# New Technologies for the Blind - A Summary

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Unlike most other disabilities, the problems caused by blindness have been seen as ones which can be solved with the use of technology. As yet, most blind people in the world have seen little benefit from the technological advances in the last twenty years.

In the 1960s there was great optimism that there would soon be an electronic mobility aid which most blind persons could use for independent pedestrian travel. One of the earliest environmental sensors was the Kay ultrasonic spectacles which represent the environment binaurally using complex sound patterns. Although a number of other devices have been developed along similar lines, the number in use is very small. This appears to result from the devices being designed without sufficient understanding of the information required by an independent blind pedestrian, and the optimal method of displaying this information in a non-visual form. Unfortunately there is little current research on this important aspect of blind mobility.

One spin-off of the development of environmental sensors, has been the further development of simple electronic obstacle detectors. These devices just indicate the presence of an object within a preset distance. A further development has been devices which are in between the environmental sensors and the obstacle detectors; these devices usually have a display which gives an indication of the distance from the nearest object in a simplified form (eg five musical notes indicating five preset ranges).

The development of devices to permit someone without sight to *read* has always attracted considerable public interest and financial support. Despite the large allocation of resources on research and development, relatively few reading devices are generally available at a reasonable price.

An early device was the Optophone which represented printed characters by patterns of musical notes, but few blind people managed to master the operation of this device. The next major advance was the Optacon which represents printed characters on a small vibrotactile display. This device was commercially successful and has recently been supseded by a new model using current technology. The advantage of leaving the recognition task to the human is that the device is not limited to a particular character set.

The other approach is for the device to recognise the characters and display the information in a non-visual form such as braille or synthetic speech. These OCR (Optical Character Recognition) devices are improving in accuracy, speed and range of typefaces they can recognise. The

best known systems are those from Kurzweil Computer Products, but there are now numerous less expensive systems on the market. These less expensive systems have not proved popular with blind users since most of the devices are significantly limited in range of typefaces and accuracy. However it is anticipated that the advent of algorithms based on artificial intelligence research should improve their performance within the next few years.

In recent years, numerous devices have been developed for storing braille digitally, usually on either floppy disc or digital cassette tape, and outputting to a transitory braille display. These systems, often referred to as *paperless braille*, have been mainly used by blind persons in employment where the device is sometimes connected as a terminal to a computer system. However, despite numerous predictions to the contrary, paperless braille systems have not replaced braille embossed on paper.

The decreasing cost of personal computers has encouraged the use of speech synthesizers; the most common application being word processing. Although speech synthesizers are available for a number of languages, there is still no system which is easy to modify to produce other languages. A significant problem is that the phonemes are often different; for instance, the basic sounds in the Korean language cannot be made by a synthesizer designed to produce sounds in American-English. This is an area of research deserving urgent attention if the blind in the less affluent nations are not to be left further behind in the utilisation of technological devices.

Although many manufacturers of high technology devices for the blind are producing *new* products, many of them are just new *models* (as in automobiles) incorporating features *borrowed* from other manufacturers. However, at long last, there is a trend towards making the devices easier to use by a blind person of average ability. The problem of training users of devices is frequently left to non-profit agencies, although a few manufacturers are trying to improve their support services for training and maintenance.

Developments in the sighted world are moving much faster than those for the blind. For instance, with computer systems the increasing use of WIMPs (Windows, Icons, Menus and Pointers) creates significant problems for blind users.

However it is in the field of network terminals for use by the general public that the greatest impact will be felt. For example, the increasing use of multi-destination ticket selling machines and door entry control systems will make life difficult for a blind person. However there are possibilities for using inexpensive technology to alleviate some of these problems. One proposal, called REACT, is for a blind person to carry a transponder about the size of a credit card which could be used to indicate the presence of a visually disabled person near:

- light-controlled pedestrian crossings where it could activate the audio signal and increase the time allowed for crossing the road.
- entry control points where it could activate an audio signal for locating the keypad.

- public telephones where it could activate a location signal.
- road works on pavements where it could activate an audible signal warning of the hazard.
- on public transport where it could activate audio announcements concerning the next stop.

It is this type of relatively inexpensive technology which appears likely to be of greatest benefit to the majority of the active visually disabled population in developed countries.

Another area for future development is the utilisation of new technology designed for general use but having a potentially different use for the visually disabled population. A good example of this is the Swedish project using facsimile machines for a remote reading service for visually handicapped people including those with a multiple handicap. In this system, a blind person has a send-only facsimile machine which is used to transmit documents to a central office where it is read back to the blind person over the telephone. Although this is a very simple application of modern technology, it demonstrates how new technology can help elderly blind persons.

Another interesting development, again from Sweden, is the RATS project where newspaper text is transmitted digitally by radio, and the blind person can access the data in braille or synthetic speech. Although this pilot scheme is expensive, it does indicate a possible direction for a new method of service delivery.

In the field of audio reproduction, the advent of CD discs (and the longer playing-time CDI discs) and digital tape promises a tremendous range of facilities which have been requested by blind people for a long time. However just because something is technologically possible does not mean that it will become a useful device for the blind at an acceptable price.

The devices using *new technology* attract considerable interest but numerically low sales; the majority of blind people throughout the world are unlikely to have access to these devices. To this majority, the development of new, well designed, simple, inexpensive devices is of paramount importance. There is also a need for more international collaboration such that limited resources are not wasted in unnecessary duplication and that the same device can be manufactured in various countries using appropriate local materials. An area of concern is educational devices suitable for use in special schools for the blind and partially sighted; the problem is that, in many countries in which such devices are produced, they have adopted the integrated approach to education which requires very different design of devices.

The educational area, in particular, is being helped by the decreasing cost of systems for small scale production of braille and large print. This means that many schools can now produce appropriate teaching material instead of relying on braille textbooks provided by external sources.

Devices which help individuals make best use of their residual vision have had a dramatic increase in sales in recent years. Most of these are conventional optical devices which have had only minor improvements such as new materials for making the lenses. The sales of closed circuit television reading aids have also increased even though the basic designs have been available for more than a decade. The technology for producing large print has changed dramatically with the availability of high quality laser printers; this has significantly reduced the cost of producing large print in small quantities. For instance the use of this technology has permitted the fast inexpensive production of bank statements in large print; many elderly persons mention that their loss of privacy is their greatest deprivation caused by blindness.

In conclusion, recent technological advances have been a mixed blessing for the blind. If sufficient resources are allocated to this area, the net result could be beneficial; however, if little is done other than talk about the problems, blind people will find it harder to fully participate in the sighted world. Finally, it must be emphasised that **it is unwise to look for purely technological solutions to human problems.**