

Technology for Deafblind People

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Introduction:

As per the UN Standard Rules on Equalization of Opportunities for Persons with Disabilities (Dec 1993), the States should:

- Support for the use of new technologies and the development and production of assistive devices, tools and equipment and measures to facilitate access to such devices and equipment for persons with disabilities to enable them to gain and maintain employment;
- Ensure that new computerized information and service systems offered to the general public are either made initially accessible or are adapted to be made accessible to persons with disabilities.
- Develop strategies to make information services and documentation accessible for different groups of persons with disabilities. Braille, tape services, large print and other appropriate technologies should be used to provide access to written information and documentation for persons with visual impairments. Similarly, appropriate technologies should be used to provide access to spoken information for persons with auditory impairments or comprehension difficulties.
- Recognize that all persons with disabilities who need assistive devices should have access to them as appropriate, including financial accessibility. This may mean that assistive devices and equipment should be provided free of charge or at such a low price that persons with disabilities or their families can afford to buy them.

About Deafblindness:

Deafblindness is a combination of visual and hearing impairments, which comes in varying degrees. Because 95 per cent of all we learn comes through our eyes and ears, deafblindness causes unique problems in communication, mobility and accessing information. It may seem that deafblindness refers to a total inability to see or hear. However, in reality deafblindness is a condition in which there is a combination of visual and hearing impairments which causes ***"such severe communication and other developmental and learning needs that the person cannot be appropriately educated in special education programs solely for children and youth with hearing impairments, visual impairments or severe disabilities, without supplementary assistance to address their educational needs due to these dual, concurrent disabilities"***.

The Challenge:

From the beginning of human race, communication is the basis of interaction and the barriers to communication faced by deafblind individuals, deny them of many independent interactions with the world. Deafblind people are seriously disadvantaged in terms of accessing information and their needs are very different as compared to people with single disability such as blindness or deafness. Deafblind people can neither communicate by 'talking' as visually impaired nor 'receiving' information as hearing impaired.

Due to the lack of communication, the problems deafblind individuals face- include feeling of isolation, lack of independence, difficulty in obtaining education, and inadequate employment opportunities. The underlying foundation of these problems is a barrier to communication. In the past, overcoming these obstacles has been difficult, if not impossible but today, combining recently developed technologies to facilitate communication will allow deafblind individuals to bridge the communication gap. If the need for interpreters could be eliminated or reduced, the independence of deafblind individuals would be greatly improved.

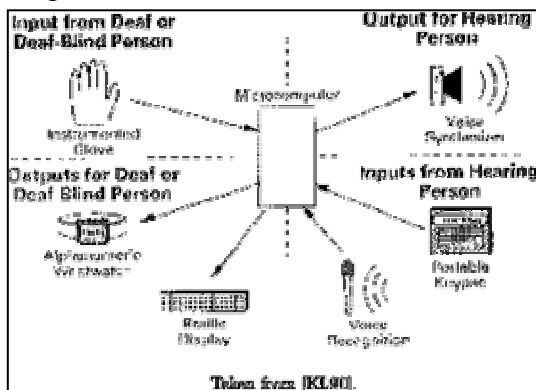
Multidimensional Tactile Display- the tadoma is a means of speech reception based on tactile monitoring of the articulatory process. A "synthetic" Tadoma system. involving an artificial face with six facial actions.

Block Letter Communicator- This portable device is designed for people who are not able to read braille. The characters that you can feel on the device are a type of blockletter (one character at a time). However this device works only one way, so the deafblind person must be able to answer by speech.

Brailtalk- is a slim pocket-sized hinged plastic case which opens to display the braille alphabet embossed beneath the corresponding raised print letters. Intended to be used as a communication card, the sighted person "talks" by moving the deafblind person's fingers over the letters. This device is also suitable for teaching the beginning of Braille.

Talking Glove

James Kramer and his supervisor, Larry Leifer, have been working on a method for communication between Deaf, Deaf-Blind and Non-vocal individuals. It is a complete system, which attempts to integrate a number of technologies together, in such a way that all parties can communicate.



Of interest and relevance to us is the glove Kramer developed (the CyberGlove) and the technology used for recognising American finger-spelling.

At the moment, the system has acceptable finger-spelling performance, and James Kramer has set up a company, called Virtual Technologies, to market the system. In

September 1995 VirTex released a commercial finger-spelling recognition package called GesturePlus.

The Tele-Braille



TeleBraille III enables a deafblind person and a person using a TDD (Telecommunications Device for the Deaf) to communicate by telephone. This important aid can also be used for face-to-face communications between a deafblind person and a sighted person. TeleBraille III is used in 2-way communications, it combines a modified Ultratec Supercom TDD with a modified 20-cell, 6-dot braille display. Typed information is translated and displayed via refreshable braille cells. The Supercom TDD unit allows telephone communication. Packaged with custom firmware and an added braille keyboard, these units function together as TeleBraille III.

For telephone conversations, TeleBraille III functions as a one-piece device by placing the telephone handset on the acoustic coupler or connecting directly to the telephone line. The braille display is then used for reading and either the braille or standard keyboard can be used for writing.



By separating the two units, face-to-face conversation is easy. The sighted partner uses the Supercom TDD device by typing on a typewriter keyboard and seeing the messages on a visual display. The deafblind partner keys in messages on the braille keyboard and reads messages on the braille display. Advanced "Tactile Phone Line Signal" vibrates the 20th braille cell to indicate ringing, busy, or speech signal on the line. Automatic TDD answering machine records incoming messages memory for 10 messages up to 255 characters each. There is a Connection port for ink printer or braille embosser to print a hard copy of messages.

TTY- Minicom IV



This basic TTY is affordable and easy to use. It has an easy-touch keyboard with a bright, tilted 20-character display for hours of comfortable use. Minicom IV includes a printer port to connect an external printer. Turbo Code lets you enjoy "real-time" conversations with other Turbo Code TTYs. Auto ID lets everyone you call know you are using a TTY. Available options include an extended warranty, a dust cover and a soft

carrying case. For basic communication features in a reliable TTY, Minicom IV is right for you.

TTY- Superprint Pro80



Maximize your conversations with the deluxe Superprint Pro80. This state-of-the-art TTY has a built-in, 80-column printer that uses standard-sized (8½" wide) thermal paper. You'll enjoy typing comfortably on the Superprint Pro80's full-size computer style keyboard. Convenient "one touch" function keys simplify everything from dialing your relay service to calling for help in an emergency. And, for the first time ever in a TTY, Caller ID* capability is included. This top-of-the-line TTY includes all the advanced features such as Auto-Answer to take messages for you, a full dialing directory to make calling fast and easy, and 32k memory to store conversations, memos, and Caller ID information. Plus, Turbo Code is included for more natural conversations with interrupt capability.

TTY- Compact/C



The pocket-sized Compact/C TTY gives you telephone accessibility everywhere you go. It is a **full-featured TTY** that is designed to fit in your purse, pocket, or briefcase. The 80-character, 2-line display allows you to read the conversation with ease. The rechargeable batteries last 7-10 hours. The Compact/C can be used acoustically with any standard telephone handset, or directly connected to today's digital cell phone for wireless calls on the go!

TTY- Uniphone Series

The Uniphone is an exciting new concept in TTYs, combining a telephone, TTY and amplified phone - all in one! Now, people who are deaf, hard of hearing, or hearing can all share one phone. A full-featured TTY, the Uniphone includes a bright display and a comfortable keyboard and an amplified handset. It is perfect for making Voice Carry Over (VCO) calls. With VCO, you speak directly to the other person and read their typed responses on the display. VCO calls can be made through a toll-free relay



service, or directly between Uniphone users for absolute privacy. In a similar way, people who can hear but cannot speak can make Hearing Carry Over (HCO) calls. The Uniphone 1000, a basic unit without memory or Auto-Answer, is also available.

Braille Lite- is an excellent little device. It is so portable that it can be taken anywhere; it is one of the smallest, most lightweight refreshable Braille products available today. Its simplicity and versatility make it popular with users of all ages, including people who are deafblind. It has a 18-40 cell refreshable braille display and it also has a standard Braille keyboard and simple command structure, a fully adjustable speech synthesizer, but a Deafblind person wouldn't require the synthesizer



Braille Lite sets the standard for efficient portable note-taking for visually impaired people. The user interface comprises:

- Braille keyboard for input
- Braille display AND speech for output

Light weight, instant-on capability and long battery life mean that it is the perfect device for people on the move. It delivers a range of features which gives you the ability to:

- Create documents
- Manage diary and address book
- Use Windisk software to transfer files to and from PC
- Make use of unlimited Compact Flash storage
- Send documents to printer or Braille embosser

Braille n Speak and Type n Speak



Braille n Speak is probably the best known note-taker for visually impaired people in the world. The user interface comprises:

- Braille keyboard for input and
- Speech for output

Light weight, instant-on capability and long battery life mean that it is the perfect device for people on the move. It delivers a range of features which gives the user the ability to:

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- Manage diary and address book
- Use Windisk software to transfer files to and from PC
- Send documents to printer or Braille embosser



CapTel



Ideal for people with some degree of hearing loss, the Captioned Telephone (CapTel™) works like any other telephone with one important addition: It displays every word the caller says throughout the conversation. CapTel users can listen to the caller, and can also read the written captions in the CapTel's bright display window.

Telephone Ring Signalers



Make sure you are alerted to *every* telephone call. These signalers plug directly into the telephone line then alert you when you receive a call. Choose from two styles: **wall-mount** or **desktop**.

Both models can flash a plugged-in lamp to alert you or signal [Remote Receivers](#) to alert you in other rooms. As an alternative, the wall-mount models can be used with the [Add-On Strobe](#). This makes the wall-mount models ideal for areas where a lamp is impractical such as in small areas like hallways and dorm rooms.

Doorbell Signalers



When opportunity knocks, make sure you are alerted with a **Simplicity Doorbell Signaler**. The signaler can flash a plugged-in lamp, flash an attached [Add-On Strobe](#) or transmit the signal to a Remote Receiver. Choose between a traditional wired unit or the convenient wireless model.

For people who do not need an audible doorbell, both models include everything needed whether there is an existing doorbell or not. For people who wish to extend their existing doorbell chime to work with the signaler, the **Model LTW** includes a transmitter that works with the existing doorbell chime.



Liquid Level Indicator, Designed to enable visually impaired people to tell when they have poured sufficient liquid into a cup, glass or other container, the device detects two different levels of liquid: an intermittent tone and vibration indicates that the cup is nearly full, while a continuous tone and vibration indicates it is full.

Vibratory Light Probe- Designed by the RNIB, the light probe has the ability to detect the presence of light directly from a light source. It is particularly useful for deafblind people as the user receives feedback by means of a vibratory signal which changes frequency according to the change in light intensity.

Audible Room Thermometer- This unit can be wall-mounted and measures temperatures between -5° and $+35^{\circ}$ C (23° and 95° F). It operates by moving a pointer to a position where a tone is heard and vibrations can also be felt.



Sarabec Vibrating Alarm- This alarm, especially suitable for use by a deafblind person, will vibrate when the alarm rings and is supplied with a quartz alarm clock and a 9 volt PP3 battery.

Sentinel Vibrating Alarm- This alarm with a vibrator and a mains adaptor is designed specifically for deafblind people and vibrates when an alarm,

door bell or telephone rings.

Tactiwatch- This hand-held watch is specifically designed for deafblind people. To tell the time, the watch emits pulses of varying duration which vibrate the unit, short pulses for hours, long pulses for tens of minutes and short pulses for minutes. Once set, the time is read by pressing the recessed switch on the top of the unit.



Braille Tele-Caption System, used with a Telebrailler or other Braille telephone device, provides news, weather, sports and educational television programming to deaf-blind individuals nationwide on ABC, CBS and NBC. The system translates data into Grade 1 Braille. Deaf-blind persons who have a Telebrailler or other braille telephone device may use them to read the Braille characters. The telebrailler receives the information like a telephone call and prints it out on its 20-character Braille display.

Closed Caption\Braille Computer System (CCBCS) Mr. Nelson Dew has developed a television closed caption to braille computer system which allows a deaf-blind person to read, in braille, televised closed captioning programs. The data input-output and translation are under computer software control. The Hardware consists of a video tape recorder, an IBM compatible computer, and a special closed caption to braille computer card.

CUPID is an information management system developed by Cloudworld Ltd. of London UK. In 1996 Cloudworld for print-disabled people, with a patented tactile output device.

Dexter, Provides face-to-face communication, and telephone and computer access for deafblind people with tactile-finger spelling skills. Dexter is a robotic hand which can form the letters of the one-hand manual alphabet of the deaf. It forms the hand

configurations in response to letters typed on an interfaced computer keyboard. It can also display information on an interfaced computer screen, letter by letter. Deafblind persons "read" Dexter by feeling its hand positions.

Finger Braille Supporting Device. 'Yubi-Tenji' or finger braille system involves touching the opposite persons fingers (3 on left and 3 on right hand) to express the characters of the braille system. This allows fast and reliable communication but is limited to conversations between 2 people. The Finger Braille Supporting Device has been developed to allow several persons to take part in a conversation simultaneously.

Flat Magnetic Stainless Steel Speakers, A supplementary device to aid morse code reception on the radio frequency for deafblind persons. The FO of this device (lowest resonance frequency) is about 800 cycles. It gives maximum power on this frequency. These magnetic speakers can be substituted for an existing 'dynamic' audio speaker to provide a lower frequency which is more appropriate for morse code. The stainless steel plate on these speakers also give a harder vibrating tone for morse code

FM Systems with Children who are Deafblind, The focus of this four-year research to practice project is the contribution of FM systems to the development of communication skills in infants, toddlers, children, and youth who are deaf-blind. Classrooms and other public areas such as auditoriums, theaters, and restaurants provide a poor acoustical environment for individuals who have a hearing loss, and it is often difficult for them to discriminate between the speaker and background noise with a hearing aid.

HASICOM, (Hearing and Sight Impaired Communications), A device called the handtapper, which enables a deafblind person to read computer-based information using an electronic reproduction of the information in the form of the British Deafblind Manual Alphabet, has been developed for use with a standard PC, and software to make it applicable to a range of information access functions, such as telecommunications and obtaining information from teletext, is well under development it will also ultimately support other European versions of the deafblind manual alphabet.

InfoTouch, InfoTouch is a communication system for deafblind braille readers. It is called InfoTouch, because each of its three basic components has been modified to work easily and effectively in an exclusively tactual environment. Messages are typed in your choice of six-key braille or on a conventional QWERTY keyboard and displayed in five seconds or less on the Romeo braille printer. These same typed messages may either be seen on a 20 character LED display, or transmitted by telephone through the Superprint TDD, which is a standard part of the InfoTouch system. Presence of an incoming call is signaled by a vibrating data detector, developed specially for the InfoTouch. InfoTouchs three separate pieces connect together in seconds without special tools or technicians.

The Romeo braille printer will automatically emboss data received from the TDD, with no need to wait until a full line is received. The Romeos view key lets you move the paper and read the latest line without paper jams or wasted space. With the direct connect feature, the user can program a message into the TDD and leave the unit on. When

unattended, the machine will answer incoming calls with the message and allow the caller to leave a braille message.

Lite Touch Telephone Communicator, A smart new system designed especially for deaf-blind users. A collaboration between Blazie Engineering and Enabling Technologies has just produced the Lite Touch portable telephone communicator. It's an exciting new system designed especially for people who are deaf-blind. Lite Touch consists of three small products: the Braille Lite personal data assistant, the UltraTec SuperPrint E modified TTY, and a tiny signal detector.

Laser Cane N-8 The N-8 is a laser cane mobility aid designed to assist blind or deafblind individuals. Two invisible light beams are emitted from the cane. The high light is for head-height protection; the second is directed forward for straight ahead information. When the light beam strikes an object within range it is reflected back to a receiving unit built into the cane. A vibrating unit signals the user's index finger and a high or low pitched sound is given off.

Wheelchair Pathfinder Navigating device for wheelchairs and scooters, consisting of a set of small rectangular boxes which mount to the front of the mobility device. Lasers point downward while ultrasonic beams are transmitted in front and to the side of the wheelchair. When the beam contacts an object, it bounces back to a receiver, causing both a tactile signal and an audible warning signal.

Polaron Lightweight, compact mobility aid for deafblind and blind people. The unit utilizes ultrasonic technology to detect objects within four, eight or sixteen feet. When an obstacle is within range, the Polaron either vibrates or emits a sound. User selects either of these with a small switch on the device.

RALPH, A fourth generation computer-controlled electromechanical fingerspelling hand called Ralph (for Robotic Alphabet) has been developed at the Rehab center. The device offers deaf-blind individuals improved access to computers and communication devices in addition to person-to-person conversations.

SuperBraille 2000 Laptop from Evas. A 586 laptop computer, refreshable Braille display and (optional) speech synthesis, can be connected to another computer which can run or share its Braille display. And has a Braille keyboard emulator. The full system contains a 40-cell Braille display, multimedia and speech options. the SuperBraille may be a good laptop for use with a Deafblind person because of it's portability it may help Deafblind people to communicate to non Deafblind Manual alphabet users when out and about.

Screen Braille Communicator, This device makes it possible for deafblind people to communicate with people who can see. The communication works in both directions. The person who can see types a short text in, the deafblind person can read this text in braille (with 1 braille cell or 8 braille cells) and can answer via the braille keys. This answer will be shown on a LCD display. In this way you can communicate with strange people (for

instant in a shop) without any physical contact. The Screen Braille Communicator is very easy to use and very simple to handle. Also people who are not used to computers can use this device. The device is small and light and uses a re-chargeable battery, so it can be carried easily where ever you go. In Holland the screen braille communicator is in use since last four years by several people and they are very satisfied about it.

Tellatouch, This device is portable and weighs less than four pounds. It consists of a small typewriter keyboard which the interpreter uses to pass on information. The deafblind person sits opposite the typist and places a finger on a small Braille "screen". Each letter that is typed appears briefly under the finger of the deafblind person. The letter can be felt as long as the typist holds down the key. Only one letter can be felt at a time. Fifty words per minute is probably the maximum speed of the device.

Speaking Hand is based on a dataglove and allows a deafblind person to send the British (2 handed) manual alphabet to a computer. In the future it is hoped the computer can send back to the user by inflating small balloons in the glove to produce pressure on the fingertips like that from another person. It was invented by Robert Kleine. It has been shown on the [BBC's](#) television programmes "[Tomorrow's World](#)" and "[See Hear!](#)" and exhibited at the [London Science Museum](#).

“Project Telephoning” with Deafblind people over the PC (Ulrich Greve)

Up to now, the spontaneous communication for deafblind people - which is very restricted anyway - was, over distant locations, only possible with a writing telephone with a Braille pad. The communication partner of deafblind had to own at least a writing telephone for that.

For deafblind, the traditional communication facilities on computer are very unsatisfying. For example, you have to be permanently online for Internet Chat or arrange a fixed time before the communication. Terminal program are also not prepared for the needs of deafblind (e.g. no ring detection for deafblind, no suitable separation between sender and receiver messages). Since computer and modems spread more and more widely, it is obvious to search a better solution for the communication between the deafblind and hearing/seeing people.

With the aid of “Project Telephoning”, a deafblind can telephone a hearing/seeing person with the computer and specially developed software and modem. Equipped with a vibration signaling unit for deafblind with the PC speaker, a call is signaled - in the Windows environment e.g. also during working with a word processor.

The simplicity of the user interface (DOS/Windows) makes it possible that the programs can also be operated with a Braille pad. Now deafblind can multiply their very restricted communication facilities enormously, e.g. by equipping relatives, friends or authorities, having a PC & a modem, with the software, or connect the software with a laptop through PCMCIA modem and a wireless telephone.

In Conclusion- Imagine this scenario.....

The deafblind user is working in an office with a computer. A co-worker enters the room, triggering a device that sends a signal to the user, announcing the co-worker's presence. The user's choice of responses includes: acknowledging the co-worker, ignoring the co-worker, or indicating that the co-worker should come back at a more convenient time.

Once acknowledged, the co-worker lifts the handset, says, "Hello," and several processes begin simultaneously. In the background, without interrupting currently open applications, the computer chooses the appropriate voice file for the co-worker. Additionally, a second signal indicates that the co-worker wishes to speak to the user. For Deafblind person, the current IT can combine several available technologies into a system which reduces the need for an interpreter, thus allowing greater independence and interaction with the world. The IT can allow deafblind individuals to achieve this freedom.

With your support deafblind people can multiply their very restricted communication facilities enormously, by equipping relatives, friends or authorities with PCs.

Now the Ball is in the court of IT professionals and Government to develop/ adapt programmes, which can be made available to deafblind people in India at an affordable cost.

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