchronous transient communication in mobile codes", Proc. of Int'l Conference on Parallel Processing (ICPP'04), August 2004 (8 pages).

5. S. Fu and <u>C. Xu</u>, "Migration decision for hybrid mobility in reconfigurable virtual machines", Proc. of Int'l Conf. on Parallel Processing (ICPP'04), August 2004 (8 pages).

6. H. Shen, <u>C. Xu</u> and G. Chen, "Cycloid: A scalable constant-degree lookup-efficient P2P overlay network", Proc. of Int'l Parallel and Distributed Processing Symposium (IPDPS'04), April 2004 (10 pages).

7. X. Zhou, J. Wei and <u>C. Xu</u>, "Processing rate allocation slowdown differentiation on Internet Servers", Proc. of Int'l Parallel and Distributed Processing Symposium (IPDPS'04), April 2004 (10 pages)

8. X. Zhou, J. Wei and <u>C. Xu</u>, "Modeling and analysis of 2D service differentiation on e-Commerce servers", Proc. of the IEEE Int'l Conf. on Distributed Computing Systems (ICDCS'04), Tokyo, Japan, March 2004, pages 740 --747.

9. M. Xu and <u>C. Xu</u>, "Decay function model for resource configuration and scheduling on Internet servers", The 12th IEEE Int'l Workshop on Internet Quality of Service (IWQoS'04), June 2004, Montreal, Canada (accepted)

10. X. Zhou and <u>C. Xu</u>, "Analysis of a bandwidth allocation strategy for proportional streaming services", Proc. of IEEE Conference on Electronic Commerce (ICEC'04), July 6-9, 2004, San Diego, California (accepted).

11. X. Zhong, <u>C.Xu</u>, and H. Shen, "A reliable and secure connection migration mechanism for mobile agents", In Proc. of Int'l Workshop on Mobile Distributed Computing (MDC'04, in conjunction with ICDCS'04), March 2004, pages 548—553.

12. G. Chen, <u>C. Xu</u>, H. Shen, "P2P overlay networks of constant degree", In Proc. of Int'l Workshop on Grid and Collaborative Computing, Lecture Notes Volume 3032/3033, December 2003.

13. J. Wei, Q. Li, and <u>C. Xu</u>, VirtualLength: A novel packet scheduling algorithm for proportional delay differentiation In Proc. of Int'l Conf. nn Computer Communications and Networks (ICCCN'2003), October 2003, pages 331-336.

14. <u>C. Xu</u> and S. Fu, "Privilege delegation and agetn-oriented access control in Naplet", Proc. of the Int'l Workshop on Mobile Distributed Computing (In conjunction with ICDCS'2003), June 2003, pages 493-497.

15. <u>C. Xu</u> and T. Ibrahim, "Towards semantics-based prefetching to reduce Web access latency", In Proc. of the 2003 International Symposium on Applications and the Internet (SAINT'2003), IEEE Computer Society, January 2003, pages 318—325.

16. G. Chen and <u>C. Xu</u>, "Topological analysis in peer-to-peer computing", Proc. of Int'l Workshop on Grid and Cooperative Computing, Publishing House of Electronics Industry, December 2002, pages 254—264.

17. X. Zhou and <u>C. Xu</u>, "Optimal video replication and placement on a cluster of video-on-demand servers", In *Proceedings of the 17th Annual International Conference on Parallel Processing* (ICPP'2002), August 2002 (accepted).

18. Y. Chen, L. Ni, M. Yong, C.-Z. Xu, J. Kusler, and P. Zheng, "CoStore: A reliable and highly available storage system", The 16th Annual IEEE Int'l Symp. on High Performance Computing Systems and Applications, Moncton, New-Brunswick, Canada, June 2002, pages 3-11.

19. G. Yin, <u>C. Xu</u>, and L. Y. Wang, "Stochastic remapping for dynamic bulk synchronous computations", In *Proceedings of the 16th IEEE International Parallel and Distributed Processing Symposium* (IPDPS'2002), April 2002 (Accepted as regular paper)

20. <u>C. Xu</u>, "Naplet: A Flexible and Reliable Mobile Agent Framework for Network-Centric Applications", In the Second International Workshop on Internet Computing and E-Commerce (ICEC'02), in conjunction with IPDPS'2002, April 2002 (Accepted).

21. X. Zhou and C. Xu, "Request Redirection and Data Layout for Network Traffic Balancing in Cluster-Based VoD Servers", Workshop on Parallel and Distributed Computing in Image Processing, Video Processing, and Multimedia (PDIVM02), April 2002.

22. <u>C. Xu</u>, L. Y. Wang and N.-T. Fong, "Stochastic prediction of execution time for dynamic bulk synchronous computations", In *Proceedings of the 15th IEEE International Parallel and Distributed Processing Symposium (IPDPS'2001)*, April 2001 (regular paper).

23. X. Zhou and C. Xu, "A video replacement policy based on revenue to cost ratio in multicast TV-anytime systems", In Proceedings of the 15th IEEE *International Parallel and Distributed Processing Symposium* (IPDPS'2000), pages 1184—1191.

24. M. Kona and <u>C. Xu</u>, "A framework for network management using mobile agents", In the First International Workshop on Internet Computing and E-Commerce (ICEC'01) in conjunction with IPDPS'2001, San Francisco, LA, April 2001.

25. <u>C. Xu</u>, L. Y. Wang, and N.-T. Fong, "Statistical Bounds for Execution time of additive bulk synchronous computations", In *Proceedings of the 12th Int'l Conference on Parallel and Distributed Computing and Systems*, November 6-9, 2000, Las Vegas, NV, pages 383—387.

26. M. Xu and <u>C. Xu</u>, "I/O Pipelining algorithms for fast classification in data mining", In *Proceedings of the 12th Int'l Conference on Parallel and Distributed Computing and Systems*, November 6-9, 2000, Las Vegas, NV, pages 518--523.

27. <u>C. Xu</u> and B. Wims, "Mobile agent technology for high performance computing on the Internet", In *Proceedings of the 16th IFIP World Computer Congress: Int'l Conference on Intelligent Information Processing*, August 21—25, 2000, Beijing China, pages 304—311.

28. N.-T. Fong, <u>C. Xu</u>, and L. Y. Wang, "Optimal periodic remapping of bulk synchronous computations on multi-programmed distributed systems", In *Proceedings of the 14th IEEE International Parallel and Distributed Processing Symposium (IPDPS'2000, formerly IPPS & SPDP)*, Cancun, Mexico, May 1-5, pages 103—108.

29. T. Ibrahim and <u>C. Xu</u>, "Neural nets based predictive prefetching to improve WWW latency", In *Proceedings of the 20th IEEE International Conference on Distributed Computing Systems (ICDCS'2000)*, April 10—13, 2000, pages 636—643.

30. B. Wims and <u>C. Xu</u>, "Traveler: A mobile agent infrastructure for global parallel computing", In *The First IEEE Joint Symposium ASA/MA'99: Int'l Symposium on Agent Systems and Applications and Int'l Symposium on Mobile Agents*, Colorado, October 1999, pages 258--259.

31. N. Fong, <u>C. Xu</u>, and L. Wang, "Periodic remapping of non-deterministic bulk synchronous computations", In *Proceedings of the 11th IASTED Int'l Conference on Parallel and Distributed Computing and Systems*, November 1999, pages 788--793.

32. <u>C. Xu</u>, B. Wims and R. Basharahil, "Distributed shared array: An integration of message passing and multithreading on SMP clusters", In *Proceedings of the 11th IASTED Parallel and Distributed Computing and Systems*, November 1999, pages 305--310.

33. D. Hwang, <u>C. Xu</u>, and F. Fotouhi, "A parallel back-propagation learning algorithm for urban traffic congestion measurement", In *Proceedings of the 9th Int'l Conference on Artificial Neural Networks in Engineering (ANNIE'99)*, November 1999, ASME Press, pages 75—80.

34. V. Chaudhary, <u>C. Xu</u>, S. Roy, S. Jia, and S. Roy, "Parallelization of radiation therapy treatment planning: A case study", In *Proceedings of the 10th ISCA Int'l Conference on Parallel and Distributed Computing Systems*, pages 564—569, Orlando, FL, August 1999.

35. <u>C. Xu</u> and Y. Nie, "Relaxed Implementation of Spectral Methods for Graph Partitioning", In *Proceedings Of the 5th Int'l Symposium on Solving Irregularly Structured Problems in Parallel (IRREGULAR)*, pages 366—375, Berkeley, CA, August 1998 (*Invited paper*).

36. <u>C. Xu</u>, X. Han, C. Liu, and J. Mann, "Active Messages Using Selective Interrupts Without Polling", In *Proceedings of 10th Int'l Conference on Parallel and Distributed Computing Systems*, pages 547—550, Las Vegas, NV, October 1998.

37. <u>C. Xu</u>, "Effects of parallelism degree on runtime parallelization of loops", In *Proceedings of the 31st Hawaii Int'l Conf. on System Science (HICSS'31)*, pages 86—95, Hawaii, January 1998.

38. V. Chaudhary, <u>C. Xu</u>, S. Jia, G. Ezzel, and C. Kota, "Experiences with the parallelization of radiation therapy treatment planning", In *Proceedings of International Conference on Advanced Computing*, pages 135—141, December 1997.

39. <u>C. Xu</u> and V. Chaudhary, "Time-stamped algorithms for parallelization of loops at run-time", In *Proceedings. of 11th IEEE International Parallel Processing Symposium* (*IPPS*), pages 443—450, April 1997.

40. V. Chaudhary, <u>C. Xu</u>, S. Roy, J. Ju, V. Sinha, and L. Luo, "Design and Evaluation of an Environment for Automatic Parallelization of Programs", In *Proceedings of 2nd IEEE Int'l Symp. on Parallel Algorithms, Architectures, and Networks* (*I-SPAN'96*), June 1996, pages 77--83.

41. <u>C. Xu</u>, S. Tschoke, and B. Monien, "Performance evaluation of load distribution strategies in parallel branch-and-bound computations", In *Proceedings of the 7th IEEE Symposium on Parallel and Distributed Processing (SPDP)*, pages 402—405, San Antonio, TX, October 1995.

42. <u>C. Xu</u>, B. Monien, R. Lueling, F. Lau, "An analytical comparison of nearest neighbor algorithms for load balancing in parallel computers", In *Proceedings of the 9th IEEE Int'l Symposium On Parallel Processing (IPPS'95),* pages 472—479, Santa Barbara, CA, April 1995.

43. <u>C. Xu</u> and F. Lau, "Decentralized remapping of data-parallel computations with the generalized dimension exchange method", In *Proceedings of IEEE Scalable High Performance Computing Conference (SHPCC'94)*, Oak Ridge, TN, May 1994, pages 414—421.

44. <u>C. Xu</u> and F. Lau, "Termination detection for loosely synchronized computations", In *Proceedings of the 4th IEEE SPDP'92*, Dec. 1992, pages 196—203.

45. <u>C. Xu</u> and F. Lau, "A generalized dimension exchange method for dynamic load balancing in distributed memory multiprocessors", In *Proc. of the 29th Allerton Conference on Communication, Control, and Computing*. UIUC, Oct. 1991, pages 1105—1113.

Technical Reports (Submitted for Publications)

1. J. Wei and C. Xu, "Consistent proportional delay differentiation in packet scheduling: A fuzzy control approach", CIC-04-03, May 2004.

2. X. Zhong and C. Xu, "Optimal timep-variant resource allocation for Internet servers with delay constraints", CIC-04-04, September 2004.

3. H. Shen and C. Xu, "Randomized locality-aware load balancing algorithms for structured Cycloid P2P networks", CIC-04-05, October 2004.

4. H. Shen and C. Xu, "Randomized locality-aware load balancing for P2P networks with churn", CIC-04-06, October 2004.

5. S. Fu and C. Xu, "Service migration in distributed virtual machines for adaptive grid computing", CIC-04-07, October 2004.

6. J. Wei, C. Xu, and X. Zhong "Robust rate allocation for differentiated service on web servers: A fuzzy control approach", CIC-04-08, October 2004.

7. S. Fu and C. Xu, "A coordinated spatio-temporal access control model for mobile computing in coalition environments", CIC-04-09, October 2004.

Yong Xu

Dept. of Electrical and Computer Engineering

Wayne State University

Detroit, MI 48202

Office telephone: (313) 577-385   FAX: (313) 577-1101

Email: yxu@ece.eng.wayne.edu

Education

Ph.D. in Electrical Engineering	June, 2002

California Institute of Technology, Pasadena, California.
Research Area: Micro Electro Mechanical Systems (MEMS)
Thesis Advisor: Professor Yu-Chong Tai

MS in Electrical Engineering	June, 1998

California Institute of Technology, Pasadena, California.

BS in Electronics Engineering	June, 1997

Tsinghua University, Beijing, China

Professional experience

Assistant Professor	August, 2002 – present

Department of Electrical and Computer Engineering, Wayne State University, Detroit, Michigan

Ongoing researches

- Intelligent textiles – this research aims at developing intelligent textiles, which are expected to have revolutionary impacts on many aspects of human life, based on a unique silicon-based flexible skin technology.

- Smart acoustic sensor systems for respiratory sound monitoring – this research aims to develop bandage-like acoustic sensors based on the intelligent textile technology. The resulting sensors can be conveniently mounted on auscultation sites like a bandage and enable real-time, long-term, and distributed lung sound monitoring.

- Micropump – this research aims to develop a practical micropump for lab-on-a-chip applications. This micropump is based on an innovative structure and overcomes many disadvantages of existing micropumps.

- Tactile sensor – this research aims to develop a novel tactile sensor/sensor skin for robotic applications.

- Cantilever biosensor – bulk micromachined parylene cantilevers have been successfully fabricated and tested for DNA hybridization detection. The high sensitivity of parylene cantilever enables the employment of piezoresistive sensing, leading to biosensors that are miniaturized, portable, low-cost, and convenient to use.

- Single DNA sequencing device – A novel Lab-on-Tip nanomechanical platform is being

developed for single molecule DNA sequencing and other biological studies.

Graduate Research Assistant   March, 1998 – June, 2002

Micromachining Lab at the California Institute of Technology, Pasadena, California.

Research projects:

- *IC-integrated smart skin technology* – developed the first IC-integrated flexible shear-stress sensor skin, which has bias and signal conditioning circuitry on-chip, by using post-CMOS MEMS processes. This IC-integrated smart skin technology is highly desirable for many medical applications. The flexible sensor skin can be mounted on human body like a Band-Aid to monitor physiological parameters. For implantable applications, sensors can be built on flexible substrates to conform to the organ shape or to minimize tissue trauma during patient movement.

- *Flexible shear-stress sensor skin* – developed skin-like flexible shear-stress sensor arrays that can be mounted on non-planar surfaces to detect flow-separation point. The sensor skin was successfully implemented in an Unmanned Aerial Vehicle (UAV) project funded by the Defense Advanced Research Projects Agency (DARPA).

- *Selective Parylene deposition* – developed a novel packaging method for the underwater shear-stress sensor to achieve a higher sensitivity. This method can also be applied to the packaging of some biosensors.

- *High-pressure pressure sensor* – developed the first surface-micromachined high-pressure pressure sensor, with pressure range up to 20,000 psi, for measuring pressure in the extreme conditions found in oil wells 2 miles underground.

- *MEMS flow sensor* – developed a novel flowmeter based on a multi-sensor chip that contains 1-D array of shear-stress sensors, pressure sensors and temperature sensors. This multi-sensor chip is valuable for many applications such as monitoring the dispensing of insulin in implantable drug deliver systems.

Summer Internship   June, 2001 – September, 2001

Umachines Inc., Pasadena, California

- *Underwater shear-stress sensor skin* – developed a flexible shear-stress sensor skin for underwater applications such as flow pattern measurement of radio controlled submarines. Special efforts have been placed on the minimization of the pressure cross-talk and waterproof coating.

Selected publications

1. A. Huang, J. Lew, **Y. Xu**, Y.-C. Tai, and C.-M. Ho, "Microsensors and actuators for macrofluidic control," Sensors Journal, IEEE, vol. 4, pp. 494-502, 2004.

2. **Y. Xu**, J. Clendenen, S. Tung, F. Jiang, and Y.-C. Tai, "Underwater flexible shear-stress sensor skins," The 17th IEEE International Conference on Micro Electro Mechanical Systems (MEMS), Maastricht, The Netherlands, 2004.

3. **Y. Xu**, Y.-C. Tai, A. Huang, and C.-M. Ho, "IC-Integrated Flexible Shear-Stress Sensor Skin," Journal of Microelectromechanical Systems, vol. 12, pp. 740-747, 2003.

4. **Y. Xu**, F. Jiang, Y.-C. Tai, A. Huang, C.-M. Ho, and S. Newbern, "Flexible Shear-Stress Sensor Skin and its Application to Unmanned Aerial Vehicle", Sensors and Actuators A: Physical, vol. 105, pp. 321-329, 2003.

5. **Y. Xu**, Y.-C. Tai, "Selective Parylene Deposition for Underwater Shear-Stress Sensor", The 12th

International Conference on Solid-State Sensors, Actuators, and Microsystems (Transducers'03), Boston, 2003.

6. Y.-C. Tai, F. Jiang, **Y. Xu**, M. Liger, S. Ho, and C.-M Ho, "Flexible MEMS Skins: Technologies and Applications," presented at Pacific Rim workshop on transducers and micro/nano technologies (invited talk), Xiamen, China, 2002.

7. **Y. Xu**, Y.-C. Tai, A. Huang, and C.-M. Ho, "IC-Integrated Flexible Shear-Stress Sensor Skin," Solid-State Sensor, Actuator, and Microsystems Workshop (Hilton Head), Hilton Head Island, South Carolina, 2002.

8. **Y. Xu**, F. Jiang, Q. Lin, J. Clendenen, S. Tung, and Y.-C. Tai, "Underwater Shear-Stress Sensor," The 15th IEEE International Conference on Micro Electro Mechanical Systems (MEMS), Las Vegas, Nevada, 2002.

9. L.-J. Yang, T.-J. Yao, Y.-L. Huang, **Y. Xu**, and Y.-C. Tai, "Marching Velocity of Capillary Meniscuses in Microchannels," The 15th IEEE International Conference on Micro Electro Mechanical Systems (MEMS), Las Vegas, Nevada, 2002.

10. A. Huang, C. Folk, C.-M. Ho, Z. Liu, W.W. Chu, **Y. Xu** and Y.-C. Tai, "Gryphon M3 system: integration of MEMS for flight control", SPIE's MEMS Components and Applications for Industry, Automobiles, Aerospace, and Communication, San Francisco, California, 2001

11. **Y. Xu**, F. Jiang, Y.-C. Tai, E. Donzier, W. Loomis, and A. Liberman, "A Surface Micromachined Nitride-Diaphragm High-Pressure Sensor for Oil Well Application," ASME International Mechanical Engineering Congress and Exposition, Orlando, Florida, 2000.

12. **Y. Xu**, C.-W. Chiu, F. Jiang, Q. Lin, and Y.-C. Tai, "Mass Flowmeter Using a Multi-Sensor Chip," The 13th IEEE International Conference on Micro Electro Mechanical Systems (MEMS), Miyazaki, Japan, 2000.

13. F. Jiang, **Y. Xu**, T. Weng, Z. Han, Y.-C. Tai, A. Huang, C.-M. Ho, and S. Newbern, "Flexible Shear Stress Sensor Skin for Aerodynamics Applications," The 13th IEEE International Conference on Micro Electro Mechanical Systems (MEMS), Miyazaki, Japan, 2000.

14. **Y. Xu**, C.-W. Chiu, F. Jiang, Q. Lin, and Y.-C. Tai, "A MEMS multi-sensor chip for gas flow sensing," Sensors & Actuators A: Physical, accepted

15. **Y. Xu**, Q. Lin, G. Lin, F. Jiang, S. Tung, and Y.-C. Tai, "Micromachined thermal shear-stress sensor for underwater applications," Journal of Microelectromechanical Systems, accepted

16. Qiao Lin, **Yong Xu**, Fukang Jiang, Yu-Chong Tai and Chih-Ming Ho, "A parametrized three-dimensional model for MEMS thermal shear-stress sensors", Journal of Microelectromechanical systems, in press

17. Qiao Lin, Fukang Jiang, Xuan-Qi Wang, **Yong Xu**, Zhigang Han, Yu-Chong Tai, James Lew and Chih-Ming Ho, Experiments and Simulations of MEMS Thermal Sensors for Wall Shear Stress Measurements in Aerodynamic Control, Journal of Microengineering and Micromechanics, in press

Invited talks

- MEMS smart skin technology, Cornell University, Ithaca, NY, Feb. 2002

- MEMS smart skin technology, Delphi Research Lab, Utica, MI, April, 2003

Patents

- Surface Micromachined Pressure Sensor and High Pressure Application

  US patent number: 6,782,755, issued on Aug. 31, 2004

- Integrated circuit-integrated flexible shear-stress sensor skin and method of fabricating the same

  US patent number: 6,825,539, issued on Nov. 30, 2004

Hao Ying, Ph.D.

B.

Department of Electrical and Computer Engineering
3144 Engineering Building
Wayne State University
Detroit, MI, 48202
office/voice mail: (313)577-3738
eFax: (702)549-9071
hying@ece.eng.wayne.edu
web page: ece.eng.wayne.edu/~hying

- -

EMPLOYMENT
WAYNE STATE UNIVERSITY, DETROIT, MICHIGAN

Professor	Dept. of Electrical and Computer Engineering	Aug. 03–Present
Associate Professor	Dept. of Electrical and Computer Engineering	Aug. 00–Aug. 03

THE UNIVERSITY OF TEXAS MEDICAL BRANCH, GALVESTON, TEXAS

Associate Professor	Department of Physiology and Biophysics	1998–2000
Assistant Professor	Department of Physiology and Biophysics	1992–1998
Scientist	Biomedical Engineering Center	1990–2000

CARRAWAY METHODIST MEDICAL CENTER, BIRMINGHAM, ALABAMA

Research Fellow	Kemp-Carraway Heart Institute	1986–1990

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Instructor	Department of Mathematics (part-time)	1987–1990

DONGHUA UNIVERSITY (FORMERLY CHINA TEXTILE UNIVERSITY), SHANGHAI, CHINA

Instructor	Department of Electrical Engineering	1984–1986

ADJUNCT ACADEMIC APPOINTMENTS
THE UNIVERSITY OF TEXAS, AUSTIN

Adjunct Associate Professor	Biomedical Engineering Program	1998–2000
Adjunct Assistant Professor	Biomedical Engineering Program	1997–1998

BARBARA ANN KARMANOS CANCER INSTITUTE, WAYNE STATE UNIVERSITY, DETROIT

Full Member	Developmental Therapeutics Program	2003-Present

VETERANS AFFAIRS MEDICAL CENTER, DETROIT
Researcher   R & D Division
        May 2004-Present

DONGHUA UNIVERSITY, SHANGHAI, CHINA
Advisory Professor   Department of Electrical Engineering
        1998–Present

EDUCATION
THE UNIVERSITY OF ALABAMA AT BIRMINGHAM
    Ph.D., Biomedical Engineering
            1987–1990
Ph.D. student, Department of Biomathematics and Biostatistics   1986-1987

DONGHUA UNIVERSITY, SHANGHAI, CHINA
    M.S., Electrical Engineering
            1982–1984
    B.S., Electrical Engineering
            1978–1982

PATENTS
- **H. Ying** and C.J. Hartley. "Apparatus and method for real-time noninvasive Doppler ultrasound evaluation of tissue damage induced by thermal therapies," U.S. patent No. 5,657,760.
- G.W. Auner, F. Zhong, C. Hughes, G.S. Shreve, and **H. Ying**, "Acoustic wave sensor apparatus, method and system using wide bandgap materials," U.S. patent, pending.

AWARDS
1. **IEEE South Eastern** Michigan **2001 Outstanding Student Branch Award** to Wayne State University IEEE Student Branch, February 2001 (I was the Branch Faculty Counselor between 2000 and 2002)

2. **IEEE Region 4 2001** Exemplary **Student Branch Award** to Wayne State University IEEE Student Branch, July 2001 (Region 4 covers Illinois, Indiana, Iowa, Michigan, Minnesota, Nebraska, North and South Dakota, Ohio, Wisconsin, and Windsor (Canada)

3. Y.-S Ding, **H. Ying*** and S. –H Shao, "Necessary Conditions for General MISO Fuzzy Systems as Universal Approximators," *IEEE International Conference on Systems, Man, and Cybernetics*, Orlando, FL, Oct. 12-15, 1997. Our paper was selected by the Conference, from 155 papers that graduate students were the first authors, as one of the five finalists to compete for the Conference's **Best Student Paper Award**.
    * I was Y.-S. Ding's supervisor and the corresponding author of the paper

RESEARCH AREAS
Theory and biomedical applications of fuzzy systems, biomedical applications of controls, modeling, signal/image processing, neural networks, expert systems, and acoustic biosensor

systems.

FUNDED RESEARCH PROJECTS
   WAYNE STATE UNIVERSITY, DETROIT, MICHIGAN

1. **2005 North American Fuzzy Information Processing Conference**
   $2,000   Ford Motor Company (via *Wayne State University*)   12/25/2004
   Principal Investigator

2. **Real Time Biosensor Water Monitoring System** (supplement)   12/15/04-12/14/05
   $1,950,474   *Department of Defense TACOM (Army)*   Grant # DAAE07-03-C-L140
   Co-Principal Investigator
   My personal share is $156,000   PI:
   Gregory W. Auner

3. **Real Time Biosensor Water Monitoring System**
        10/1/03-4/30/05
   $2,500,000   *Department of Defense TACOM (Army)*   Grant # DAAE07-03-C-L140
   Co-Principal Investigator
   My personal share is $125,000   PI:
   Gregory W. Auner

4. **Development of a Multidisciplinary Research Program in Information-Based Decision-Making Technology with Biomedical and Industrial Applications**
        8/1/03-7/31/05
   $449,942 (direct cost),   *WSU President's Research Enhancement Program*
   Principal Investigator

5. **Database Development and Computer Analysis of Raman Spectra for Real-Time Identification of Cancer Tissue**
        8/1/03-7/31/05
   $245,000 (direct cost),   *WSU President's Research Enhancement Program*
   Co-Principal Investigator
   PI: Ratna Naik
   My personal share is $10,000

6. **Development of a Novel Fuzzy Discrete Event System Technology and Its Application in AIDS/HIV Treatment Planning**   8/20/03-8/19/04
   $32,500 (direct cost),   *WSU Graduate Research Assistant Program*
   Principal Investigator

7. **A Treatment Decision Modeling and Optimizing Technology**   4/1/03-3/31/06
   $439,650,   *National Institute of Bioimaging and Bioengineering, National Institutes of Health*, Grant Number: 1 R21 EB001529-01A1
   Principal Investigator

8. **Novel Acoustic Sensor Arrays for Biomedical Applications**   9/30/02-8/31/07

$2,843,735, *National Institute of Bioimaging and Bioengineering, National Institutes of Health*, Grant Number: 1 R01 EB00741-01
Co-Investigator,
        PI: Gregory W. Auner
My personal share is $710,933

9. **From Atoms to Space**
                7/1/02-6/30/03
 $1,900,000, *National Aeronautics and Space Administration*,
 Grant Number: NAG-1-02105
 Co-Principal Investigator,   PI:
 Gregory W. Auner
 My personal share is $114,000

10. **Information Technology in Biomedicine**
        April 2002
 $10,000 (direct cost),   *WSU Interdisciplinary Research Seed Fund*
 Principal Investigator

THE UNIVERSITY OF TEXAS MEDICAL BRANCH, GALVESTON, TEXAS
(Total external funding is $1,178,500)
1. **Secondary Prevention in Small Subcortical Strokes - Pilot Study**
 Co-Investigator, $130,000 (subcontract to UTMB), *National Institutes of Health*, 1999-2001.

2. **NIRS-guided Resuscitation of Hemorrhagic Shock**
 Co-Investigator, $240,000, *National Medical Technology Testbed*, 01/01/00 – 12/31/00

3. **A Novel Ultrasonic System for Guiding Thermal Therapy**
                Principal Investigator, $180,000, *The Whitaker Foundation*, 1995–1998.

4. **An Expert System for Aquaculture Environmental Control**
 Co- Principal Investigator, $225,000 (Phases I and II), *The Small Business Innovative Research Program, US Department of Commerce*, 1995–1998.

5. **A Computer Control System for Integrated Dephosphatization/Denitrification Filtration**
 Co- Principal *Investigator*, $70,000, *Texas A&M Sea Grant College Program*, 1997–1998.

6. **Real-Time Ultrasound-Guided Fuzzy Logic Control of Thermal Therapy**
 Principal Investigator, $140,000, *Advanced Technology Program, Texas Higher Education Coordinating Board*, 1996–1997.

7. **Application of Ultrasound in Laser Therapy**
 Principal Investigator, $52,500, *C. R. Bard, Inc.*, 1994–1995.

8. **Ultrasound-Based System for Monitoring Laser Coagulation in Tissues**
 Principal Investigator, $30,000, *The John Sealy Memorial Endowment Fund for Biomedical Research, The University of Texas Medical Branch*, 1994–1995.

9. Computer-Based Automation and Expert System Development for Aquaculture
Co-Investigator, $141,000, *Texas A&M Sea Grant College Program*, 1993–1995.

PROFESSIONAL ACTIVITIES

- **Senior Member**, The Institute of Electrical and Electronics Engineers (IEEE), 1998 – Present.

- **Member**, Fuzzy Systems Technical Committee, IEEE Neural Networks Society, 2002-2003

- **Associate Editor**, *International Journal of Fuzzy Systems*, 2003-Present

- **Editorial Board Member**, Fuzzy Medicine, February 2004 - Present

- **Journal Guest Editor**
  1. *Information Sciences*
  2. *International Journal of Fuzzy Systems*
  3. *Acta Automatica Sinaca.*

- **Member of Projects Advisory Board**, Idaho *National Science Foundation* Experimental Program to Stimulate Competitive Research (EPSCoR) Project, 2002-2004.

- **Program Chair of the following 3 international conferences**
  1. The First International Joint Conference of North American Fuzzy Information Processing Society Conference, Industrial Fuzzy Control & Intelligent System Conference, and NASA Joint Technology Workshop on Neural Networks & Fuzzy Logic, Dec. 18-20, 1994, San Antonio, TX, USA.
  2. The Third International Workshop on Intelligent Systems, Feb. 27 – Mar. 3, 2000, Atlantic City, NJ, USA.
  3. The 24th North American Fuzzy Information Processing Society Conference, June 23-26, 2005, Ann Arbor, MI, USA.

- **Publication Chair**, The IEEE International Conference on Fuzzy Systems, May 7-10, 2000, San Antonio, TX, USA.

- **Program Committee member for the following 17 international conferences**
  1. The Third International Conference on Industrial Fuzzy Control & Intelligent Systems, December 1–3, 1993, Houston, TX, USA.
  2. International Joint Conference of CFSA/IFIS/SOFT'95 on Fuzzy Theory and Applications, December 6–9, 1995, Taipei, Taiwan.
  3. International Conference of the North American Fuzzy Information Processing Society Biannual Conference, June 20–22, 1996, Berkeley, CA, USA.
  4. International Conference of the North American Fuzzy Information Processing Society, September 21–24, 1997, Syracuse, NY, USA.
  5. International Conference of the North American Fuzzy Information Processing Society, August 20–21, 1998, Pensacola Beach, FL, USA.

6. The Second International Workshop on Intelligent Control Systems, October 24–28, 1998, Research Triangle Park, NC, USA.
7. International Conference of the North American Fuzzy Information Processing Society, June 10–12, 1999, New York, NY, USA.
8. 8th International Fuzzy Systems Association World Congress, Aug. 17–20, 1999, Hsinchu, Taiwan.
9. The IEEE International Conference on Fuzzy Systems, May 7-10, 2000, San Antonio, TX, USA.
10. Fifth Joint Conference on Information Sciences, Feb. 27 – Mar. 3, 2000, Atlantic City, NJ, USA.
11. International Conference of the North American Fuzzy Information Processing Society, July 13–15, 2000, Atlanta, Georgia, USA.
12. Joint International Conference of 9th International Fuzzy Systems Association World Congress and 20th North American Fuzzy Information Processing Society, July 25–28, 2001, Vancouver, BC, Canada.
13. The IEEE International Conference on Fuzzy Systems, May 25-28, 2003, St. Louis, MO, USA.
14. The Third International DCDIS Conference on Engineering Applications and Computational Algorithms, May 15-18, 2003, Guelph, Ontario, Canada.
15. The Fourth International Conference on Intelligent Technologies (Intech'03), December 17-19, 2003, Chiang Mai, Thailand.
16. The International Workshop on Subjective Evaluation Technology (SEIT'03), December 17-19, 2003, Shanghai, China.
17. The IEEE International Conference on Fuzzy Systems, May 22-25, 2005, Reno, NV, USA.
18. The Fifth International Conference on Intelligent Technologies (InTech'04), December 2-4, 2004, Houston, Texas.
19. Fourth DCDIS International Conference on Engineering Applications and Computational Algorithms, Guelph, Ontario, Canada, July 27-29, 2005.

- **International conference tutorial instructor**
  1. *"Fuzzy Control Theory"* at the 1994 First International Joint Conference of the North American Fuzzy Information Processing Society Biannual Conference, the Industrial Fuzzy Control and Intelligent Systems Conference, and the NASA Joint Technology Workshop on Neural Networks and Fuzzy Logic, December 18–20, 1994, San Antonio, TX, USA.
  2. *"Fuzzy Control Theory: An Analytical Approach"* at the IEEE International Conference on Fuzzy Systems, September 8–11, 1996, New Orleans, LA, USA.

- **Co-editor**, *Proceeding of the 1994 First International Joint Conference of the North American Fuzzy Information Processing Society Conference, Industrial Fuzzy Control and Intelligent Systems Conference, and the NASA Joint Technology Workshop on Neural Networks and Fuzzy Logic*, IEEE Press, 1994.

- **Invited reviewer** for numerous international conferences including the *Control and Decision Conference* (CDC), *American Control Conference* (ACC), and *IEEE International*

Conference on Fuzzy Systems (FUZZ-IEEE).

- **Invited reviewer for the following 42 international journals**
1. *Acta Automatica Sinaca*
2. *Aerospace Science and Technology*
3. *Applied Soft Computing*
4. *Artificial Intelligence in Medicine*
5. *Automatica*
6. *Control and Intelligent Systems*
7. *Computers & Mathematics with Applications*
8. *Electronics Letters*
9. *Engineering Applications of Artificial Intelligence*
10. *European Journal of Control*
11. *EURASIP Journal on Applied Signal Processing*
12. *Fuzzy Sets and Systems*
13. *IEICE Transactions*
14. *IEE Proceedings – Control Theory and Applications*
15. *IEEE Expert*
16. *IEEE Transactions on Automatic Control*
17. *IEEE Transactions on Biomedical Engineering*
18. *IEEE Transactions on Medical Imaging*
19. *IEEE Transactions on Control Systems Technology*
20. *IEEE Transactions on Fuzzy Systems*
21. *IEEE Transactions on Industrial Electronics*
22. *IEEE Transactions on Instrumentation and Measurement*
23. *IEEE Transactions on Neural Networks*
24. *IEEE Transactions on Systems, Man, and Cybernetics*
25. *IEEE Transactions on Vehicular Technology*
26. *Information Sciences*
27. *International Journal of Adaptive Control and Signal Processing*
28. *International Journal of Applied Mathematics and Computer Science*
29. *International Journal of Approximate Reasoning*
30. *International Journal of Control*
31. *International Journal of Computer Applications and Technology*
32. *International Journal of Fuzzy Systems*
33. *International Journal of Intelligent Control and Systems*
34. *International Journal of Intelligent Automation and Soft Computing*
35. *International Journal of Modeling and Simulation*
36. *International Journal of Multiple-Valued Logic*
37. *International Journal of Neural Systems*
38. *International Journal of Systems Science*
39. *ISA Transactions*
40. *Journal of Computational and Applied Mathematics*
41. *Journal of Intelligent & Fuzzy Systems*
42. *Uncertainty, Fuzziness and Knowledge-Based Systems*

- **Invited reviewer for the following 6 books**

1. *Industrial Applications of Fuzzy Control and Intelligent Systems*, J. Yen, R. Langari and L.A. Zadeh (eds.), IEEE Press, 1995 (reviewed for the publisher).
2. *Fuzzy Logic: Intelligence, Control, and Information*, J. Yen and R. Langari, Prentice Hall, 1996 (reviewed for the publisher).
3. *Neuro-Fuzzy and Soft Computing – A computational Approach to Learning and Machine Intelligence*, J.R. Jang, C. Sun and E. Mizutani, Prentice Hall, 1996 (reviewed for the publisher).
4. *Adaptive Fuzzy Systems and Control – Design and Stability Analysis*, L.-X. Wang, PTR Prentice Hall, Englewood Cliffs, NJ, 1994 (the review was published in *Journal of Intelligent and Fuzzy Systems*, 3: 187–188, 1995).
5. *Essentials of Fuzzy Modeling and Control*, R.R. Yagar and D.P. Filev, Wiley-Interscience, John Wiley & Sons, Inc., 1994 (the review was published in *Journal of the American Society for Information Science*, 46: 791–792, 1995).
6. Reviewed a book proposal on fuzzy theory and applications for Academic Press, 2001.
7. *A Concise Course in Fuzzy Systems*, Guanrong Chen and Trung Tat Pham, CRC Press, 2004 (reviewed for the publisher).

- **Invited grant proposal reviewer for**
  City University of Hong Kong, 2003
  Research Grants Council of Hong Kong, 2004

TEACHING EXPERIENCE
WAYNE STATE UNIVERSITY, DETROIT, MICHIGAN
- **Advisor for 10 Ph.D. students**
1. Amin Haj-Ali, Sept. 2000 – Nov. 2002 (dissertation defended on Nov. 18, 2002); Dissertation title: "Structure Analysis of Mamdani Fuzzy Controllers With Nonlinear Input Fuzzy Sets."
2. Abdullah Alwadie, May 2001 – April 2003 (dissertation defended on March 24, 2003) Dissertation project title: "Analysis, Design, and Tuning of the Two-Input Two-Output Fuzzy Control Systems Using the Simplified Fuzzy Rules."
3. Jianzeng Xu, (co-supervision with Professor Greg Auner), Sept. 2001 – Present; Dissertation project title: "Novel Acoustic Biosensor Systems."
4. Fule Zhou, August 2002 – December 23, 2004 (dropped out)
5. Kalyan Raman, August 2002 – Present
6. Xiaodong Luan (Professor Feng Lin is a co-supervision), October 2002-Present
7. Guopeng Hu (Professor Greg Auner is a co-supervision), March 2003 – Present
8. Fazal Syed, May 2003-Present
9. Ali M. Hariri, September 2003-Present
10. Yanqing Ji, January 2004-Present

- **Advisor for 5 thesis M.S. students**
11. Hiten Shah, Jan. 2002 – Dec. 2002 (thesis defended on December 9, 2002); Thesis project title: "Software Design and Implementation for Fuzzy Discrete Event System."

12. Aamrapali Chatterjee, May 2002 – Dec. 2002 (thesis defended on December 9, 2002); Thesis project title: "Biomedical Control System Design Using LabVIEW and Simulink."
13. Sohail Razaq, May 2003 – Present
14. Dian Wang, Sept. 2003 – May 2004 (dropped out)
15. Julia Dipierdomenico, Dec. 2003 – Present

- **Member, Ph.D. and M.S. Committees**
1. Qiong Zhou, Department of Chemical Engineering and Materials Science, (Ph.D. advisor is Professor Y.L. Huang); Dissertation defended on July 8, 2002.
2. Wei Zhang, Department of Electrical and Computer Engineering, (Ph.D. advisor is Professor is P. Siy).
3. Gulsheen Kaur, Department of Electrical and Computer Engineering, (M.S. advisor is Professor H. Singh); Thesis defended on April 24, 2002.
4. S.G. Balasubramanian, Department of Chemical Engineering and Materials Science, (M.S. advisor is Professor Y.L. Huang); Thesis defended on March 27, 2002.
5. Murali Mahesh Vatturi, Department of Electrical and Computer Engineering, (M.S. advisor is Professor P. Siy); Thesis defended on October 30, 2002.
6. Amrita J. Baliga, Department of Electrical and Computer Engineering, (M.S. advisor is Professor P. Siy); Thesis defended on Nov. 27, 2002.
7. Mohammed Iqtidar Alam, Department of Electrical and Computer Engineering, (M.S. advisor is Professor H. Singh); Thesis defended on Nov. 27, 2002.
8. Madan Mohan Kovur, Department of Electrical and Computer Engineering, (M.S. advisor is Professor P. Siy); Thesis defended on January 27, 2003.
9. Sasidhar Saladi, Department of Electrical and Computer Engineering, (M.S. advisor is Professor P. Siy); Thesis defended on May 1, 2003.
10. Zhi Zeng, Department of Electrical and Computer Engineering, (Ph.D. advisor is Professor Xiaoyan Han).
11. Vera Loggins, Department of Electrical and Computer Engineering, (M.S. advisor is Professor Xiaoyan Han); Thesis defended on December 1, 2003.
12. Md. Sarwar Islam, Department of Electrical and Computer Engineering, (Ph.D. advisor is Professor Xiaoyan Han).
13. Chantelle Hughes, Department of Electrical and Computer Engineering, (M.S. advisor is Professor Greg Auner); Thesis defended on January 5, 2004.
14. Qi He, Department of Electrical and Computer Engineering, (M.S. advisor is Professor Xiaoyan Han); Thesis defended on December 14, 2004.

- **Courses taught**
1. ECE7690, *Advanced Fuzzy Systems*, 4 credit hours, Lecture
   - Fall 2002 (25 students), Mean Summative Class Rating is 12.5; Mean Summative Interest Rating is 8.8.
   - Fall 2003 (18 students), Mean Summative Class Rating is ?; Mean Summative Interest Rating is ?.
2. ECE7420, *Nonlinear Control Systems*, 4 credit hours, Lecture
   - For Winter 2003 (19 students), data is unavailable.
3. ECE6690, *Introduction to Fuzzy Systems*, 4 credit hours, Lecture, Fall 2001

- Mean Summative Class Rating is 13 (full score is 15); Mean Summative Interest Rating is 9.4 (full score is 10).
4. ECE5470, *Control Systems II*, 4 credit hours, Lecture
   - For Winter 2002, Mean Summative Class Rating is 13.4; Mean Summative Interest Rating is 9.
   - For Winter 2003 (19 students), data is unavailable.
5. ECE5440, *Computer-Controlled Systems*, 4 credit hours, Lecture
   - For Fall 2000, Mean Summative Class Rating is 12.9; Mean Summative Interest Rating is 8.9.
   - For Winter 2001, Mean Summative Class Rating is 12.9; Mean Summative Interest Rating is 9.2.
   - For Winter 2002, Mean Summative Class Rating is 12.3; Mean Summative Interest Rating is 8.7.
   - For Winter 2004 (17 students), Mean Summative Class Rating is 12.2; Mean Summative Interest Rating is 8.3.
6. ECE4470, *Control Systems I*, 4 credit hours, Lecture, Spring/Summer 2001 and 2002
   - For Spring/Summer 2001, Mean Summative Class Rating is 11.5; Mean Summative Interest Rating is 7.5.
   - For Spring/Summer 2002, data is unavailable.
   - For Spring/Summer 2003 (23 students), data is unavailable.

THE UNIVERSITY OF TEXAS MEDICAL BRANCH, GALVESTON, TEXAS

- **Taught 2 graduate courses**: (1) Neural Networks, and (2) Introduction to Scientific Computing.

- **Directed dissertation research of 4 Ph.D. students, thesis research of 2 M.S. students, and research of 1 physics postdoctoral fellow**. They were funded by my grants. The time indicated below is the time they performed research in my laboratory:
   1) Zhigang Sun, Ph.D. (postdoctoral fellow), May 1995 – October 1998. Ultrasound in thermal therapies. (He is currently a researcher at Industrial Materials Institute, National Research Council of Canada)
   2) Chih-Wei Chang, January 1994 - December 1996. Ph.D. dissertation "Identification of Human Cortical Structures in Magnetic Resonance Imaging by Encapsulating Expert Knowledge in Fuzzy Logic." Graduated in Dec. 1996 from Department of Computer Science, Texas A&M University. (He currently works at a computer company in Taiwan).
   3) Jialiang Lu, January 1996 – August 1998. Ph.D. dissertation "Fuzzy Predictive Control: Theory, Design, and Application." Graduated in October 1999 from Department of Electrical Engineering, University of Houston. (He currently works at a technology company in Houston, Texas).
   4) Yongsheng Ding, June 1996 – June 1998. Ph.D. dissertation "Analytical Analysis and Design of Fuzzy Systems with Applications to Laser Thermal Therapy." Graduated in June 1998 from Department of Electrical Engineering, Donghua University. Sole winner of university's *Best Ph.D. Dissertation Award* in 1999. Competed for the *Best Ph.D. Dissertation Award in Shanghai.* (He is currently a full professor at Donghua University, Shanghai, China).

5) Peiyun Wu, August 1996 – August 1998. M.S. thesis "A Fuzzy System for Laser Coagulation Front Detection." Graduated in Dec. 1998 from Department of Electrical Engineering, University of Houston. (She currently works at a technology company in Houston, Texas).

6) Aamer Azeemi, June 1994 - January 1996. Applications of ultrasound and laser in thermal therapies. Interrupted his Ph.D. study at Bioengineering Program, Texas A&M Univ. due to family reasons. (He works at a technology company in Texas).

7) Aravind Kumar Yarlagadda, January – December 1997. Fuzzy logic in medical imaging analysis. He interrupted his M.S. study because he changed his advisor at Department of Computer Science, Texas A&M University.

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM
Instructor   Department of Mathematics
    1987–1990
• Taught three undergraduate courses
Tutor   Department of Mathematics   March 1987–
August 1987

DONGHUA UNIVERSITY
Instructor   Department of Electrical Engineering
    1984–1986

External Ph.D. dissertation examiner:
1) For the Electrical Engineering Department, The National University of Singapore, 1995 and 1998.
2) For the Electrical and Electronics Engineering Department, Sri Venkateswara University, India, 2003.

ACADEMIC SERVICE
WAYNE STATE UNIVERSITY, DETROIT, MICHIGAN
• **University Level**
    1. Conflict of Interest Task Force   May 2001- Aril 2002
    2. F&A Advisory Committee   August 2003-Present

• **College of Engineering**
    1. Arthur Carr Professorship Award Committee   August 2003-August 2004
    2. Tenure & Promotion Committee   August 2003-August 2004
    3. Salary Committee   August 2003-Present
    4. Mathematics Committee   August 2000-Present
    5. R. G. Wingerter Award Committee   August 2001-August 2003
    6. ESFB Representative   August 2000-August 2001

- **Department of Electrical and Computer Engineering**
  1. Tenure & Promotion Committee   August 2003-Present
  2. Salary Committee
     August 2003-Present
  3. Budget Committee
     August 2003-Present
  4. Graduate Committee   August 2000-Present
  5. Seminar Committee   August 2000-August 2003
  6. R. G. Wingerter Award Committee   August 2001-August 2003
  7. IEEE Student Branch Faculty Counselor   August 2000-August 2001
  8. HKN Faculty Advisor   August 2000-August 2001

THE UNIVERSITY OF TEXAS MEDICAL BRANCH, GALVESTON, TEXAS

- Chair, Seminar Committee of Biomedical Engineering Center   1996–2000.
- Interviewed medical school applicants
     1992–2000.

PUBLICATIONS

Research Monograph/Advanced Textbook
Ying, H., *Fuzzy Control and Modeling: Analytical Foundations and Applications*, IEEE Press, 2000 (342 pages. Foreword by Professor **Lotfi A. Zadeh** – the founder of theory of fuzzy logic, fuzzy control, and fuzzy systems). The entire book contains my own research results only.

64 Peer-Reviewed Journal Publications
1.   Luan, Xiaodong, **Hao Ying**, Feng Lin, , Rodger D. MacArthur, Jonathan A. Cohn, Daniel C. Barth-Jones, Hong Ye, and Lawrence R. Crane,, "A Fuzzy Discrete Event System Approach to Determining Optimal HIV/AIDS Treatment Regimens," to be submitted.
2.   Syed, Fazal U., Ming Kuang, John Czubay, and **Hao Ying**, "Power-Split Hybrid Electric Vehicle Model Development and Validation," to be submitted.
3.   **Ying, H.**, "General Mamdani Fuzzy Controllers as Nonlinear State Feedback Controllers with Variable Gains: Conditions, Stability and Design," to be submitted.
4.   **Ying, H.**, "Input Fuzzy Set Design Conditions for Fuzzy Controllers Using Zadeh Fuzzy AND Operator," *IEEE Transactions on Fuzzy Systems*, submitted.
5.   Lu, Zhao, Feng Lin, and **Hao Ying**, "Multiple Sliding Surface Control For Systems in Nonlinear Block Controllable Form," *Cybernetics and Systems*, submitted.
6.   **Ying, H.**, "Deriving Analytical Input-Output Relationship for Fuzzy Controllers Using Arbitrary Input Fuzzy Sets and Zadeh Fuzzy AND Operator," *IEEE Transactions on Fuzzy Systems*, submitted.
7.   Lei Gao, Yongsheng Ding, and **H. Ying**, "An Adaptive Social Network-Inspired Approach to Resource Discovery for the Next Generation Grid," *IEEE Transactions on Systems, Man, and Cybernetics (Part A)*, submitted.
8.   Ying, H., "Structure and Stability Analysis of General Mamdani Fuzzy Dynamic Models," *International Journal of Intelligent Systems*, in press.
9.   Xu, J., J. S. Thakur, F. Zhong, **H. Ying**, and G. W. Auner, "Propagation of a Shear-Horizontal Surface Acoustic Mode in a Periodically Grooved AlN/Al_2O_3 Microstructure," *Journal of Applied Physics*, 96: 212-217, 2004.
10.   Haj-Ali, Amin, and **H. Ying**, "Structural and Stability Analysis of Fuzzy Controllers with Nonlinear Input Fuzzy Sets in Relation to Nonlinear PID Control with Variable Gains," *Automatica*, 40:1551-1559, 2004.
11.   **Ying, H.**, "Conditions for Analytically Determining General Fuzzy Controllers of Mamdani Type to be Nonlinear, Piecewise Linear or Linear," *Soft Computing*, in press.
12.   Ren, L.H., Y.S. Ding, **H. Ying**, and S.H. Shao, "Emergence of Self-Learning Fuzzy Systems by a New Virus DNA-Based Evolutionary Algorithm," *International Journal of Intelligent Systems*, 18(3):339-354, 2003.
13.   Alwadie, A., **H. Ying**, and H. Shah, "A Practical Two-Input Two-Output Takagi-Sugeno Fuzzy Controller," *International Journal of Fuzzy Systems*,5:123-130, 2003.
14.   **Ying, H.**, "A General Technique for Deriving Analytical Structure of Fuzzy Controllers That Use Arbitrary Trapezoidal/Triangular Input Fuzzy Sets and Zadeh Fuzzy Logic AND Operator," *Automatica*, 39: 1171 – 1184, 2003.
15.   Ding, Y. –S., **H. Ying** and S. –H. Shao, "Typical Takagi-Sugeno PI and PD Fuzzy Controllers: Analytical Structures and Stability Analysis," *Information Science*, 151:245-262, 2003.
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58.   Chang, C. -W., G. R. Hillman, **H. Ying**, T. A. Kent and J. Yen, "Brain MRI Analysis Using a Two-stage Fuzzy System," *Proceeding of 13th Annual Houston Conference on Biomedical Engineering Research*, pp. 101, Houston, Texas, USA, Feb. 16-17, 1995.

59.   **Ying, H**., A. Azeemi, C. J. Hartley, M. Motamedi, B. Bell, S. Rastegar and L. C. Sheppard, "Ultrasonic Detection of Photothermal Interaction of Laser with Tissue Using a Pulsed Doppler System," *Proceeding of Biomedical Optics '95*, San Jose, California, USA, Feb. 4-9, 1995.

60.   **Ying, H**. and G. –R. Chen, "Some Necessary Conditions For Single-Input Single-Output Fuzzy Systems As Universal Approximators," *Proceedings of the International Joint Conference of The North American Fuzzy Information Processing Society Biannual Conference, The Industrial Fuzzy Control and Intelligent Systems Conference and The NASA Joint Technology Workshop on Neural Networks and Fuzzy logic*, pp. 264-265, San Antonio, Texas, USA, Dec. 18-20, 1994.

61.   Chang, C. -W., G.R. Hillman, **H. Ying**, T. Kent and J. Yen, "Segmentation of Rat Brain MR Images Using a Hybrid Fuzzy System," *Proceedings of the International Joint Conference of The North American Fuzzy Information Processing Society Biannual Conference, The Industrial Fuzzy Control and Intelligent Systems Conference and The NASA Joint Technology Workshop on Neural*

Networks and Fuzzy Logic, pp. 55-59, San Antonio, Texas, USA, Dec. 18-20, 1994.

62.   **Ying, H**., "General Analytical Structure Of Typical MIMO Fuzzy Controllers," *Proceedings of The Sixth International Conference on Artificial Intelligence and Expert Systems Applications*, pp. 519-524, Houston, Texas, USA, Dec. 1-2, 1994.

63.   **Ying, H**. and L.C. Sheppard, "Clinical Application of a Real-time Fuzzy Blood Pressure Control," *Proceedings of Artificial Neural Networks in Engineering*, pp. 271-276, St. Louis, Missouri, USA, Nov. 13-16, 1994.

64.   Brewer, L.J., G.H. Hillman, **H. Ying**, S.F. Viegas and W.L. Buford, "A Rule-based Fuzzy System for Automatically Identifying Bone Contours from CT Images of the Carpus," *Proceedings of Twelfth Annual Conference on Biomedical Engineering Research in Houston*, pp. 156, Houston, Texas, USA, Feb. 10-11, 1994.

65.   **Ying, H.**, "General Fuzzy Systems Are Function Approximators," *Proceedings of 32nd IEEE Conference on Decision and Control*, pp. 1739-1742, San Antonio, Texas, USA, December 15-17, 1993.

66.   **Ying H.**, "Analytical Structure of a Two-input Two-output Fuzzy Controller," *Proceedings of The Third International Conference on Industrial Fuzzy Control and Intelligent Systems*, pp. 123-127, College Station, Texas, USA, December 1-3, 1993.

67.   Chen G. –R. and **H. Ying**, "Stability Analysis of Nonlinear Fuzzy PI Control Systems," *Proceedings of The Third International Conference on Industrial Fuzzy Control and Intelligent Systems*, pp. 128-133, College Station, Texas, USA, December 1-3, 1993.

68.   **Ying, H.**, M. McEachern, D. Eddleman and L.C. Sheppard, "Adaptive Fuzzy Control of Mean Arterial Pressure in Critically-ill Patients," *Proceedings of 1993 American Control Conference*, pp. 1845-1849, San Francisco, California, USA, June 2-4, 1993.

69.   **Ying, H.**, M. McEachern, D. Eddleman and L.C. Sheppard, "Real-time Fuzzy Control of Mean Arterial Pressure in Postsurgical Patients in an Intensive Care Unit," *Proceedings of Second IEEE International Conference on Fuzzy Systems*, pp. 255-260, San Francisco, California, USA, March 28 - April 1, 1993.

70.   **Ying, H.** (invited paper), "A Two-input Two-output Fuzzy Controller Is the Sum of Two Nonlinear PI Controllers with Variable Gains," *Proceedings of Second IEEE International Conference on Fuzzy Systems*, pp. 35-37, San Francisco, California, USA, March 28 - April 1, 1993.

71.   **Ying, H.** and L.C. Sheppard, "Fuzzy Theory in Cardiac Surgical Intensive Care Unit: Fuzzy Control of Mean Arterial Pressure in Postsurgical Patients," *Proceeding of Eleventh Annual Conference on Biomedical Engineering Research in Houston*, pp. 26, Houston, Texas, USA, February 11-12, 1993.

72.   **Ying, H.**, L.C. Sheppard, P.E. Turk and P.G. Lee, "Modeling a Squid Culture Tank System Based on Physical Insight," *Proceeding of Eleventh Annual Conference on Biomedical Engineering Research in Houston*, pp. 44, Houston, Texas, USA, February 11-12, 1993.

73.   **Ying, H.**, L.C. Sheppard, P.E. Turk and P.G. Lee, "Modeling a Squid Culture Tank System," *Proceeding of the Simtec' 92*, pp. 412-415, Houston, Texas, USA, Nov. 4-6, 1992.

74.   **Ying, H.**, L.C. Sheppard, "Fuzzy Control of Mean Arterial Pressure in Postsurgical Patients," *Proceeding of the Simtec' 92*, pp. 377-380, Houston, Texas, USA, Nov. 4-6, 1992.

75.   **Ying, H.**, "A Fuzzy Controller with Nonlinear Control Rules Is the Sum of a Global Nonlinear Controller and a Local Nonlinear PI-like Controller," *Proceeding of 1992 NASA International Joint Technology Workshop on Fuzzy Logic and Neural Network*, Houston, Texas, USA, June 1-3, 1992, pp. 40-47.

76.   Lee, P.G., P.E. Turk, **H. Ying** and J.L. Whitson, "Computer Automation for Recirculating

Aquaculture Systems," *Proceedings of World Aquaculture Society Meeting*, May 22-25, 1992.

77.   **Ying, H.**, L.C. Sheppard, P.G. Lee, P.E. Turk, "Automation of a Squid Culture Tank System," *Proceeding of Tenth Annual Conference on Biomedical Engineering Research in Houston*, Houston, Texas, USA, Mar. 19-20, 1992.

78.   **Ying, H.**, L.C. Sheppard, P.E. Turk and P.G. Lee, "Modeling a Squid Tank System," *Proceedings of the 1992 International Simulation Technology Conference, Society of Computer Simulation*, San Diego, CA, pp. 412-415, 1992.

79.   **Ying, H.**, L.C. Sheppard, "Fuzzy Control of Sodium Nitroprusside to Regulate Blood Pressure in Postsurgical Patients," *Proceeding of Ninth Annual Conference on Biomedical Engineering Research in Houston*, Houston, Texas, USA, Feb. 7-8, 1991.

80.   **Ying, H.**, D. Tucker, M. McEachern, D. Eddleman, M. Perl, A. Stanley, L.C. Sheppard, "Nonlinear Fuzzy Control of Mean Arterial Pressure in Critically Ill Patients", *Proceeding of IEEE Engineering in Medicine and Biology Society 1990 Conference*, Philadelphia, Pennsylvania, USA, Nov. 1-4, 1990.

81.   **Ying, H.** and L.C. Sheppard, "Tuning Parameters of the Fuzzy Controller Based on the Golden Section Search", *Proceeding of North American Fuzzy Information Processing Society 1990 Conference*, Toronto, Canada, June 7-8, 1990.

82.   **Ying, H.** and L.C. Sheppard, "Real-time Fuzzy Control of Mean Arterial Pressure in Pigs Based on Fuzzy Expert System Shell FLOPS," *Proceeding of Third International Fuzzy Systems Association World Congress*, Seattle, Washington, USA, August 6-11, 1989.

83.   **Ying, H.**, Louis C. Sheppard and Douglas Tucker, "Fuzzy Control of Human Arterial Pressure by Drug Infusion Using a Fuzzy Expert System Shell FLOPS," *Proceeding of World Congress on Medical Physics and Biomedical Engineering*, San Antonio, Texas, USA, August 6-13, 1988.

84.   **Ying, H.**, L.C. Sheppard and Douglas Tucker, "Fuzzy Control of Arterial Oxygen Using a Fuzzy Expert System Shell FLOPS," *Proceeding of the 7th Annual Meeting of North American Fuzzy Information Processing Society*, San Francisco, California, USA, June 8-10, 1988.

85.   **Ying, H.**, W. Siler and D. Tucker, "A New Type of Fuzzy Controller Based upon a Fuzzy Expert System Shell FLOPS," *Proceeding of IEEE International Workshop on Artificial Intelligence for Industrial Applications*, Hitachi City, Japan, May 25-27, 1988.

86.   Buckley, J.J. and **H. Ying**, "Linear Fuzzy Controller," *Proceeding of NASA's Conference on Artificial Neural Systems and Fuzzy Logic*, Houston, Texas, USA, May 2-3, 1988.

87.   **Ying, H.**, W. Siler and J. J. Buckley, "Fuzzy Control Theory: a Nonlinear Case," *Proceeding of 1988 NASA Conference on Artificial Neural Systems and Fuzzy Logic*, Houston, Texas, USA, May 2-3, 1988.

88.   Siler, W. and **H. Ying**, "Signal Processing Using a General-Purpose Fuzzy Expert System," *Proceeding of IEEE 21st Annual Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, California, USA, November 2-4, 1987.

89.   **Ying, H.**, W. Siler and D. Tucker, "An Expert-System-Based Fuzzy Controller," *Proceeding of Artificial Intelligence in Minerals and Materials Technology*, Tuscaloosa, Alabama, USA, October 21-22, 1987.

90.   Hong C. -W., S. -H. Shao and **H. Ying**, "Fuzzy Self-Organizing Controller and Its Application in Control for Speed and Current of D.C. Motor," *Proceeding of the Second National Conference of Electrical Technique Association of China on Electrical Control Systems and Equipment*, Guilin, Guangxi Province, China, October 1985.

91.   Hong C. -W., S. -H. Shao and **H. Ying**, "Research in Real-Time Fuzzy Self-Organizing Control for Speed and Current of D.C. Motor Based on a Microcomputer," *Selected Papers of the*

First National Conference of the Graduate Student on Computer and Its Applications, Beijing, China, August 1985.

92.   Hong C. -W., S. -H. Shao and **H. Ying**, "Further Research in Real-Time Fuzzy Control for Speed and Current of D.C. Motor Based on a Microcomputer," *Proceeding of the Second National Conference of Automation Association of China on Electrical Automation*, Mount Lu, Jiangxi Province, China, September 1984.

WAYNE STATE UNIVERSITY
Professional Record

Updated: 10/20/2004

NAME: Yang Zhao

Office address:

Department of Electrical and Computer Engineering
Wayne State University
Detroit, MI 48202
Telephone number: 313-577-3404
Fax number   313-577-1101
Email: yzhao@ece.eng.wayne.edu

Home address:

45181 Yorkshire
Novi, MI 48375
Telephone number: (248) 344-9449

DEPARTMENT/COLLEGE: Electrical and Computer Engineering / Engineering

WSU APPOINTMENT HISTORY:

Year Appointed/Rank: 1989/Assistant Professor
Year Awarded Tenure: 1994
Year Promoted to Associate Professor: 1994
Year Promoted to Full Professor: 1998

DATE AND PLACE OF BIRTH: October 26, 1961/ Zhejiang, China

CITIZEN OF: USA

EDUCATION:

Baccalaureate: Zhejiang University, China, BS in optical engineering,   1982
Graduate:
    Ohio State University, Columbus, MS in electrical engineering,   1984
    Pennsylvania State University, University Park, PhD in electrical engineering, 1989
Postgraduate: NO

Other Professionally Related Service (cont.)

Licensure:
Certification: NSF Faculty Enhancement Workshop in Semiconductor
          Optoelectronics, 1990

**FACULTY APPOINTMENT AT OTHER INSTITUTIONS
(Years and Rank):**
NO

PROFESSIONAL SOCIETY MEMBERSHIPS:
Optical Society of America
IEEE Lasers and Electro-Optics Society
Engineering Society of Detroit
SPIE- The International Society of Optical Engineering

HONORS/AWARDS:
University scholarship, Zhejiang University, 1980-1981
Faculty Research Award, Wayne State University, 1990
Career Development Chair, Wayne State University, 1997-1998
Board of Governors Faculty Recognition Award, Wayne State University, 1998

BIOGRAPHICAL CITATIONS:
      Who is Who in Science and Technology, 3rd edition
      Who is Who in the World
      Who is Who among America's Teachers

I. TEACHING

A. Years at Wayne State: 14

B. Years at Other Colleges/Universities: 0

C. Course Taught at Wayne State in Last Five Years:

  1. Undergraduate:
      ECE 4850 "Introduction to Engineering Optics"
      ECE 4570 "Electronics II"
      ECE 4700 "Introduction to Communication systems"
      ECE 5001
      ECE 5002

  2. Graduate:
      ECE 5500 "Electronic and Photonic Materials"
      ECE 5870 "Introduction to Lasers
      ECE 7030 "Engineering Mathematics for Electrical Engineers"
      ECE 7830 "Nonlinear Optics"
      ECE 7700 "Statistical Communication theory"
      ECE 7850 "Fiber and Integrated Optics"

  3. Graduate Professional School: No

D. Essays/Theses/Dissertations Directed:

  1. Zhengzhong Feng, M.S., "Error performance of multiple quantum well based
     optical modulators and switching devices," 1994.
  2. Krishnan Narayan, M. S. "Comparative study of ultra-fast fiber optic networks and their
     applications" 1995
  3. B. Ham, Ph.D. "Experimental study of lasing without population inversion in ruby,"
     1995. (Currently with Inha University, South Korea)
  4. P. Shah, Ph.D. "Numerical simulation models and techniques for optimizing wide bandgap
     semiconducotr optoelectronica devices," 1996. (Currently with Army Research Lab)
  5. I. E. Awad, Ph.D. "Quantum coherence and interference effects in doped crystals and
     quantum wells," 1997.
  6. J. Lu, M. S. "A digitial signal processing algorithm for forward-looking obstacle detection
     systems," 1997
  7. Jinkoo Kim, M. S. "Medical image processing for radition treatments," 2000 (Currently
     with Henry Ford Hospital)
  8. Beijing Wang, Ph.D. "Variable coding gain optimization to improve wireless data
     communication system power efficiency," 2003. (Currently with DaimlerChrysler)
  9. Shixiang Zhou, M.S. "An Analytic Study and Simulation of Wavelength Routing in WDM
     Optical Networks," 2004.
  10. Dan Tang, M. S., "Tunneling properties of Polyvinylidene Fluoride tin film with
nanometer thickness," 2004.

  E. New Course Development:
     ECE 783 "Nonlinear optics"
     ECE 550 "Electronic and photonic materials" (with G. Auner and V. Mitin)
     ECE 551 "Electronic and photonic materials laboratory" (with G. Auner and V.
        Mitin)

F. Course Materials (unpublished):
        Notes for ECE 550, Electronic and Photonic Materials, (with G. Auner and V.
Mitin)

II. RESEARCH

A. Research in Progress, Not Funded:

  1. Electro-optic technology for active vehicle safety
  2. Laser-based sound system for material diagnostics.
  3. Optical nanostructures using colloidal crystals

B. Funded Research in Last Five Years:

TITLE	AGENCY	DATES)	AMOUNT
Experimental Study of Four-wave	NSF	8/91-1/93	$50,000

Mixing in InGaAs/GaAs Multiple
Quantum Wells with Applications to
Optical Switching Devices and Soliton
Generation

Experimental Study of Four-Wave Mixing in InGaAs/GaAs Multiple Quantum Wells (Air Force Engineering Research Initiation Grant)	Engineering Foundation	6/91-12/91	$23,000
Research Experience for Minority Undergraduates	NSF	3/92-1/93	$13,250
Optics for exhaust gas sensing	Ford Motor Co.	7/92-6/93	$45,000
Emerging electronic and photonic materials synthesis and processing technology (with G. Auner and V. Mitin)	NSF	10/92-3/96	$300,000
Computer applications in optics	World Business Co	92-93	$17,150
Experimental study of quantum interference in crystals	Office of Naval Research	4/93-3/97	$254,977
Smart material structure using nonlinear photonic bandgap and photon localization for rejecting high-intensity laser radiation	Army Research Office	6/93-12/96	$360,000
Optics research at 1.3 gm wavelength	NSF	8/93-1/95	$34,300
Nondestructive inspection of steel pipes	American Natural	9/93-8/94	$12,000

using infrared tomography	Resources Co.		
Atomic interference and lasing without population inversion in crystals	Office of Naval Research	7/94-6/97	$159,050
High-speed electronic instruments for testing of advanced fiber-optic networks	Army Research Office	6/95-5/96	$94,700
Experimental realization of an inversionless ruby laser	Office of Naval Research	4/96-3/97	$70,000
Optics Research	General Motors	11/96-10/98	$10,000
High Frequency Circuits for Laser inspections	Display Inspection Systems, Wixom, MI	9/96-8/98	$19,240
Development of diode-pumped tunable mid-infrared laser using Co doped II-VI crystals,	NSF	3/98-10/99	$53,570
High resolution instrumentation for resonant quantum optical processes in solids	Office of Naval Research	4/99-3/00	$66,150
Medical image processing for radiation treatment	Henry Ford Hospital	2/99-8/01	$49,421
Laser-assisted prediction of acoustic radiation and scattering	NSF	10/00-9/03	$210,000
MRI: Acquisition of a Shared Scanning Probe Microscope Facility to Improve Research and Education (with G. Mao, S. Brock, H. Mathew, and P. Van Tassel)	**NSF**	**7/02-6/03**	**$220,000**

C. Fellowships/Grants/Special Awards in Last Five Years:

   (<u>NOTE:</u> Major research grants included in Funded Research category, see above.)

1. "Optical time-domain reflectometer for fiber optic sensors," Supplemental Research Equipment Fund and the Institute of Manufacturing Research, Wayne State University, $31,000, 1991-1992.

2. "Fiber optic sensors for industrial applications," Institute of Manufacturing Research, (GRA), $60,000, 9/92-8/96

3. "Sensor technology for active vehicle safety," Institute of Manufacturing Research, (GRA), $15,000, 9/96-8/97

III. PUBLICATION

A. Scholarly Books Published:

 1. Authored: NO

 2. Co-Authored: NO

B. Chapters Published:

 1. Authored: Y. Zhao, "Switching with Optics" in "Introduction to Information Optics," edited by F. T. S. Yu, (2001)

 2. Co-Authored: NO

C. Editorships of Books/Proceedings: NO

D. Journal Articles Published

 1. Refereed Journals:
 1. Y. Zhao, "Characteristics of solitary waves in four-wave interactions," J. Opt. Soc. Am B-3, 1116-1119 (1986).

 2. Y. Zhao, "The spatial symmetry of the third-order susceptibility tensor," IEEE J. Quant. Elect. QE-22, 1012 (1986).

 3. Y. Zhao, "Effects of phase variation and attenuation on solitary waves in forward four-wave mixing," J . Opt. Soc. Am. B-4, 1984-1987 (1987).

 4. Z. Lu, Q. Fan and Y. Zhao, "A new method for analyzing the thermo- stable telescopic resonators," Acta Optica Sinica, 7, 879-885 (1987).

 5. Y. Zhao, "Soliton propagation in optical fibers with random perturbations," Optics Communications, 68, 21-24 (1988).

 6. I. C. Khoo and Y. Zhao, "Probe beam amplification and phase conjugation self-oscillation in a thin Kerr medium," IEEE J. Quant. Elect., 25, 368-372 (1989).

7. Y. Zhao, "All-optical power-controlled switching in four-wave mixing," Optics Letters, 14, 1085-1087 (1989).

8. K. Aydin, Y. Zhao, and T. A. Seliga, "Rain-induced attenuation effects on C-band dual polarization meteorological radars," IEEE Trans. Geosci. Remote Sensing, 27, 57-66 (1989).

9. K. Aydin, Y. Zhao, and T. A. Seliga, "A differential reflectivity radar hail measurement technique: Observations during the Denver hailstorm of 13 June 1984," Journal of Atmospheric and Oceanic Technology, 7, 104-113 (1990).

10. K. Aydin and Y. Zhao, "A computational study of polarimetric radar observables in hail," IEEE Trans. Geosci. Remote Sensing, 28, 412-422 (1990).

11. Y. Zhao, B. Wang and Q. Tang, "Jones matrix for round-trip wave propagation in non-reciprocal media," Applied Optics, 31, 4471-4473 (1992).

12. Q. Tang and Y. Zhao, " Measurement and modelling of the optical transfer function of silica multiple image fiber," Applied Optics, 31, 6011-6014, (1992).

13. C. Wu and Y. Zhao, "High efficiency double phase conjugation in a Ce-SBN crystal," Opt. Lett., 18, 98-100 (1993).

14. Y. Zhao, C. Wu, P. Shah, M. K. Kim, and L. R. Dawson, "Phase conjugation in InGaAs/GaAs multiple quantum wells at 1.06 gm wavelength," Appl. Phys. Lett., 63, 281-283, (1993).

15. B. Wang, Y. Zhao, and G. Auner, "A dual-wavelength method for high density magnetooptic data storage at blue wavelengths," Appl. Opt., 33, 1828-1831, (1994).

16. Y. Zhao, C. Wu, and Q. Tang "High gain two-wave mixing in a Ce-SBN photorefractive crystals: Large modulation effect and dynamic properties," IEEE J. Quant. Elect., 30, 1651-1655, (1994)

17. Y. Zhu, M. Xiao, and Y. Zhao, "Intesity characteristcs of inversionless lasers from induced atomic coherence," Phys. Rev. A, 49, 4016-4020 (1994).

18. Y. Zhao, D. Huang, C. Wu, "Electric-field-induced quantum coherence of the intersubband transition in semiconductor quantum wells," Opt, Lett., 19, 816-818, (1994).

19. Y. Zhao, D. Huang, C. Wu, "Electromagnetically induced transparency of interband transitions in quantum wells," **Invited Paper,** Quant. Optics, 6, 327-340, (1994)

20. D. Huang, C. Wu, and Y. Zhao, "Coulomb and light-induced electronic renormalization in quantum wells for electromagnetically induced transparency and light amplification without inversion," J. Opt. Soc. Am. B., 11, 2258-2265, (1994).

21. Y. Zhao, D. Huang, and C. Wu, "Field-induced quantum interference in semiconductor quantum wells for electromagnetically induced transparency and light amplification without inversion," **Invited Paper,** Int. J. Nonlinear Opt. Phys., 4, 261-282, (1995).

22. Y. Zhao, D. Huang, C. Wu and R. Shen, "Comparative study of one-dimentional photonic bandgap structures using multilayer nonlinear thin films," 4, 1-11, Int. J. Nonlinear Opt. Phys., (1995).

23. D. Huang and Y. Zhao, "Interband quantum coherence in intersubband coupled quantum wells," Phys. Rev. A, 51, 1617-1721, (1995).

24. D. Huang and Y. Zhao, "Optical-phonon transport and localization in periodic and Fibononacci polar-semiconductor superlattices," Phys. Lett., A. 200, 459-463 (1995).

25. Y. Zhao, D. Huang, and C. Wu, "DC-field induce quantum interference for lasing without inversion in quatum wells," J. Opt. Soc. Am., B. 13, 1614 (1996).

26. Y. Zhao, C. Wu, B. Ham, M. K. Kim, and E. Award, "Microwave induced transparency in ruby," Phys. Rev. Lett., 79, 641 (1997).

27. D. Huang, Y. Zhao, C. Wu, and E. Awad, "Nonlinear optical property of quantum-wells with field-induced coherence," J. Nonl. Opt. Phys. Mat., 6, 119 (1997).

28, Y. Zhao and P. Hemmer, "Electromagnetically induced transparency in solids," Accepted for publication in Optics '97, December issue Optics and Photonics News, (1997).

29. Y. Zhao and I. Avrutsky, "Two-dimensional colloidal crystal corrugated waveguide," Optics Letters, 24, 817, (1999).

30. Y. Zhao, I. Avrutsky, and B. Li, "Optical coupling between single colloidal crystals and a planar waveguide," Appl. Phys. Lett., 75, 3596, (1999).

31. Y. Zhao and I. Avrutsky, "Two-dimensional corrugated waveguide," vol. 10, 17, Special issue on Optics in 1999, Optics and Photonics News, December issue, (1999)

32. I. Avrytsky, Y. Zhao, and V. Kochergin, "Surface-plasmon-assited resonant tunneling of light though a periodically corrugated thin metal films," Opt. Lett., 25, 595, (2000).

33. I. Avrutsky, B. Li, and Y. Zhao, "Characterization of two-dimensional colloidal polycrystalline materils using optical diffraction," J. Opt. Soc. Am., B., 17, 904 (2000).

34. B. Li, I. Avrutsky, Y. Zhao, and G. Mao, "Statistical study on two-dimensional colloidal crystals based on microscopic images and optical diffraction," Colloids and Surfaces, A, 174, 113, (2000).

35. V. Kochergin, I. Avrytsky, and Y. Zhao, "High sensitivy wavrguide grating sensor based on radiative losses," Biosensors and Bioelectronics, 15, 283-289 (2000)

36. I. Avrutsky, V. Kochergin, and Y. Zhao, "Optical demultiplexing in a planar waveguide with colloidal crystal," IEEE Photon. Tech. Lett., 12, 1647, (2000)

37. Y. Zhao, "Switching with Optics" in "Introduction to Information Optics," F. T. S. Yu, S. Jutamulia, and S. Yin Ed., Academic Press, San Diego, CA (2001).

38. V. Bondarenko and Y. Zhao, "Resonant photonionization absorption spectra of spherical quantum dots," J. Phys.: Condens Matter, 15, 1377-1385, (2003).

39. V. Bondarenko, Miroslaw Zaluzny, and Y. Zhao, "Interlevel electromagnetic response of systems of spherical quantum dots," Phys. Rev. B, Accepted for Publication, (2004).

40. J. K. Kim, F. F. Yin, J. H. Kim and Y. Zhao, "Effects of x-ray and CT image enhancements on the robustness and accuracy of a rigid 3D/2D image registration," Medical Physics, Accepted for publication

2. Invited Review Articles:
   1. Y. Zhao, D. Huang, and C. Wu, "Field-induced quantum interference in semiconductor quantum wells for electromagnetically induced transparency and light amplification without inversion," Int. J. Nonlinear Opt. Phys., Int. J. Nonlinear Opt. Phys., 4, 261-282, (1995).

3. Non-Refereed Journals: NO

E. Papers Published in Conference Proceedings:

Refereed Papers:

1. Z. Lu and Y. Zhao, "On Nd:YAG stable telescopic resonators," Second International Conference on Laser, Guangzhou, China (1983)

2. K. Aydin, T. A. Seliga and Y. Zhao, "A self-correction procedure of attenuation due to rain for C-band dual linear polarization radars," 23rd Conference on Radar Meteorology, Snowmass, CO. (1986).

3. Y. Zhao, "Theory of solitary waves in four-wave mixing," XV International Conference on Quantum Electronics, Baltimore, MD. (1987).

4. K. Aydin, T.A.Seliga, and Y. Zhao, "Rainfall estimation with C-band dual polarization radars: Focus on attenuation effects," International Geosciences and Remote Sensing Symposium, Ann Abor, Michigan, (1987).

5. I. C. Khoo, R. Normandin, Y. Zhao and R. R. Michael, "Effect of diffracted beams on optical phase conjugation and self-oscillation," International Conference on Nonlinear Optical Phenomena, Ashford Castle, Ireland (1988).

6. Y. Zhao, K. Aydin, and T. A. Seliga, "Empirical relations for rainfall rate estimation with the dual linear polarization radar technique at C-band wavelengths," American Geophysical Union Fall Meeting, San Francisco, CA, (1988).

7. K. Aydin, T.A.Seliga, and Y. Zhao, "Hail detection using differential reflectivity and comparison with dual wavelength and reflectivity factor techniques," Polarimetric Technology Workshop, Redstone Arsenal, Alabama, (1988).

8. I. C. Khoo, Y. Zhao, R. R. Michael, T. H. Liu and R. Normandin, "New theoretical and experimental results on optical phase conjugation and self-oscillation in a thin nonlinear Kerr medium," XVI International Conference on Quantum Electronics, Tokyo, Japan, (1988).

9. K. Aydin and Y. Zhao, "A computational study of polarimetric radar observables for measuring hail parameters," International Geosciences and Remote Sensing Symposium, Vancouver, Canada, (1989).

10. K. Aydin, T.A.Seliga, and Y. Zhao, "Radar observations of the June 13, 1984 Denver hailstorm using the differential reflectivity hail signal (HDR)," 24rd Conference on Radar Meteorology, Tallahassee, Florida, (1989).

11. Y. Zhao and Z. Li, "Photonic switching using four-wave mixing with two pumps," Proceeding of Optical Society of America Annual Meeting, Boston, (1990)

12. Jianyi Lu, T. W. Lin and Y. Zhao, "Effects of the optical switching in a dielectric-cladded nonlinear thin film for different polarizations," Proceeding of Optical Society of America Annual Meeting, Boston, (1990)

13. R. Brandt, F. Lin and Y. Zhao, "Phase invariant for images," Proceeding of Optical Society of America Annual Meeting, Boston, (1990).

14. Y. Zhao, "New optical devices using four-wave mixing in highly nonlinear media", Proceeding of International Conference on Lasers, '90, **<u>Invited Parser,</u>** San Diego, (1990).

15. Wang, Y. Zhao and G. Auner, "Dual-wavelength magneto-optics for high density optical data storage", Proceedings of Optical society of America Annual Meeting, 1991.

16. Y. Zhao, B. Wang and G. Auner, "Polarization matrix of round-trip wave propagation in anisotropic media," Proceedings of Optical society of America Annual Meeting, 1991.

17. Y. Zhao, Q. Tang, and Z. Li, "Nonlinear characteristics of two-wave mixing in InP:Fe photorefractive crystals," Proceedings of Optical Society of America Annual Meeting, San Jose, CA (1991).

18. Q. Tang and Y. Zhao, "The optical transfer function of silica milticore image fibers," Proceedings of Optical Society of America Annual Meeting, San Jose, CA (1991).

19. Z. Li, Y. Zhao, Q. Tang and P. Shah, "Large modulation effects in two-wave mixing in photorefractive crystals," Optical Engineering Midwest-1992, Chicago, IL (1992)

20. Y. Zhao and Q. Tang, "Measurement and analysis of optical fiber with lossy cladding for sensor applications," Optical Engineering Midwest-1992, Chicago, IL (1992)

21. Q. Tang and Y. Zhao, "Binary modulation of light intensity for distributed fiber optics sensors," SPIE OE/FIBERS'92, Boston, (1992).

22. Y. Zhao, Q. Tang, P. Shah and L.R.Dawson, "Nonlinear absorption and wave mixing in InGaAs/GaAs trained layer multiple quantum wells at 1.06um wavelength," Optical Society of America Annual Meeting, (1992).

23. B. Wang, Y. Zhao, G. Auner, "Optimal design of multi-layer coatings for dualwavelength magneto-optic data storage," Optical Society of America Annual Meeting, (1992).

24. Y. Zhao, C. Wu, P. Shah, M. K. Kim and L. R. Dawson, "Optic Phase conjugation in InGaAs/GaAs multiple quantum wells at 1.06 Rm wavelength," Conference on Lasers and Eletro-Optics, Baltimore, MD, (1993)

25. C. Wu and Y. Zhao, "Lasing without population inversion in ruby," Optical Society of America Annual Meeting, Toronto, Canada, (1993).

26. Y. Zhao, Z. Feng, and C. Wu, "Error performance for multiple quantum wellbased optical modulators," Optical Society of America Annual Meeting, Toronto, Canada, (1993).

27. Y. Zhao, **Invited Paper,** "Electromagnetically induced transparecy and lasing without population inversion in semiconductor quantum wells" IEEE Laser and Electr-Optics Society annual Meeting, Boston, (1994).

28. Y. Zhao, **Invited Paper,** "Smart photonic bandgap structures," ARO workshop on Smart Materials, Brandeis University, MA, (1994).

29. Y. Zhao, R. Shen and J. Xu, "Implementation of smart photonic bandgap structures using Langmuir-Blodgett films," Conference on Smart structures and Materials, San Diego, (1995).

30. Y. Zhao, **Invited Paper,"Quantum** Coherence in Crystals: Theory, Experiments, and Applications," Mediterranean Workshop and Topical Meeting on Novel Optical Materials and Applications, Cetrato, Italy, (1995).

31. Y. Zhao, C. Wu, and M. K. Kim, "Experimental results of lasing without inversion in ruby using low-frequecy coupling, " Quantum Elelctronics and Laser science Conference, Baltimore, (1995).

32. Y. Zhao, C. Wu and M. K. Kim, **Invited Paper,** "Optically induced transparency in ruby," Workshop on "Atomic Coherence and Interference Effects," Jackson Hole, Wy. (1995).

33. Y. Zhao, D. Huang, C. Wu, "Lasing without inversion in quantum wells controlled by a do field," Optical Society of America Annual Meeting. Portland, OR (1995).
34. D. Huang and Y. Zhao, "Electric-field induced quantum interference in double quantum wells," APS Annual meeting, San Jose (1995).
35. Y. Zhao, C. Wu, M. K. Kim, and B. Ham, **Invited Paper,** "Observation of laasfing without inversion in ruby," 20th Colloquia on physics of quantum optics, Snowbird, UT (1996).
36. Y. Zhao, C. Wu, M. K. Kim, and B. Ham, "Light amplification without inversion in ruby," International Quantum Electronics Conference, Sydner, Australia (1996).
37. Y. Zhao and C. Wu, "Novel hybrid gyroscope system using photorefractive double phase conjugation" SPIE Annual Meeting, Denver, Co. (1996).
38. Y. Zhao and C. Wu,"Dioade-pumped tunable mid-infrared laser using CO-doped II-VI crystals", Confernce on Lasers and Electro-Optics (OLEO), Baltimore, MD,   (1997)

39. Y. Zhao and C. Wu,"Dioade-pumped tunable mid-infrared laser using CO-doped II-VI crystals", Confernce on Lasers and Electro-Optics (CLEO), Baltimore, MD, (1997)
40. Y. Zhao, Invited paper, "Dynamics of field induced transparency in ruby," Taos Summer School, Taos, NM, (1997).
41. Y. Zhao, I. Avrutsky, and B. Li, "Two-dimensional corrugated waveguides using colloidal crystals," Optical Society of America Annual Meeting, (1999).
42. I. Avrutsky, V. Kochergin, and Y. Zhao, "Biological sensing using optical diffraction from waveguide gratings," Optical Society of America Annual Meeting, (1999).
43. Y. Zhao and I. Avrutsky, **Invited paper,** "Fabrication and applications of two-dimensional periodic waveguides using colloidal crystals," SPIE Conference on Photofractive fiber and Crystal devices, San Diego, 2000
44. J. K. Kim, F.-F. Yin, M. Ajlouni, Y. Zhao, and J. H. Kim, "A computer-Assisted portal verification system," World Congress on Medical Physics and Biological Engineering, 2000.
45. J.K. Kim, F.-F Yin, M. Ajlouni, Y. Zhao, J.H. Kim, "Automatic skin and chest-wall edge identification in breast portal images using PTGs trained by AHK I," 43rd Annual Meeting of the American Association of Physicists in Medicine, Salt Lake City, Utah, July 2001
46. V. Bondarenko and Y. Zhao, "Design of photon absorption spectra due to bound to free transitions in spherical quantum dots," American Physical Society March Meeting, Indianapolis, IN, March, 2002.
47. Q. Hu, Z. Ni, H. Lu, S. F. Wu, and Y. Zhao, "Prediction of acoustic radiation based on particle velocity measurements," the 143rd Meeting of the Acoustical Society of America, Pittsburgh, Pennsylvania, June (2002).
48. J. Choi, Y. Song, D. Tang and Y. Zhao, "Ferroelectric polymers for advanced polymeric light emitting devices," **Invited paper**, SPIE Annual Meeting, Seattle, WA, (2002)
49. J. K. Kim, F. F. Yin, J. H. Kim and Y. Zhao, "A Robust 3D Morphological Algorithm for Automatic Skin Contour Detection on CT Images," Annual Meeting of the American Association of Physicists in Medicine, (2003).
50. Z. Ni, H. Lu, S. F. Wu, and Y. Zhao, "Prediction of acoustic radiation via 3D particle velocity measurements," the 146th Meeting of the Acoustical Society of America, Austin, TX, November, (2003).
51. Y. Zhao, G. Mao and J. Wang "Self-assembled nanostructures for antireflection optical coatings," Invited paper, Photonics Asia, (2004).

2. Non-Refereed Papers:

F. Translations of Authors Published:

   1. Books: NO

   2. Articles or Creative Works: NO

G. Abstracts Published in Academic Journals: NO

H. Book Reviews Published:

   1. Academic Journals: NO

   2. In Magazines / Newspapers: NO

I. Creative Shows/Exhibits

   1. Refereed or Judged (National Competition): NO

   2. Refereed or Judged (Local/Regional Competition): NO

   3. Not Refereed: NO

J. Creative Performances:

   1. Outside Metropolitan Area: NO

   2. Metropolitan Area: NO

   3. Campus: NO

K. Instructional Materials Formally Published

   1. Textbooks: NO

   2. Study Guides/Laboratory Workbooks: NO

   3. Other Published Materials: NO

L. Papers Presented

Other Professionally Related Service (cont.)

 1. Invited and/or Refereed Internationally or Nationally

 1. Z. Lu and Y. Zhao, "On Nd:YAG stable telescopic resonators," Second International Conference on Laser, Guangzhou, China (1983).

 2. K. Aydin, T. A. Seliga and Y. Zhao, "A self-correction procedure of attenuation due to rain for C-band dual linear polarization radars," 23rd Conference on Radar Meteorology, Snowmass, CO. (1986).

 3. Y. Zhao, "Theory of solitary waves in four-wave mixing," XV International Conference on Quantum Electronics, Baltimore, MD. (1987).

 4. K. Aydin, T.A.Seliga, and Y. Zhao, "Rainfall estimation with C-band dual polarization radars: Focus on attenuation effects," International Geosciences and Remote Sensing Symposium, Ann Abor, Michigan, (1987).

 5. I. C. Khoo, R. Normandin, Y. Zhao and R. R. Michael, "Effect of diffracted beams on optical phase conjugation and self-oscillation," International Conference on Nonlinear Optical Phenomena, Ashford Castle, Ireland (1988).

 6. Y. Zhao, K. Aydin, and T. A. Seliga, "Empirical relations for rainfall rate estimation with the dual linear polarization radar technique at C-band wavelengths," American Geophysical Union Fall Meeting, San Francisco, CA, (1988).

 7. K. Aydin, T.A.Seliga, and Y. Zhao, "Hail detection using differential reflectivity and comparison with dual wavelength and reflectivity factor techniques," Polarimetric Technology Workshop, Redstone Arsenal, Alabama, (1988).

 8. I. C. Khoo, Y. Zhao, R. R. Michael, T. H. Liu and R. Normandin, "New theoretical and experimental results on optical phase conjugation and self-oscillation in a thin nonlinear Kerr medium," XVI International Conference on Quantum Electronics, Tokyo, Japan, (1988).

 9. K. Aydin and Y. Zhao, "A computational study of polarimetric radar observables for measuring hail parameters," International Geosciences and Remote Sensing Symposium, Vancouver, Canada, (1989).

 10. K. Aydin, T.A.Seliga, and Y. Zhao, "Radar observations of the June 13, 1984 Denver hailstorm using the differential reflectivity hail signal (HDR)," 24rd Conference on Radar Meteorology, Tallahassee, Florida, (1989).

 11. Y. Zhao and Z. Li, "Photonic switching using four-wave mixing with two pumps," Proceeding of Optical Society of America Annual Meeting, Boston, (1990)

 12. Jianyi Lu, T. W. Lin and Y. Zhao, "Effects of the optical switching in a dielectric-cladded nonlinear thin film for different polarizations," Proceeding of Optical Society of America Annual Meeting, Boston, (1990)

13. R. Brandt, F. Lin and Y. Zhao, "Phase invariant for images," Proceeding of Optical Society of America Annual Meeting, Boston, (1990)

14. Y. Zhao, "New optical devices using four-wave mixing in highly nonlinear media", Proceeding of International Conference on Lasers, '90, **<u>Invited Paper</u>,** San Diego, (1990).

15.13. Wang, Y. Zhao and G. Auner, "Dual-wavelength magneto-optics for high density optical data storage", Proceedings of Optical society of America Annual Meeting, 1991.

16. Y. Zhao, B. Wang and G. Auner, "Polarization matrix of round-trip wave propagation in anisotropic media," Proceedings of Optical society of America Annual Meeting, 1991.

17. Y. Zhao, Q. Tang, and Z. Li, "Nonlinear characteristics of two-wave mixing in InP:Fe photorefractive crystals," Proceedings of Optical Society of America Annual Meeting, San Jose, CA (1991).

18. Q. Tang and Y. Zhao, "The optical transfer function of silica milticore image fibers," Proceedings of Optical Society of America Annual Meeting, San Jose, CA (1991).

19. Z. Li, Y. Zhao, Q. Tang and P. Shah, "Large modulation effects in two-wave mixing in photorefractive crystals," Optical Engineering Midwest-1992, Chicago, IL (1992)

20. Y. Zhao and Q. Tang, "Measurement and analysis of optical fiber with lossy cladding for sensor applications," Optical Engineering Midwest-1992, Chicago, IL (1992)

21. Q. Tang and Y. Zhao, "Binary modulation of light intensity for distributed fiber optics sensors," SPIE OE/FIBERS'92, Boston, (1992).

22. Y. Zhao, Q. Tang, P. Shah and L.R.Dawson, "Nonlinear absorption and wave mixing in InGaAs/GaAs trained layer multiple quantum wells at 1.06um wavelength," Optical Society of America Annual Meeting, (1992).

23. B. Wang, Y. Zhao, G. Auner, "Optimal design of mufti-layer coatings for dual-wavelength magneto-optic data storage," Optical Society of America Annual Meeting, (1992).

24. Y. Zhao, C. Wu, P. Shah, M. K. Kim and L. R. Dawson, "Optic Phase conjugation in InGaAs/GaAs multiple quantum wells at 1.06 μm wavelength," Conference on Lasers and Eletro-Optics, Baltimore, MD, (1993)

25. Y. Zhao and C. Wu, **<u>Invited Paper</u>,** "Field-induced atomic interference in ruby and other solid state media," Workshop on "Atomic Coherence and Interference Effects," Crested Butte, Co. (1993).

26. C. Wu and Y. Zhao, "Lasing without population inversion in ruby," Optical Society of America Annual Meeting, Toronto, Canada, (1993).

27. Y. Zhao, Z. Feng, and C. Wu, "Error performance for multiple quantum wellbased optical modulators," Optical Society of America Annual Meeting, Toronto, Canada, (1993).

28. Y. Zhao, **Invited Paper,** "Electromagnetically induced transparecy and lasing without population inversion in semiconductor quantum wells" IEEE Laser and Electr-Optics Society annual Meeting, Boston, (1994).

29. Y. Zhao, C. Wu and M. K. **Kim, Invited Parser,** "Progress in experiments of lasing without population inversion in ruby," Workshop on "Atomic Coherence and Interference Effects," Crested Butte, Co. (1994).

30. Y. Zhao, **Invited Paper,** "Smart photonic bandgap structures," ARO workshop on Smart Materials, Brandeis University, MA, (1994).

31. Y. Zhao, R. Shen and J. Xu, "Implementation of smart photonic bandgap structures using Langmuir-Blodgett films," Conference on Smart structures and Materials, San Diego, (1995).

32. Y. Zhao, **Invited Parser,"Quantum** Coherence in Crystals: Theory, Experiments, and Applications," Mediterranean Workshop and Topical Meeting on Novel Optical Materials and Applications, Cetrato, Italy, (1995).

33. Y. Zhao, C. Wu, and M. K. Kim, "Experimental results of lasing without inversion in ruby using low-frequecy coupling, " Quantum Elelctronics and Laser science Conference, Baltimore, (1995).

34. D. Huang and Y. Zhao, "Electric-field induced quantum interference in double quantum wells," APS Annual meeting, San Jose (1995).

35. Y. Zhao, C. Wu and M. **K. Kim, Invited Paper, "Optically** induced transparency in ruby," Workshop on "Atomic Coherence and Interference Effects," Jackson Hole, Wy. (1995).

36. Y. Zhao, D. Huang, C. Wu, "Lasing without inversion in quantum wells controlled by a do field," Optical Society of America Annual Meeting. Portland, OR (1995).

37. Y. Zhao, C. Wu, M. K. Kim, and B. Ham, **Invited Paper, "Observation** of laasfing without inversion in ruby," 20th Colloquia on physics of quantum optics, Snowbird, UT (1996).

38. Y. Zhao, C. Wu, M. K. Kim, and B. Ham, "Light amplification without inversion in ruby," International Quantum Electronics Conference, Sydner, Australia(1996).

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43. I. Avrutsky, V. Kochergin, and Y. Zhao, "Biological sensing using optical diffraction from waveguide gratings," Optical Society of America Annual Meeting, (1999).

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45. J.K. Kim, F.-F Yin, M. Ajlouni, Y. Zhao, J.H. Kim, "Automatic skin and chest-wall edge identification in breast portal images using PTGs trained by AHK I," 43rd Annual Meeting of the American Association of Physicists in Medicine, Salt Lake City, Utah, July 2001

46. V. Bondarenko and Y. Zhao, "Design of photon absorption spectra due to bound to free transitions in spherical quantum dots," American Physical Society March Meeting, Indianapolis, IN, March, 2002.

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48. J. Choi, Y. Song, D. Tang and Y. Zhao, "Ferroelectric polymers for advanced polymeric light emitting devices," **Invited paper**, SPIE Annual Meeting, Seattle, WA, (2002)

49. J. K. Kim, F. F. Yin, J. H. Kim and Y. Zhao, "A Robust 3D Morphological Algorithm for Automatic Skin Contour Detection on CT Images," Annual Meeting of the American Association of Physicists in Medicine, (2003).

50. Z. Ni, H. Lu, S. F. Wu, and Y. Zhao, "Prediction of acoustic radiation via 3D particle velocity measurements," the 146th Meeting of the Acoustical Society of America, Austin, TX, November, (2003).

51. Y. Zhao, G. Mao and J. Wang "Self-assembled nanostructures for antireflection optical coatings," Invited paper, Photonics Asia, (2004).

    2. Invited and/or Refereed Locally/Regionally

M. Invited Seminars or Lectures Presented in Last Five Years:

   1. "Nonlinear optical characteristics of four-wave mixing in highly nonlinear media," Ohio State University, (1992)
   2. "Laser-based sound system for material diagnostics," General Motors Technical Center, Warren, MI. (1997)
   3. "Field-induced quantum interference for lasing without inversion in solids," National Research Council, Ottawa, Canada, (1997)

N. Other Scholarly Work:

   (a). PATENT:

1. Q. Tang and Y. Zhao "Fiber-optic pressure or liquid level sensors," US Patent 5,303,586 (1994).

2. Y. Zhao and D. Hu, "A high gain infreared collectror using gradient-index lenses," US Patent 6,064,067, (2000)

IV. **SERVICE**

A. Administrative Appointments at Wayne State in Last Five Years:

8/2000 – present
Chairman, Department of Electrical and Computer Engineering

B. Administrative Appointments at Other College/University in Last Five Years:

C. Committee Assignments in Last Five Years

1. University Committee Chaired:

2. University Committee Membership:

Graduate Council. 1994-1995
Faculty Research Award Committee, 1995
Scholarship and Fellowship Awards Panel, 1997, 2000
Board of Governors Faculty Recognition Award Evaluation committee, 1999
WSU China Delegation, 2001
Campaign Executive, Leading the Way: The Faculty and Staff Campaign, 2002
Steering Committee, Wayne First Capital campaign, 2004

3. College/Department Committee Chaired:

ECE Faculty Search Committee, (1999-2000)

4. College/Department Committee Membership:

College Research Advisory Committee, 1994-1995 College Faculty
Assembly Executive Committee, 1994-1995 ChE 304 Teaching and
Learning Committee, 1993-1994 Academic Standard Committee,
1993-1994 Arthur R. Carr Professorship selection criteria committee, 1994
College Faculty Assembly Election Committee, 1990-1991 College T & P
Committee, 1997-2000 College Salary Committee, 1997-2000 Engineering
Student-Faculty Board (ESFB), 1997
College Strategic planning committee, 2000

ECE T & P and Salary Committee
ECE Department Graduate Committee
ECE Undergraduate Committee
ECE Faculty Search Committee
ECE Department Chair Search Committee
ECE Ph.D. Preliminary Exam Subcommittee - Mathematics
ECE Ph.D. Preliminary Exam Subcommittee - Optics

D. Position Held in Professional Associations in Last Five Years:

1. President, Optical Society of America - Detroit, Chapter, 1993-1995, 2. Vice President, Optical Society of America - Detroit, Chapter, 1992-1993

E. Membership/Offices Held in Public or Private Agencies Related to Discipline in Last Five Years: NO

F. Professional Consultation

  1. Public Presentations as an Expert in Discipline: NO

  2. Testimony before Public Bodies:

Expert witness for Laser Vehicle speed detection instrument, (Police Department, Michigan State).

  3. Consulting to Public Agencies, Foundations, Professional Associations: NO

  4. Consulting to Private Enterprises:

CMS Technologies, Farmington, MI;
Lake Shore Cryotronics, Inc., OH

G. Journal/Editorial Activity:

  1. Editorships: NO

  2. Editorial Board Memberships: NO

H. Other Professionally Related Services:

1. Proposal Reviewed for:

NSF
ASEE
Office of Naval Research
National Science Research Council of Canada

2. Journal Referee for:
   Optics Letters
   Journal of Optical Society of America
   Applied Optics
   International Journal of Nonlinear Optical Physics
   IEEE Trans. Neural Network

3. Mentor of the pre-college students, "Research Apprenticeship for Minority High School Students," College of Engineering, Wayne State University, 1991

4. Mentor of the pre-college students, "Experience Engineering," Sponsored by NASA, College of Engineering, Wayne State University," 1991

5. Mentor of Martin Luther King Jr.-Cesar Chavez-Rosa Parks College Day Program, 1994, 1995

APPENDIX B
3DS Doctoral Student Profile

**200301
cpe**

Last Name	First Name	MI	Banner ID	Enrolled_Ind	Prior college	GPA
Fu	Song		003473783	Y	Nanjing Univ Of Aeron & Astron	
Xu	Lu		000459778	Y	Rivier College	3.54

200309

Mohanty	Sudhansu	M	003556587	Y	Atlanta University	4
Pham	Nhi	V	000343311	Y	Henry Ford Community College	3.66
Qudah	Bashar		003503274	Y	Univ of Michigan-Dearborn	8.66
Wang	Meijun		003495767	Y	Beijing Inst Of Tech	3.64

200401

Wang	Xiaoyi		003502518	Y	Tongji University	3.83

200409

Kaur	Gurkamal		003683062	Y	University Of Massachusetts Lo	3.15
Ranjan	Rahul		003702727	Y	Indian Inst Of Tech	2.91
Samuel	Jenifa Daniel	P	003642553	Y	Anna University	

200209EE

Last Name	First Name	MI	Banner ID	Enrolled _Ind	Prior college	GPA
Li	Ming		003429600	Y	Tianjin University	
Raman	Kalyan		003476635	Y	Purdue University	
Soundararajan	Ramkumar		000472735	Y	Tennessee Technological Univer	0.61
Tarique	Mohammed		003464232	Y	Bangladesh U/engg &tech	
Wang	Jinsong		000510543	Y	Univ Of Scienc & Tech Of China	3.35
Zhang	Jinju		000436499	Y	University Of Texas At Dallas	3.08
Zhong	Xiliang		003453868	Y	Southeast University	
Zhou	Fule		000508498	Y	East China Normal Univ	0
200301						
Liu	Zhengyu		003493668	Y	University Of Windsor	
Luo	Xuanwen		000338747	Y	Southern Illinois Univ-Carbond	3.73
Scott	Andrew	J	003469026	Y	Oakland Community College	
200306						
Dajani	Omar	F	000313702	Y	University Of Jordan	0
Jain	Parul		003516164	Y	University Of Delhi	7.83
200309						
Ali	Mahdi	N	000241468	Y	Henry Ford Community College	3.47
Alkeilani	Anwar	A	003451163	Y	Univ of Michigan-Dearborn	3.8
Chaganti	Kalyani		003597112	Y	Jawaharal Nehru University	
Mekki	Ahmed		003467366	Y	Univ Of	

		O			Khartoum	
200401						
Phatak	Deepti	D	003622380	Y	University Of Pune	6.01
200409						
Awasthi	Anuj		003702720	Y	Jamia Millia Islamia U	69.1
Dixit	Arati	M	003627270	Y	University Of Pune	57.5
Du	Xinyu		003627314	Y	Tsinghua University	3.82
Fernando	Joseph	V	003646227	Y	Manonmaniam Sundaranar Univ	71.55
Hossain	Irina		003626637	Y	Univ Of Manitoba	4.18
Wu	Shi		003677310	Y	New Jersey Institute Of Techno	3.2
Zhang	Huan		003558999	Y	Huazhong Univ Of Sci & Tech	3.75

APPENDIX C
3M/CPS Masters/Certificate Student Profile

Master
Term: 200209 View Personal Information

Last Name	First Name	MI	Banner ID	Prior college	GPA
Abdel Galil	Yasser	A	000478642	COL - Egypt	
Almburg	Scott	A	000334763	Wayne State University	
Anson	Terry	J	003447517	Modesto Junior College	
Aravindakshan	Sabarinath	M	000509736	University Of Mumbai	0
Bhatti	Waseem	A	000455452	Wayne State University	2.67
Chen	Wanli		003447193	Huazhong Univ Of Sci & Tech	
Cheng	Yong		003452814	Shanghai Univeristy Of Tech	
Deol	Simranjit	S	003473672	Punjab Technical University	6.27
El-Chanti	Hussein	A	000424235	Wayne State University	3.46
Gadi	Naveen		000510827	Bharathiar University	0
Habib	Fakhir		000334622	Wayne State University	2.95
Hong	Haiwen		000405594	Southeast University	
Jindal	Abhishek		003407172	Aligarh Muslim Univ	2.84
Kaddouh	Ibrahim	F	000402837	Henry Ford Community College	3.5
Karbowski	Glenn	R	000415984	Wayne State University	3.18
Khaleel	Rahman	U	000504230	Jawaharlal Nehru Tech U	70.9
Kim	Jong Ho		000478332	Kyongpook Natl Univ	0
Kumar	Mahesh	G	000407581	University Of Madras	7.2
Li	Mu		003446274	Tsinghua University	
Liu	Weibing		000312517	University Of Windsor	
Maniruzzaman	Sheikh		000470542	Bangladesh Inst Of Technology	
Meyyappan	Vidya		003455206	Bangalore University	6.5
Narina	Chaithanya		000511285	University Of Madras	6.7
Obeid	Mamon Abdo	A	000317345	Wayne State University	2.84
Pillapalem	Smitha		000475174	Jawaharlal Nehru Tech U	72.32
Qu	Huyu		000510943	China Inst of Metrology	
Segan	Parag		000429528	Wayne State University	2.83
Shanker	Shobhit		003409366	Dr. B Ambedkar Marathwada Univ	
Sinha	Nikhil		000511409	Bhilai Inst of Tech	0
Stedman	Eli	J	000336034	Wayne State University	0
Syed	Nawazuddin		003464159	Jawaharlal Nehru Tech U	
Thaker	Alpesh	S	003424192	South Gujarat University	
Vaidya	Swanand	S	003424381	Nagpur University	
Wang	Yingge		003453867	University Of Illinois-Urbana	3.85

Term: 200301 View Personal Information

Adhami	Muhammad	T	000504223	NED Univ of Eng'g & Tech	7.2

Fadel	Fouad	M	003458617	Henry Ford Community College	2.44
Garth	Alicia	L	003469261	Kettering University	
Ghelani	Ashwin	N	000460838	Schoolcraft College	3.208
Gundreddy	Sandeep	K	003471114	Jawaharlal Nehru Tech U	
Hingu	Bipin	J	003471298	Gujarat University	
Hobson	Latoya	F	000210624	Wayne State University	
Katragadda	Rakesh Babu	V	003467347	Bangalore University	
Khan	Ashfaq	A	000502283	Sir Syed Univ Of Eng & Tech	
Kitapini	N'ton		003484682	Truckee Meadows Community Coll	
Li	Dan Dan		000509496	Guangdong Univ Of Tech	3.16
Li	Kang		000480873	Huazhong Univ Of Sci & Tech	
Li	Xin		003473364	Fudan University	
Mason	Bryan	A	003453527	North Carolina Agric & Tech St	3.29
Mohammed	Shafiuddin	A	003477727	Jawaharlal Nehru Tech U	6.2
Nguyen	Binh	V	003465837	Grand Rapids Community College	
Punjala	Radhika		003446378	Wayne State University	2.33
Ramaswamy	Shreyaswini		003475584	Bangalore University	
Sahu	Ravindra		003476833	COL - India	

Term:200306 View Personal Information

Atallah	Wael	G	000379735	Wayne State University	3.25
Ding	Huiqin		000272496	Jiangsu University	0
Khatib	Rami	R	000461459	Henry Ford Community College	2
Mirza	Khurshed	A	000366816	Wayne State University	3.58
Muddu	Soumya		003476839	Nagpur University	
Nagaraja	Vandana		003503539	Univ Of Mysore	6.82
Yu	Jie		003442769	Zhejiang Univ Of Technology	

Term: 200309 View Personal Information

Abdallah	Said	M	000321794	Henry Ford Community College	3
Agarwal	Abhinav		003522391	Bhilai Inst of Tech	
Al Nazawi	Rida	Z	003590838	Lawrence Technological Univers	3.3
Allur	Nihar		003446470	University Of Texas At Arlingt	
Berhe	Temesgen	E	003463806	University Of Windsor	2.86
Byravasubramanian	Narayanan		003518208	University Of Madras	
Cherla	Sindhura	K	003496334	Jawaharlal Nehru Tech U	
Durairaj	Sumitha		003503553	University Of Madras	
Elzein	Imad	M	000469249	Wayne State University	4
Frankstein	Dmitry		000436962	Univ of Michigan-Dearborn	3.48
Gao	Yidong		000243407	Eastern Michigan University	
Garg	Sumit		003525651	Punjab Technical University	
He	Qi		000497038	Shanghai Jiaotong Univ	3.71

Jhajj	Jaskamal	K	000371027	Wayne State University	3.66
Kalash	Mohammad	I	000425513	Wayne State University	3.42
Khalid	Irfan		000485485	National U Of Science & Tech	2.99
Khatib	Rami	R	000461459	Henry Ford Community College	2
Kodimyala	Santosh		003532798	Default Grading Table	
Kolli	Chitti	B	003492998	Gitum College Of Engineering	
Kovoor	Tom		003497270	Univ Of Mysore	
Mack	Sylvia		000106169	Wayne State University	3.06
Manikkavasagam	Munusamy		003508820	Manonmaniam Sundaranar Univ	
Mehdi	Mohammed		003483214	Cleveland State University	1.65
Mohiuddin	Tariq	A	003537518	Osmania University	6.41
Muhialdin	Ali	M	000386001	Wayne State University	3.22
Nazmee	Tufail	M	003455054	Lawrence Technological Univers	2.85
Pamidimukkala	Manoj		003532998	Osmania University	6.41
Parthasarathy	Kaushik	S	003493667	Bharathidasan University	
Pingali	Gautham		003503545	University Of Madras	7.45
Qaisar	Muhammad	A	003453338	Govt College - Lahore	
Ramteke	Praveen Kumar	R	003502710	Visveswaraiah Tech Univ	6.24
Russell	Douglas	A	003482051	Macomb Community College	1.67
Safaeian	Sara		000396256	Schoolcraft College	3.9
Sagiraju	Krishna	C	003492945	Jawaharlal Nehru Tech U	
Sandhu	Jasdeep	S	003482322	Guru Nanak Dev Univ	
Shah	Chirayu	S	003535639	Sardar Patel University	2.59
Singh	Shivinder		003494947	Punjab Technical University	
Sran	Roopinder	S	003462256	Thapar Inst/engg&tech	
Vatsa	Sumeet		003507577	Madras Inst Of Tech	
Wang	Chao		003539140	Beijing Inst Of Tech	3.35
Wang	Yamin		003490077	Zhejiang University	3.13
Yaldo	Sinan	G	000302624	Wayne State University	3.22
Yasin	Walid		003553026	Ryerson Polytech University	2.96

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Akkashian	Eric	W	000294359	Michigan State University	
Atallah	Wael	G	000379735	Wayne State University	3.25
Chanila	Mohan		003596792	Visveswaraiah Tech Univ	5.86
Eshaq	Nahel	J	000472459	Oakland Community College	3
Gunsch	Joseph	A	000187027	Macomb Community College	3.02
Hiler	Christopher		003563420	Washtenaw Community College	3.18
Ismail	Shawki	S	000320432	Wayne State University	3.28
Jbeily	Mario	R	000489739	Oakland Community College	3.12
Johnson	Todd	R	003619341	Princeton University	
Khatri	Shagun	B	003480957	St Petersburg State University	2.28
Li	Xiaoqun		000458685	Southeast University	3.63
Mohammed	Hameed Uddin		003610196	Osmania University	6.75

Murao	Siddhartha		003598943	Bharathiar University	6.93
Nazimuddin	Riaz	M	000481917	Wayne State University	3.69
Rathi	Rajesh	K	003592980	University Of Pune	5.97
Shah	Sharlik	M	003601365	Gujarat University	2.47
Sharma	Amardeep		003606764	Punjab Technical University	6.89
Stachurski	Adam	R	000350592	Wayne State University	3.19
Syed	Feroz		003559023	Osmania University	7.7
Sypitkowski	Gregory	J	003458710	Kettering University	
Tiwari	Abha		000350673	Wayne State University	3.59
Yu	Rui		003497389	Southeast University	3.12

200406

Ali	Syed	G	003631120	Cuny-City College Of New York	3.155
Asfaw	Samson	Y	003455456	Lawrence Technological Univers	
Dearie	Katherine	M	000365526	Wayne State University	3.3
Habib	Rafeek	R	000437740	Macomb Community College	2.2
Hua	Lei		003536970	Shanghai Univeristy Of Tech	2.89
Ibrahim	Ali	M	000462595	Lebanese University	3.73
Irshad	Walid		003642991	University Of Windsor	2.755
Jackson	Jason	J	003639098	Univ of Michigan-Ann Arbor	2.933
Khalid	Waqas		000483545	Wayne State University	3.46
Naim	Elie	P	000429436	Wayne State University	3.24
Robbins	Andre	M	000242843	Wayne County Community College	3.33
Rossi	Celestino	D	003648035	Univ Of Waterloo	78.11

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Al-Baadani	Almamoon		000391683	Saginaw Valley State Universit	3.194
Bharadwaj	Abhijith	S	003641919	Visveswaraiah Tech Univ	61.32
Biswas	Ritwik		003674534	Bangalore University	61.88
Boinpally	Abishek		003660779	University Of Madras	66.22
Brackett	Thomas	P	000093512	Wayne State University	3.34
Chatterjee	Debchitra		003628913	Bangalore University	6.0716
Desai	Arpitkumar	A	003624286	George Brown College	
Deschere	Andrew	M	003439903	Massachusetts Institute Of Tec	3.4
Dubey	Raveesh		003631205	Barkatullah Univ	59.1
Ghulghule	Milind	A	003647958	University Of Mumbai	58.47
Grewal	Manpreet	S	000455867	Sheridan College	3.54
Griwicki	Eric	L	000403749	Wayne State University	3.64
Humberi	Gourish		003641893	Visveswaraiah Tech Univ	68.83
Ibrahim	Ali	M	000462595	Lebanese University	3.73

Kaur	Mandeep		003621053	Punjab Technical University	72.8
Klepadlo	Jeffrey	C	000441427	Wayne State University	3.88
Koya	Lakshmi Deepthi		003663708	Visveswaraiah Tech Univ	62.26
Kussandra	Pratap		003677149	Visveswaraiah Tech Univ	71.5
Mayekar	Siddharth	P	003647870	University Of Mumbai	56.68
Naredlla	Dheeraj	R	003626488	Osmania University	64.15
Nautiyal	Kshitiz		003646242	University Of Madras	79.22
Nuthakki	Sumna		003631156	Osmania University	75.08
Panneerselvam	Venkatesh		003646419	University Of Madras	69.14
Patel	Nayan	D	003545103	Gujarat University	58.6
Peyyeti	Pratima		003663705	University Of Delhi	
Pitchandi	Vahini		003628827	Anna University	2.32
Polineni	Divya		003638666	Jawaharlal Nehru Tech U	64.64
Raghavendra	Lv		003633598	Jawaharlal Nehru Tech U	57.49
Rahman	Mohammad	F	003606373	Western Michigan University	2.75
Ravisankar	Lakshmi		003634514	University Of Madras	65.44
Saba	Elden	J	000368123	Macomb Community College	3.13
Sameer Abbas	Syed Muhmmad		003628803	NED Univ of Eng'g & Tech	64.8
Sekhon	Mandip	K	003633551	Guru Nanek Dev Eng College	60.13
Shah	Shreya	S	000422238	Wayne State University	3.5
Shashidhara	Sithanshu	K	003661142	Bangalore University	75.81
Siddiqui	Kamran		000347576	NED Univ of Eng'g & Tech	80.32
Sonje	Vinay		003641888	Visveswaraiah Tech Univ	62.84
Sreedhar	Vivek		003648241	University Of Madras	74.55
Subramanian	Hariram		003501395	Bharathidasan University	7.73
Sundararajan	Saiprasad		003625670	Annamalai University	3.67
Trivedi	Vishal	B	003638021	Sardar Patel University	3.07
Vijay	Vidhu		003651112	University Of Calicut	67.66

APPENDIX D
Recruitment Material Packets

ELECTRICAL &
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ELECTRICAL AND COMPUTER ENGINEERING

The Department of Electrical and Computer Engineering is the largest department in the WSU College of Engineering. We currently have 20 full-time regular faculty positions with an average undergraduate enrollment of approximately 400 students and a graduate enrollment of roughly 415 master's and 60 Ph.D. students. Because more than half of our students attend school part-time while working, key courses are offered in the evening as well as during the day. Our average class size is approximately 24 students for undergraduate courses and 16 students for graduate courses. Full-time faculty members teach introductory as well as the most advanced graduate courses.

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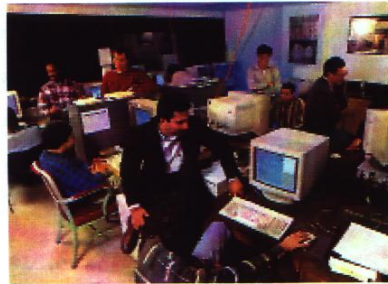COMPUTER
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ENGINEERING

Career Opportunities

Basic physical and mathematical principles are utilized to develop new devices, technologies and techniques of constantly broadening application in the field of electrical and computer engineering. Examples are the development of smaller, less expensive and more powerful computers, parallel processing systems, and microprocessors. There is a growing use of sophisticated data and satellite communication networks in modern telecommunications. Lasers, sophisticated control techniques, remote sensors and transducers are employed for advanced automation and electric power systems. The application of electronics to health care and diagnostics, such as noninvasive measurements and ultrasound imaging, and energy conversion devices such as solar cells, creates exciting career opportunities.

Being located close to the Big Three automobile manufacturers and their suppliers, as well as the major industrial base in southeastern Michigan, our graduates receive job offers with pay rates among the highest of all bachelor's degree students.

Electrical and Computer Engineering

Yang Zhao
Department Chair
(313) 577-3920

Faculty members of the department of Electrical and Computer Engineering conduct research on a wide range of topics including smart sensors and integrated technology, optical devices and systems, control systems, semiconductors, machine intelligence and neural networks, enabling technology, parallel and distributed systems in computing, nanotechnolgy, and biomedical electronics.

Degree Programs

- Bachelor of Science in Electrical Engineering
- Master of Science in Computer Engineering
- Master of Science in Electrical Engineering
- Doctor of Philosophy with a major in Electrical Engineering
- Doctor of Philosophy with a major in Computer Engineering

Faculty and their research areas

Greg W. Auner, Ph.D.
Wayne State
Smart sensors, biomedical electronics

Robert Erlandson, Ph.D.
Case Western
Enabling technology, mechatronics

Mohamad H. Hassoun, Ph.D.
Wayne State
Artificial neural systems, soft computing, pattern recognition

Feng Lin, Ph.D.
Toronto
Discrete event systems, manufacturing systems, control systems

Donald J. Silversmith, Ph.D.
MIT
Solid state devices, microstructures fabrication

Harpreet Singh, Ph.D.
Roorkee (India)
Computers, control, systems

Pepe Siy, Ph.D.
Akron
Pattern recognition, VLSI design, smart sensors

Le Yi Wang, Ph.D.
McGill
Robust control, information processing & identification, adaptive control, biomedical systems, automotive control

Hao Ying, Ph.D.
Alabama
Fuzzy control and systems, image processing, neural networks, expert systems, ultrasound, clinical/biomedical applications

Yang Zhao, Ph.D.
Penn State
Photonic devices, optical communications, nanoscale optics

Associate Professors

Syed M. Mahmud, Ph.D.
Washington (Seattle)
Computer architecture, parallel processing, digital system, microprocessor-based instrumentation

James Woodyard, Ph.D.
Delaware
Solid-state electronics

Cheng-Zhong Xu, Ph.D.
Hong Kong
Parallel and distributed systems, high performance computing

Assistant Professors

Ivan Avrutsky, Ph.D.
Rassian Academy of Sciences
Optoelectronics, theory and technology of fiber-and integrated optics, semiconductor lasers

Q. John Cheng, Ph.D.
Illinois (Urbana-Champaign)
Multimedia signal processing, digital communications, Information/computer security

Jaewu Choi, Ph.D.
Nebraska
Molecular Electronics, Sensors, Nanotechnology

Xiaoyan Han, Ph.D.
Wayne State
Infrared imaging and nondestructive evaluations

Nabil Sarhan, Ph.D.
Penn State
Multimedia computer systems, Computer engineering

Yong Xu, Ph.D.
Caltech
MEMS, biomedical electronics, Smart skins using MEMS nanotechnology

WAYNE STATE UNIVERSITY
COLLEGE OF ENGINEERING

Electrical and Computer Engineering Department
5050 Anthony Wayne Drive • Detroit, MI 48202
(313) 577-3920 — Phone • (313) 577-1101 — Fax
http://www.ece.eng.wayne.edu