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PROCEEDINGS

of

2nd National Technology Conference for the Visually Handicapped

December 21 _ 22, 1998

Organised by

All India Confederation of the Blind

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in collaboration with

Norwegian Association of the Blind & Partially Sighted

Norway

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Mr. D. K. Manavalan, Secretary, Ministry of Social Justice & Empowerment,
Govt. of India, New Delhi inaugurating the Conference.

Mr. Pedro Zurita, Secretary General, World Blind Union delivering the Presidential Address.

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INTRODUCTION

It was in February 1997 that All India Confederation of the Blind had taken the initiative in focusing attention, in a concerted manner on the development of adaptive devices for the visually handicapped by organising the first ever national conference of representatives from the scientific community and the related leading blindness organisations. It was being widely realised, after the conclusion of this first endeavour, to provide another forum for a meaningful and stimulating exchange of views on the subject of technology-mobilisation for the visually handicapped.

It was also being widely recognised that with the new millennium just round the corner, some basic policy-decisions, prioritisation and implementation frame-work would need to be carefully considered and delineated for ensuring the best possible utilisation of appropriate technology for the benefit of the visually handicapped. For this purpose, too, a dialogue among all concerned players was considered essential, so that a practical action-plan could be evolved for at least the first decade of the new millennium.

And yet, it was felt that the second such discussion forum need not just be a re-run of the preceding conference, nor should it involve itself in mere cliches or platitudes. What was urgently needed was to try and secure in clear terms, the points of view of the actual uses of adaptive technologies with regard to the direction such technological endeavours should take in the coming years. In this context, the work done in the field of adaptive technology for the visually handicapped in the developed countries, could also be summarised to point the way for future work in this country, keeping in view important lessons to be learned in terms of our specific Indian condition. The roles of various international non-government agencies as well as our own Government Ministries/Departments could also form the focus of consideration to identify and highlight suitable sources of support.

Keeping all these factors in mind, the Confederation planned its second conference on technology for the visually handicapped for two days during December 1998. The Confederation broached the idea with its well-wishers in the Norwegian Association of the Blind and Partially Sighted (NABP). The response received was most heartwarming. The NABP promptly agreed with the Confederation about the need for convening a technology conference of this nature. Accordingly, they were good enough to consent to sponsor the conference

and provide the required funds for the purpose. The Confederation wishes to take this opportunity to place on record its deep sense of gratitude to the NABP for their invaluable support.

The stage was, thus, set for convening the conference, which was held at the India International Centre, New Delhi on Dec. 21-22, 1998.

OBJECTIVES

On the basis of the rationale for the second conference, as discussed earlier, the conference was designed to facilitate a frank and fruitful exchange of views among representatives of the users, the scientific community the leading researchers and manufacturers as well as eminent international agencies and Government of India Ministries/Department. The exchange was intended to act as a pace-setter for ensuring application of affordable and meaningful technologies for the visually handicapped in the years to come. In particular, the conference had the following major objectives :

a) To provide visually handicapped users of adaptive technologies in India an opportunity to present their specific requirements and expectations with reference to technology-development for them in future ;

b) to take stock of the present policy frame-work and research endeavours with regard to the utilisation of suitable technologies for the visually handicapped ;

c) to facilitate interaction between leading national and international agencies working in the field of technology-mobilisation for the visually handicapped; and

d) to lay down specific priorities and directions for further technological developments for the visually handicapped in future.

PARTICIPANTS

The conference brought together a cross-section of persons representing different sectors and interests relating to harnessing suitable technologies for the visually handicapped. It also had a galaxy of distinguished experts from different leading international organisations, such as *The World Blind Union, The Asian Blind Union, The Royal National Institute for the Blind, London, The National Library Service for the Blind & Physically Handicapped, Library of Congress, USA and Braille America.*

At the national level, representatives of about 25 leading scientific/ engineering institutes, manufacturing centres and blindness organisations from ten states participated in the conference. Besides, a select group of blind users representing a cross section of interests, also attended the conference. These included college students, special educators, university teachers, low vision persons and other professionals. Further, officers from different related Government Ministries such as those of Science And Technology, Human Resource Development, Social Justice & Empowerment and Home Affairs as well as the Department of Electronics also attended. A list of conference participants is attached herewith.

CONFERENCE SESSIONS

The theme of the two-day conference was "Adaptive Technology for the Visually Handicapped in the Next Millennium. The conference was inaugurated by Mr. D.K. Manavalan, Secretary, Union Ministry of Social Justice and Empowerment. In his Address, Mr. Manavalan outlined various initiatives being taken by the Government of India, to development and make available suitable technology for the visually handicapped. "The Ministry is convinced that the visually handicapped have a great potential and can perform better than their able-bodied counterparts in many spheres of activities", Mr. Manavalan asserted. He expressed the hope that the deliberations of the conference would give a new fillip to the ongoing Government programmes for the visually handicapped.

In his Presidential remarks, Mr. Pedro Zurita, Secretary-General, World Blind Union focussed on India's unique position as a country full of knowledge and skills and also as a country which is facing many problems in terms of the sheer number of visually handicapped persons requiring assistance. He felt that the participation of the visually handicapped in the design and planning process of technological devices is essential. The full text of Mr. Zurita's Address is placed as an annexure hereto.

The keynote Address of the conference was delivered by Dr. John Gill, Chief Scientist, Royal National Institute for the Blind, London. A copy of his Address is annexed hereto. Dr. Gill provided an over-view of the technological advances made for the visually handicapped in the last ten years in such diverse areas as orientation and mobility, computer-accessibility and audio digital recordings. In his view, if the blindness organisations passively accept the technology which is made available to them, the visually handicapped will be much worse off ten years hence and hence the need for their playing an active role in the field of special adaptations.

The conference had six business sessions. The first of these commenced during pre-lunch period from 11.30 a.m. onwards. It was titled "User Perspectives". Chaired by Mr. Kua Cheng Hock, President, Asian Blind Union, the session had four main speakers, who are themselves blind. These included: Dr. Anil Aneja, Sr. Lecturer (English), Delhi University; Mr. R.S. Chauhan, Lecturer, (Special Education), National Institute for the Visually Handicapped, Debra Dun; Miss Geetha Shamanna, Office Secretary, CBM SARO (S), Bangalore and Mr. Anil Sard, Manager, one of the nationalized banks, Punjab.

In his opening remarks, Mr. Cheng Hock emphasised the vital significance of securing user's perspectives to ensure a reality-based development of adaptive technology. Dr. Aneja suggested, among other items, the development of multi-lingual scanning, screen reading and embossing softwares to help visually handicapped college teachers overcome many information-access barriers in actual class-room situations. Miss Shamanna, in her presentation felt that the web-page designers must provide text labels to all graphics and also give 'Text Only' link on the websites. The screen reading developers should work in close contact with other software companies to ensure ease of accessibility for the visually handicapped. Making his presentation, Mr. Chauhan stressed the need for developing Braille equipment, such as Braille teaching machines, concept development boards and handy Braille writers. Mr. Sarad called for improved facilities and equipment for persons with low vision. Enclosed are copies of papers presented by Dr. Aneja, Miss Shamanna and Mr. Chauhan.

During the discussion which followed these presentations, there was a general consensus on the following points :

a) Suitable technologies are needed with regard to the application of scanners and multi-lingual softwares;

b) The problems faced by the visually handicapped on account of graphic user interface need to be attended to;

c) Simple kitchen appliances with minimum adaptations, as well as suitably modified geometry, science and geography equipment are required;

d) Adaptive technology must be low cost.

The conference adjourned for lunch at about 1 p.m.

The second titled "Technology in Aid of the Visually Handicapped" commenced at 2 p.m. under the Chairmanship of Mr. R. Saha, Director, Ministry

of Science And Technology, Government of India. Introducing the session, Mr. Saha stressed the critical need for ensuring access on easy terms, for the visually handicapped, to different types of print reading material. The main speaker at the session was Mrs. Ruth J. Foss, Head, Collection Development, National Library Service for the Blind and Physically Handicapped, the Library of Congress, U.S.A. In her paper titled "Access to Print Materials By Blind And Physically Handicapped Individuals." Mrs. Foss dealt comprehensively with the various attempts being made in USA to provide access to print for the visually handicapped. She presented a brief historical account of the development of such services and focussed on the method adopted by NLS for the selection of materials and considerations governing the choice of alternative formats. Her paper is annexed hereto.

During the discussion that followed, a number of points were raised concerning the availability of NLS reading material to visually handicapped persons in India as also the possibility of networking electronic and digital reading materials.

The third business session started at 3.45 p.m. entitled "Roles of International Agencies in Promoting Technologies For The Visually Handicapped in Developing Countries." The session was conducted in the form of a symposium and was chaired by Dr. S.K. Guha, Professor, Bio-medical Engineering, Indian Institute of Technology, New Delhi. In his presentation, Mr. Cheng, Hock drew attention to the fact that, as Asia has the maximum number of blind persons, the need to mobilise technologies for them assumes much greater urgency. He cited the attempts made by some organisations such as the Japanese Braille Library to promote technology in countries like Malaysia, Indonesia and Myamar as also the work relating to assembly of Perkins Braillers in India.

Mr. Pedro Zurita, speaking next was of the view that though WBU was 'poor **in resources', it was 'rich in ideas'. He felt that conferences such as the** present **one, promote a 'much cherished priority' of WBU, viz. 'technology for** all.' **He called for affordable and realistic technologies which must reach the end users.**

Mr. Vileen Shah, President, Braille America, who followed Mr. Zurita, spoke of the attempts made by his organisation to find donors who could subsidise the cost of hardware and software required by a few blindness organisations in India. Speaking after Mr. Shah, Dr. John Gill referred to the directory containing information on different technological devices for the blind and the visually impaired which is compiled and updated regularly by RNIB. This Directory is also available on Internet, Dr. Gill informed. The final speaker, Mrs. Ruth

Foss, talked of the inter-library loan arrangements which NLS has with various countries, so that its benefits could reach the maximum number of blind and visually impaired persons.

Thus concluded, at about 5.15 p.m., the first day's deliberations of the conference.

The first two business sessions (business sessions four and five) of the second day were held from 10 a.m. to about 1 p.m. These sessions dealt with "Adaptive Technology for the Visually Handicapped in India" and afforded Indian scientists an opportunity of explaining and demonstrating the technological products developed by them for the visually handicapped in such areas as mobility, computer software, vocational training, education and employment. The sessions were chaired by Mr. Subhash A Datrange, Executive Director, National Association for the Blind and Dr. V.P. Verma, Professor, Deptt. of Philosophy, Delhi University, Delhi respectively. A list of the scientists and the devices presented by each of them is given below :

S. No.	Scientist & Organisation	Device presented
1.	Dr. Bhushan Punani Exe. Director, Blind People's Association, Ahmedabad.	a) Sketching Pen b) Continuity & Soldering Tester c) Spot Welding Equipment
2.	Dr. Ashok Kumar Scientist **E-II** National Physical Labortatory.	Ultrasonic Mobility Device for the Visually Impaired
3.	Dr. Shailender Nigam Scientist C, Central Electronic Engineering Research Institute, New Delhi.	Text to Speech Software in Hindi
4.	Dr. **J.B.** Parikh Director, Minal Engineering Limited.	Braille Writer
5	Col. K. Radhakrishnan Director (Operations), Worth Trust.	Indian Perkins Brailler

6.	Dr. T. Sreeram Director, 1NTEMO Systems (P) Ltd.	Braille Teaching Equipment
7.	Dr. J.C. Bhardwaj Centre for Bio-Medical Engineering, 1.I.T., New Delhi.	Automechanism Devices
8.	Mr. K. A. Chandrashekhar President, Faith-India.	a) Ultrasonic Torch b) Infrared Obstacle Detector
9.	Mr. Youdhvir Dhama Territory Manager, Digicontrols Northern Pvt. Limited.	STD/ PCO with Voice Output
10.	Mr. Milan Das Senior Research Officer (T), National Institute for Visually Handicapped.	Scrabble Board for Education & Recreational Purposes
11.	Mr. Vileen Shah President, Braille America,U.S.A.	Usha Braille Translation Software
12.	Mr. A.M. Patankar *(Paper circulated in absentia)*	Text Editing and Management Software

The participants evinced keen interest in these devices and discusst, and means to further strengthen ongoing research in the field.

The concluding business session commenced after lunch at 2 p.m. chaired by Mr. Lal Advani, Life Member, World Blind Union. The session was devoted in the form of another symposium, to ***"Government roles and responsibilities in promoting technology for the visually handicapped"***

In his opening remarks, Mr. Advani stressed the need always to keep in view the real and felt-needs of the majority of visually handicapped persons in India and focus on suitable advances with a view to short-term as well as long term applications.

The first speaker at the symposium, was Dr. S.R Das, Senior Director, Department of Electronics, Govt. of India. In his paper, Dr. Das outlined the steps taken by the Department for Developing Braille Embossers and other software for Indian languages. A copy of his paper is annexed. The next speaker was Prof. Neerja Shukla, Head, Department of Youth & Children with Special Needs, National Council of Educational Research and Training, Union Ministry of Human Resource Development. Prof. Shukla spoke of various simple, yet meaningful educational devices, developed or being developed th rough various departments of NCERT for promoting education of the visually handicapped in such areas as Mathematics, Science, Geography and Low Vision. She also stressed the contributions of NCERT in preparing audio material which could he of help in the education of the visually handicapped also at the pre-school and primary levels. The final speaker, Mr. Manoj Hatoj, Research Officer, in the Union Ministry of Social Justice & Empowerment, gave an overview of the projects being supported by the Ministry's Science and Technology Project in the Mission Mode, for the benefit of the visually handicapped.

Discussion that followed these presentations focussed on a variety of issues of concern to the participants and provided them all an opportunity of expressing their views on the topics considered during these two days. These discussions culminated in the presentation of an.Action Plan consisting of 11 points initially, which were modified to cover 14 aspects during the discussion that ensued. The Action Plan thus adopted at the end of this concluding session, focusses on the direction that the testing and development of adaptive technology should take during the next few years as well as the speed and momentum it needs to pick up during this period. Another salient aspect of the plan is that the Government and the R&D funding agencies should ensure enough financial support not only for the development of prototypes but also to ensure their mass production so that these end-products actually reach the blind users. The Action Plan is set forth in lull in the section that follows.

The Confederation wishes to take this opportunity to acknowledge its gratitude to all those who made it possible to attend the conference. The near-full attendance on both days of the conference and the lively and stimulating interventions from almost all of them bore rich testimony to the increasing importance being attached to promoting technological advances for the visually handicapped in India. The Confederation's special gratitude is also due to all of the distinguished international guests, who took the trouble of attending the Conference and enriching its proceedings without any cost to the Confederation. The conference was also widely covered by both the print and electronic media, for which the Confederation is thankful to the concerned personnel.

ACTION PLAN

The National Technology Conference meeting in New Delhi on 21-22nd December, 1998, recommends the following plan of action :

1. A composite approach to the development of low-tech and high-tech devices serving all types of blind persons should be adopted.

2. The Govt. of India should establish a demonstration cell in NIVH or in collaboration with an NGO to display all types of aids available here and elsewhere. If an NGO is chosen, 100% funding should be provided by the Govt. of India.

3. The Govt. of India should identify and assist the establishment of beta testing and evaluation sites for testing various devices and softwares being developed for the visually impaired.

4. A list of priorities in technological research for the visually impaired should be developed by AICB within the next two months and circulated amongst participants of the Conference for their comments.

5. UGC, AICTE, DST, DOE and Ministry of Social Justice and Empowerment as well as all other agencies interested in research should be requested to expand their scope for giving financial assistance for technological research in this area on a priority basis.

6. The Ministry of Rural Development which has reserved 3% of its funds for the disabled, should be urged to fund research designed to assist visually impaired people in rural areas, particularly in the area of employment generation.

7. The ADIB Scheme of the Ministry of Social Justice and Empowerment should be expanded to include the supply of specified software and hardware items essential for the education/employment of young blind persons as well as the rehabilitation of the elderly blind and low vision persons.

8. AICB should publish twice a year a bulletin giving the current status of research in the country in the field of hardware and software development suitable for the visually impaired.

9. Government of India should be persuaded to provide maximum possible subsidy both at the level of research and development as well as manufacture/ production of appropriate technological devices for the visually handicapped, for the twin objectives of achieving easy transition from the prototype stage to actual production and easy access for visually handicapped persons with very limited means.

10. AICB should set up its on website for broader linkages in the country and abroad, containing inter alia, information about people, devices and institutions/organisations and activities for the blind in the country.

11. The Ministry of Social Justice and Empowerment should be requested to direct NIVH to develop a special braille and recording section on technology in the National Library for the Print Handicapped. Provision should also be made, as far as possible in collaboration with the Ministry of Social Justice and Empowerment and Department of Electronics, for electronic networking of an increasing number of institutions/organisations working with the visually handicapped in India and abroad.

12. All possible efforts should be made for expending Braille literacy among the visually handicapped population of the country and, for this purpose, such endeavours may be accepted as integral components of the activities of the National Literacy Mission. Further, material available in digital form/on diskettes should also be accessed with the help of leading international organisations like the Library of Congress, RNIB etc.

13. Suitable arrangements should be worked out for facilitating sharing of technology-related know-how and information among researchers and manufacturers engaged in adapting technologies for the visually handicapped in India and overseas and, for this purpose, appropriate listings and directories as well as computer-networking should be encouraged and promoted.

14. AICB should set up a small Delhi-based Committee to monitor and lobby for the implementation of this action plan.

LIST OF PARTICIPANTS

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OPENING ADDRESS

By : Mr. Pedro Zurita,
Secretary General, World Blind Union

I feel very honoured and privileged to be in India. My view is that in this highly populated country, one can find everything : the best in knowledge and know-how and the greatest needs. In your own statistics, you show that organizations like the AICB are doing a gigantic job, but the amount of people that would benefit from your action in the foreseeable future is so high that prompts many people to do something to cater for underserved or unserved populations.

You really deserve the greatest attention from the WBU. Two years ago, the WBU President, Dr. Herie was here, and now the rank lowered itself a little bit, and I am with you.

I sincerely wish this conference a lot of success. Some of the things that need to be done in the technology field have serious financial implications, but others require mainly a change of philosophy.

Blind and visually impaired wish to be recognised as potential users of any service or product for everyone. We, therefore, demand that our needs should be taken into account in the designing, planning and manufacturing stages. What is useful for us is usually helpful for other people as well. The right philosophy can be applied in India when planning services or products for the general public, and this would be of benefit for people all over the world.

For many reasons, there will be technology that will be for us visually impaired in the first place. Do encourage companies here to think of us as a market. The potential beneficiaries here are seldom in small numbers, but useful products can be purchased by visually impaired people in other countries as well.

Probably my following demand should be borne in mind by the WBU when setting up its priorities. The products of use for visually impaired should not be prohibitive in cost for potential beneficiaries. Globalization is becoming a reality in many areas. In our environment, we have reasons not to act parochially and to do most things in worldwide terms. When our market is the whole world, we are still a small market, but significantly bigger.

I do encourage you to do a meaningful step forward with your deliberations and decisions for future action for the benefit of people in India, in Asia and in the whole world.

The WBU and Technology

I often say that the WBU is very rich in ideals and very poor in resources. When the WBU Foundation, which has been created specifically to raise funds will be successful, hopefully we will be to do a lot.

Now we do administer funds we receive from UNESCO Centres in the framework of the so-called "Co-Action Programme". With those funds we mostly finance small scale literacy projects by providing slates and styli, braillers, computer software, computers and braille printers... Sometimes we had the pleasure to help our friends in India through that programme.

However important finances are in this area, right ideas play a crucial role. And right philosophies is one of the things WBU can develop and spread, and in my view that is one of things that warrant our existence. A conference like this, and in the future it should become an Asian initiative, is most important in promoting one of our cherish priorities : technology for all.

Design for All

Visually impaired are aware that appropriate technology is most important in our lives. Technology does not only facilititate our activity; in many cases it opens to us ways which were up to now completely closed.

We know that adapt available technology is difficult, costly, and sometimes even impossible. We, therefore, welcome the trend that exists now in many parts of the world to promote taking care of our needs in the designing, planning and manufacturing stages.

If services and products can be immediately accessible to us, we have saved a lot of money and trouble. Accessible products are a blessing for us, but they are good for everyone.

The WBU must work at all levels to ensure that when thinking of a product or service, our reality is borne in mind. It is no good doing things for a human being which does not exist in reality. In reality, there are children, elderly people, people with sensory, physical or intellectual impairments... In Japan, there is an increasing movement to promote the so-called free barrier design; in the USA,

the ADA and other initiatives brought about that key companies like Microsoft consider that accessibility is really crucial. In Europe, the implementation of a document called "design for all" is being fostered at different levels...

The WBU has the duty to mobilise forces and awareness about this issue. It is very important that conscientious users, true experts, see to it that free barrier design does not remain something symbolically beautiful. We must see to it that our real needs are actually met.

Evaluation of Technology

There are many instances in which we need a dedicated technology for the visually impaired. There are problems that are very specific to us, or there are unfortunately many cases in which the real world we live in is far distant from the ideal world which we aim at constructing. Designing and manufacturing of special products is consequently a must. The evaluation of the appropriateness of technology is very necessary but is not easy. That is another area in which an international organization can play an important role.

Engineers do not necessarily understand correctly what we really need. In this area the role of conscientious users is crucial. We often see that miracles are promised that when we carefully examine them, we discover they really are not.

In many countries there are now worthwhile attempts to achieve this aim, but here it should be mentioned the initiative undertaken by the NFB in the USA to establish the so-called International Technology Center. That is one of the many good legacies we inherited from the late Dr. Jernigan.

In the ITC it is aimed to have one unit of each available product, to evaluate it, to let people test it and to make critical comparative evaluations of products that are designed to attend to an specific issue, such as optical character recognition systems.

The WBU has a standing committee on Technology, but it is not easy to implement true international programmes.

Affordable Technology

We often see devices that are very useful for us, but their price is prohibitive in most cases. I know competition is healthy, but sometimes there are too many similar choices for such a small market. We must undertake cooperative efforts so that all potential beneficiaries have access to useful technology. Enlarging the

market is a way of lowering the price, but in the current world the economic realities differ a great deal among various countries. Ways have to be sought so that useful goods are affordable there where they may be used successfully.

Inforniation

We often observe that people are not aware of what is really exists. Magazines, newsletters, the internet, national and international exhibitions must be promoted. We also have to implement truly effective mechanisms to exchange information.

Conferences such as this should be adequately exploited, and in all WBU regions there should be fostered international events. Inter-regional conferences that follow the pattern of the held periodically in North America should be organised. There producers, distributors and consumer organizations get together.

Conclusion

The world is becoming really a global village, and we have many motives to work together in this field.

There was a time when international organizations had mainly a diplomatic value, but in the threshold of the new Millennium there are reasons to work together and to think in many aspects on world terms.

Let us all help to turn the WBU into a meaningful forum for developed and developing countries.

KEYNOTE ADDRESS

TECHNOLOGICAL DEVELOPMENTS FOR BLIND PEOPLE : THE NEXT TEN YEARS

By : Dr. John Gill
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In the last ten years there have been significant advances in technological methods for accessing information by blind people. However in many other areas, such as inexpensive devices for daily living, progress has been very slow. Another area beginning to attract interest is the design of terminals for the general public so that disabled people are not unnecessarily excluded from using these systems.

Devices for Daily Living

The majority of blind people, in both rich and poor countries, do not have access to high technology devices, and have to rely on inexpensive devices such as simple magnifiers and home-made methods for labelling tins of food. In many ways life is becoming more difficult; for instance food increasingly comes in standard size packaging which is often very difficult to open.

This is not the glamorous end of research for blind people so it is largely ignored by university-based research workers. The commercial companies have also rejected developing low technology devices because it is difficult to make a profit from selling low cost products to a specialist market. Therefore there is a need to develop new mechanisms for the imaginative development and marketing of this type of product. All too often one sees a device for blind people produced in a rich country being sold in a poorer one where it may be inappropriate for the users' needs.

Mobility and Orientation

The long cane remains the most common mobility device. Although numerous electronic mobility aids have been developed over the last twenty-five years, none have proved popular with more than a handful of users. The problem would appear to be that the extra information provided by such devices may be useful but does not outweigh the disadvantages of using the device; one common complaint is that auditory output from the device masks ambient auditory information.

In the last few years there has been increasing interest in orientation systems. These fall into two groups : ones which require modification to the environment, and ones which piggyback on systems already installed for other purposes.

Examples of the former are infrared and radio beacons mounted at strategic positions; the blind person has a small hand-held receiver which gives an audible message such as the name of the street, the status of traffic lights or the destination of the bus. These systems normally perform well, but the high cost of installing and maintaining the large number of transmitters has prevented their widespread adoption.

The other type of orientation system uses existing infrastructure. One approach, which may have practical relevance in the long term, is to use satellite navigation systems (such as the American Global Positioning System) coupled with an electronic map of the area. This may sound very futuristic but there have been successful pilot schemes with blind people using such systems for orientation in unknown environments. An essential aspect is that precise digital maps must exist for the area; this is not a problem in the UK since there are already such maps for the whole of the country, but availability has proved problematic in other countries. In experiments in England, blind people found that the system gave them 2 metre accuracy for about 75% of the time. Further development is needed before such systems can be considered of general practical use for blind people.

Access to Information

Over many years, work has been done to develop electronic reading aids for blind people. The earliest viable system was the Optophone which converted the shapes of printed characters to musical notes. Nearly fifty years later came the Optacon which presented printed characters as a tactual vibratory image. Both these systems required the user to recognise the shape of individual characters.

Optical character recognition is now a viable alternative, and so the output can be in synthetic speech or braille. As yet the standard OCR systems cannot cope with handwritten material.

However it is the dramatic increase in power and decrease in cost of personal computers which has had the greatest impact. Early personal computers used text-based operating systems, such as DOS, which was relatively easy to convert to speech or braille output. However these were superseded by graphical user interfaces, such as Microsoft Windows, which made life more difficult for blind computer users.. Although there are a number of non-visual access systems for the common GUIs, they could not be described as easy to use by the non-technical user.

The advent of the world wide web has the potential of significantly increasing direct access to information by blind people who can afford the cost of a terminal and the service charge. Access to the world wide wcl) is

limited by the design of some web pages and the design of browser software with non-visual output. Some web pages are almost meaningless if one removes the graphical elements; one possibility is to educate web page designers to provide alternate textual descriptions to all graphical elements-this is a laudable but probably unrealistic aim.

What about the Future?

The tape recorder has been one of the most useful aids for many blind people. Recorded books have proved to very popular in many **countries. Unfortunately the technology is beginning to show its age so new delivery systems have to be considered. Modern digital systems can give much better audio quality than the present systems, and sophisticated methods of indexing can be incorporated. it is likely that the new system to be adopted by blindness organisations in the richer countries will be based on HTML (i.e. similar to the structure used for multi-media on the world wide web). The problem with this approach is that poorer countries may not be able to afford the technology, resulting in a greater divide between the richer and poorer countries.**

Virtual reality looks as if it will play an increasingly important role. In non-immersive virtual reality the user does not wear a headset, but can navigate through virtual space on a screen. For instance an information kiosk in a shopping centre may have a screen and a joystick, and the user can explore the shopping centre from the kiosk. However virtual reality can be used in other ways, so that information normally displayed visually is output in audio or tactual space; this has exciting possibilities for blind people.

A different use of virtual reality will be to model buildings prior to their construction, and then explore the buildings as if one had a variety of visual defects. In addition one could superimpose the effect of various low vision aids, or alter the lighting or colour scheme of the building to investigate the problems faced by partially sighted users. It is far less expensive to model a building in virtual reality, than to build it and find it does not meet accessibility requirements.

Cortical stimulation has long held out the promise of being able to connect a television camera via a box of electronics direct to the human brain. This is a very interesting area of research, but I do not **anticipate practical systems being generally available within the next** ten years.

Sensory substitution is where information normally presented in one modality is presented in another. The problem for blind people has been that the capacity of the auditory and tactual channels are significantly less than the visual one. Therefore it is a matter of extracting the key bits of information from a visual picture before presenting it non-visually to the blind person.

This is still not possible to do in the general case in real time, but hopefully we will see significant progress in this area in the next ten years.

In other areas new technology offers the possibility of new services. For instance the introduction of digital television, makes it easier to provide additional services such as audio description and real-time sign language interpretation of programmes. Audio description involves a verbal description of the relevant visual part of the programme in the gaps in the dialogue. The change to digital television in the UK has given us the opportunity to improve the visual quality of the text on the screen; **RNIB** was involved in designing a new typeface for this application.

Trying to predict technology trends over a period of ten years is very risky, since it is not what is technologically possible but what is commercially profitable that will determine what is actually available. However some trends are reasonably clear. One is that the available bandwidth for telecommunication services will continue to increase; this gives the possibility of transmitting a whole talking book in a few minutes along a high bandwidth line. The convergence of telecommunications, computing and television will eventually make a range of new services possible; this may include interactive teletext and web TV which may be used for home shopping and home banking.

With new technology for the general public it is essential to ensure that disabled people are not unnecessarily excluded from using these systems and services. Often all that is required is a minor inexpensive change to the specification but this must be done before the system is developed. Herein lies a problem — how do blindness organisations get involved at a sufficiently early stage to be able to influence the outcome?

There is no simple answer, but I would suggest that :

1. Blindness organisations need to learn more about the technologies involved.
2. Then they should be involved in the development of the relevant standards.
3. They should liaise with the companies before prototypes are developed.
4. They should provide assistance to these companies to speedily evaluate prototype systems and services with a cross-section of potential users which will include disabled and elderly people.
5. Lobby politicians to exert influence on companies which do not take action to accommodate reasonable requirements of disabled persons. This is not easy since many information technology companies are multi-national.

To sum up, there is an important role for blindness organisations to ensure access to future systems and services. If they fail to take up this challenge, blind people will become increasingly isolated from the rest of society.

CLASS-ROOM TECHNOLOGY AND ACCESS TO INFORMATION

By : Dr. Anil Aneja
Senior Lecturer,
Delhi University, Delhi, India.

An alumnus of St. Stephen's College, Delhi, Dr. Anil Aneja is currently working as a Senior Lecturer in English at Delhi University in the Distance Education Sector. His Doctoral Thesis relates to a study of Modern British Fiction in Relation to Indian History, Myth and Philosophy. He has to his credit, publications in the areas of English Literature, Translation and Distance Education. Dr. Anil Aneja is associated in various capacities with NGOs working both in the disability and non-disability sectors. One of his current professional interests lies in the application of integrated technology in higher education.

In the context of the ever-increasing professional competency requirements and **demands chiefly dictated by the rapid globalization of socio-economic** factors, the technology **available to the visually impaired, if not swiftly upgraded, may soon** prove **to be obsolete because the significance of any technology is chiefly assessed in terms of the quality of life that it assists in improving. The' cfore. to protect the visually disabled from this overt disadvantage resulting in a hidden discrimination a twofold action-plan is the urgent need of the hour : (1) to restructure and adapt the existing technology** with a **view to targeting hitherto untouched areas of application of technology; that is, the work-areas of the visually impaired where the full potential of the available technology has not yet been exploited; and (2) to work towards developing specific need-based and cost-effective technology in order to meet future challenges. As College and University teaching is a high priority career option for the visually impaired, the need to harness technology to facilitate teaching in a standard class-room environment becomes all the more urgent.**

There are, in my view, two distinct aspects to class-room teaching: pre-lecture preparation and actual class-room teaching. I wish to argue here that using technology in actual class-room situation can immensely reduce the pre-lecture work-load for a visually impaired teacher. Technology can also help him to deliver lectures more effectively by enabling to use substitute teaching aids.

One simple class-room tool the visually impaired teacher is unable to put to good use for instance, is the black-board. My own experience as a University teacher has been that substituting verbal communication for black-board can only partially succeed. The disadvantage suffered by a visually unpaired teacher while delivering the lecture can now be made good through

the use of a computer monitor attached to a PC in the class-room itself. This is a technology which a visually impaired teacher can easily use. The information which a sighted teacher would have communicated to the students through the black-board can be displayed by a visually disabled teacher on a monitor by using a normal PC in the class-room. In large class-room situations, however, the standard size display monitor proves to be rather small. Also, the display space when compared to a black-board is rather limited.

This is one area where contribution on the part of the scientists will be much appreciated. There is a need to devise what we may call digital black-boards; that is large screens, which, when connected to a PC will work as display monitors. Presently, some institutions are equipped with L.C.D. Projector-screens which can be connected to a normal PC. The cost factor however, is a serious drawback in using such screens as digital black-boards. We need to have a display unit, something in between a normal monitor and a Projector screen.

I may mention here that with the help of digital blackboards, a visually handicapped teacher can display textual information as well as supplement his presentation with visual effects and aids by drawing graphs and diagrams in the class-room itself. While many visually impaired persons working in different sectors have been able to prepare graphs and diagrams by using the Excel Spread Sheet and also Power Point software, some difficulty is encountered in colour-coding. Therefore, we suggest that softwares such as Excel Spread Sheet and Power Point should be modified and made user-friendly for the visually impaired. Effective use of these softwares by a visually disabled teacher can greatly facilitate him in teaching subjects such as economics and geography. Therefore, urgent attention is required in this respect as well.

While speaking of accessing information in class-room situation, the most obvious difficulty faced by the visually impaired teachers is that, unlike their visually normal counterparts they are unable to refer to the existing print materials at will on the spot. A sighted teacher does not need to make copious notes before his lectures. He simply familiarizes himself with the relevant materials, takes books and documents to the class-room and refers to them as per requirement while lecturing to the students. A blind teacher on the other hand, has to spend hours before each lecture transcribing in braille the materials he may need to refer to while delivering a particular lecture. Almost all citations, bibliographical details, references, at times entire lengthy poems and even long chapters from novels or data reports need to be transcribed for use only in one or two lectures.

Apart from the sheer physical labour involved in this exercise, there is also the disadvantage of having much lesser flexibility while delivering the lecture. A blind teacher due to his inability to introduce unplanned materials to the students, would find it difficult to depart from his planned lecture. The class-room situations however, often make such departures almost inevitable.

The technology developed during last few years has provided partial answers to this problem. However, much further work remains to be done in this sphere, specially, keeping in view the Indian context. The technology presently available offers the following possibilities for the visually impaired University teachers :

In a class-room equipped with a PC, a Scanner and a sound-card, the blind teacher, by using either "Open Book" or "Kurzweil-1000" software, can access any print document or book in voice form in the class-room itself while he/she is delivering the lecture. For instance, if I wish to introduce unplanned citations from T.S. Eliot's poetry in my lecture on 'The Influence of Oriental Thought on Western Creative Writers', I can do so with the help of the technology by simply placing the print copy on the scanner and access these citations in voice form in the class-room itself in real time. If a visually impaired teacher wishes to display these citations directly from the print copy, he can do so by using a scanner and a PC. Pre-prepared maps, graphs and diagrams can also be displayed to the students through the aid of scanners, an advantage which can immensely enhance the quality of one's class-room teaching. By installing a domestic Braille Embosser in the class-room itself, it is even possible for a blind teacher to obtain a Braille copy of any document he wishes to refer to in the class-room.

Thus, in a global context, the present technology possesses tremendous potentials for use by the visually impaired teachers in actual class-room situations. There are, nonetheless, many limitations which need to he urgently addressed. For one, both the Open Book and Kurzweil-1000 softwares have very limited application as screen-readers when scanning is not in use. In the Indian context, the options presently available leave much to be desired. Both the book-reading softwares referred to above can read books of English language only, therefore a majority of the Indian visually impaired are unable to use these softwares for educational purposes because access to book in Hindi is not possible. Also, there is no OCR in the market which can efficiently scan and convert a Hindi print document into a text-file or a word-document on PC. Unfortunately, we do not as yet have a Hindi screen-reading software. The two recently developed softwares aimed at producing Hindi books into Braille namely, NDBTI from NAB and Usha Translation from Braille America

require extensive modifications.

In view of such a scenario we offer the following recommendations :

1. There is a need to develop digital blackboards and also to make the existing softwares more user-friendly for the visually disabled.

2. In any technological innovation aimed at the disabled, the consumer cost factor must always be taken into consideration. In the context of developing countries, technological aids for the visually impaired can commercially succeed only when these are priced low.

3. The hardware as well as software products suggested here must contain bi-lingual features so that these can be used by a majority of the visually impaired.

4. While developing technology for the education sector, relating to the visually impaired, our emphasis should be dual : as far as hardwares are concerned, we should target to develop mono-application equipments, while the softwares must be multi-purpose. The mono-application or what is technically known as the dedicated application machines should be specific need-based, portable, and cost-effective and therefore user-friendly. The integrated multi-purpose softwares and PCs could serve as useful help for those visually impaired persons who may have varied and complex information access requirements.

5. In the context of the higher education of the visually impaired, two mono-application single unit equipments are urgently required: a bi-lingual book reading machine on the lines of the existing English book reading Kurzweil or Robotron readers. The equipment should be able to scan and read any English or Hindi print document. Secondly, we suggest that a single unit scanner-cum-Braille Embosser for personal use be developed which without being connected to a PC can scan and print a Braille copy of a normal print document. The parallel proto-type I have in mind is the recently launched HP's 1100-A three-in-one scanner, copier and printer. In this unit, the document is directly sent by the scanner to the printer without being rooted through a PC. For the visually impaired, a similar unit could be developed by substituting a normal Lazer Printer with a home Braille Embosser and by installing the Braille translation software in the unit itself.

6. For everyday use by the visually impaired teachers, we suggest that an

electronic students' attendance register be developed, possibly by integrating the technologies used in multi-lingual talking calculators and easily available digital diaries. Such a device could have provision for around one hundred separate entries, with each entry having a memory of half KB. Such a device could also serve as a talking digital diary : a product, which, even without its special application, would be commercially viable.

7. **In terms of software development for the visually impaired, our approach should be to develop integrated and multi-purpose softwares. For instance, there is a need to develop a bi-lingual book-scanning and book reading software, with the additional feature that while scanning application is not in operation the programme could work as a complete bi-lingual screen-reader to enable the visually impaired to refer to pre-generated files. As stated earlier the two book-reading softwares already available perform limited screen-reading functions. In fact, it would be ideal if we could also incorporate another feature in the proposed software: a feature which allows the user to take the document either to the screen-reading mode or the braille embossing mode after scanning. In other words, with the help of a single software, the user should be able to access the document either in speech form or in embossed form by using the appropriate hardwares with PC. There is also an urgent need to develop a high speed, but low cost personal braille printer which can be attached to a PC.**

To conclude, I may mention that there was a time when adaptive technology projects had an attitude of philanthropy behind them. Helping the impaired was perceived in itself to be the end of such a technology. Now a new dimension needs to be added to this view. With the **ever-increasing awareness about the capabilities of the visually-impaired and** the passing **of 'Persons with Disabilities' Act in 1995, the opportunities for the visually impaired to participate in the national and social development have relatively increased. If we fail to provide them with suitable technologies to avail of these opportunities, we would be highly under-utilizing their valuable human resources and would also denying them equal performance opportunities. Therefore, our ventures to develop special technology for the visually impaired should be viewed not just to help the blind, but as a means to contributing to the development of valuable national and social resources.**

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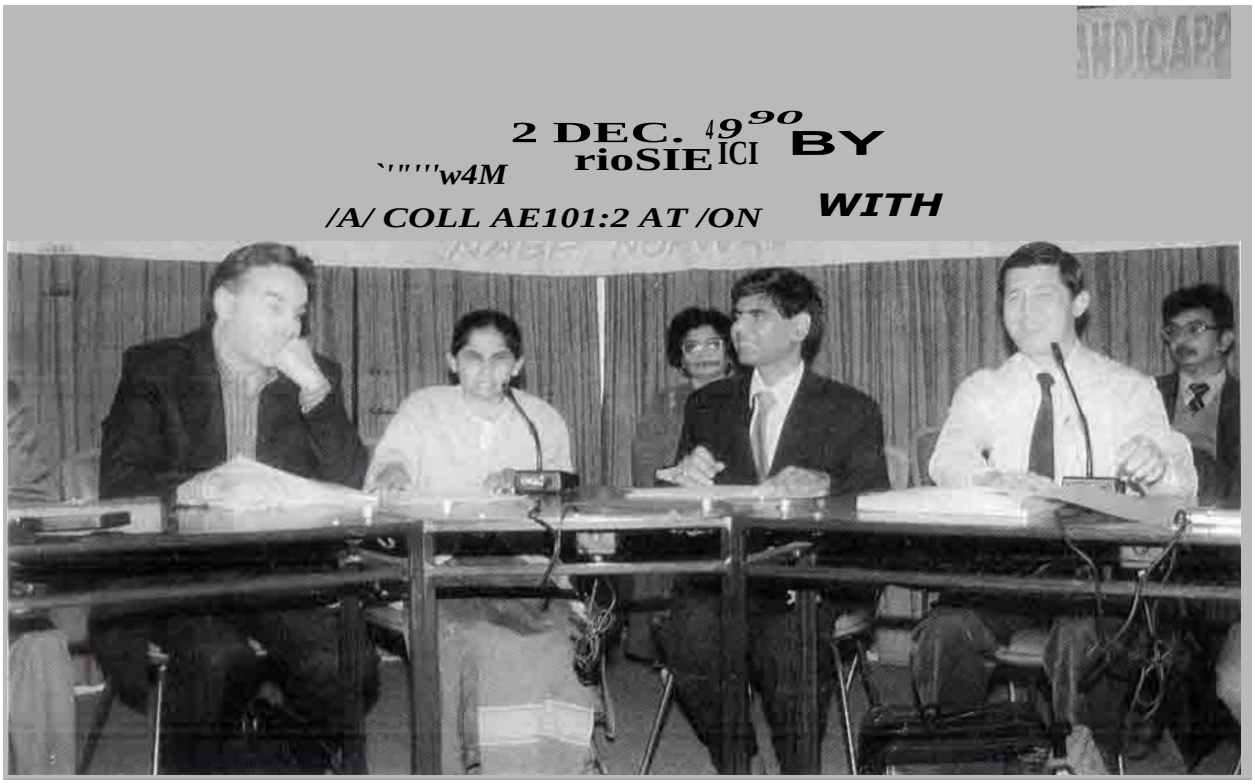
/IV COLLABORAT/O/V WITH

Dr. AM1 Aneja (4th from left side) Sr. Lecturer (English), Delhi University, Delhi presenting his paper.

Mr. **R.** S. Chauhan, Lecturer, (Special Education),
National Institute for the Visually Handicapped, Dehra Dun presenting his paper



Miss Geetha Shamanna, Office Secretary, CBM SARO (S), Bangalore presenting her paper.

Mr. Anil Sard, Manager, Bank of Baroda, Phagwara, presenting his paper.

Mr. Kua Cheng Hock, President, Asian Blind Union, making the opening remarks of Business Session I.

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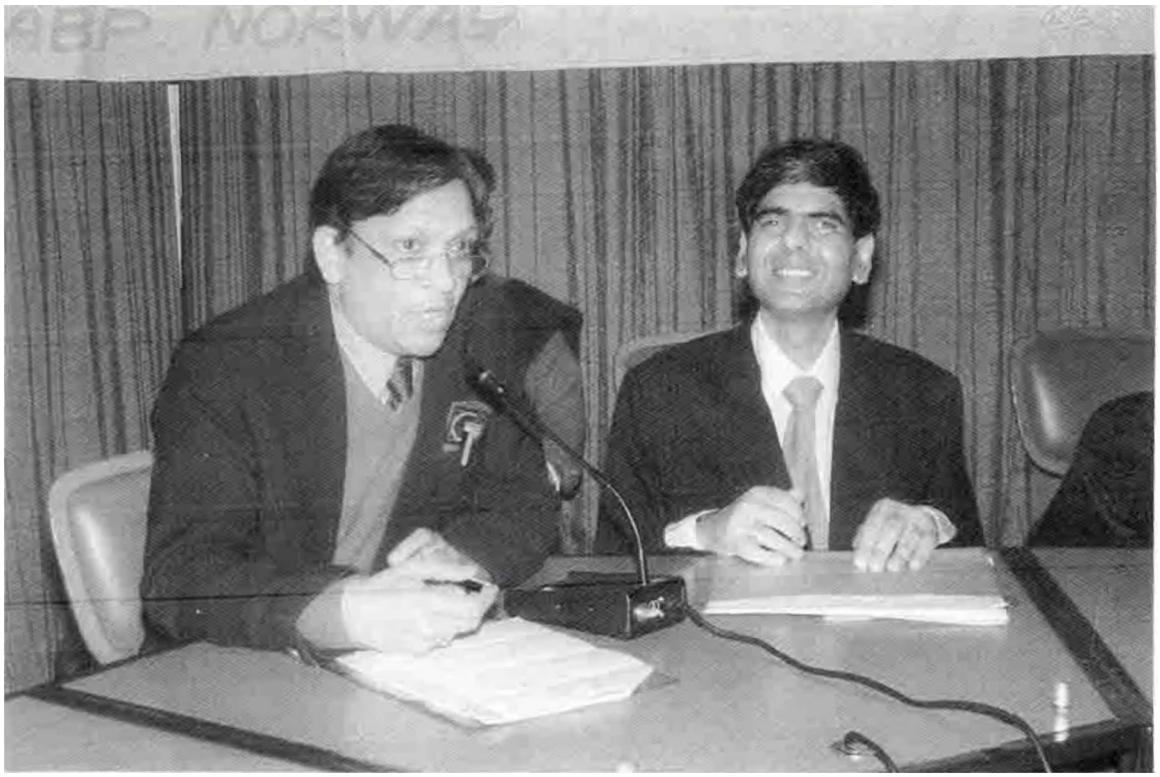
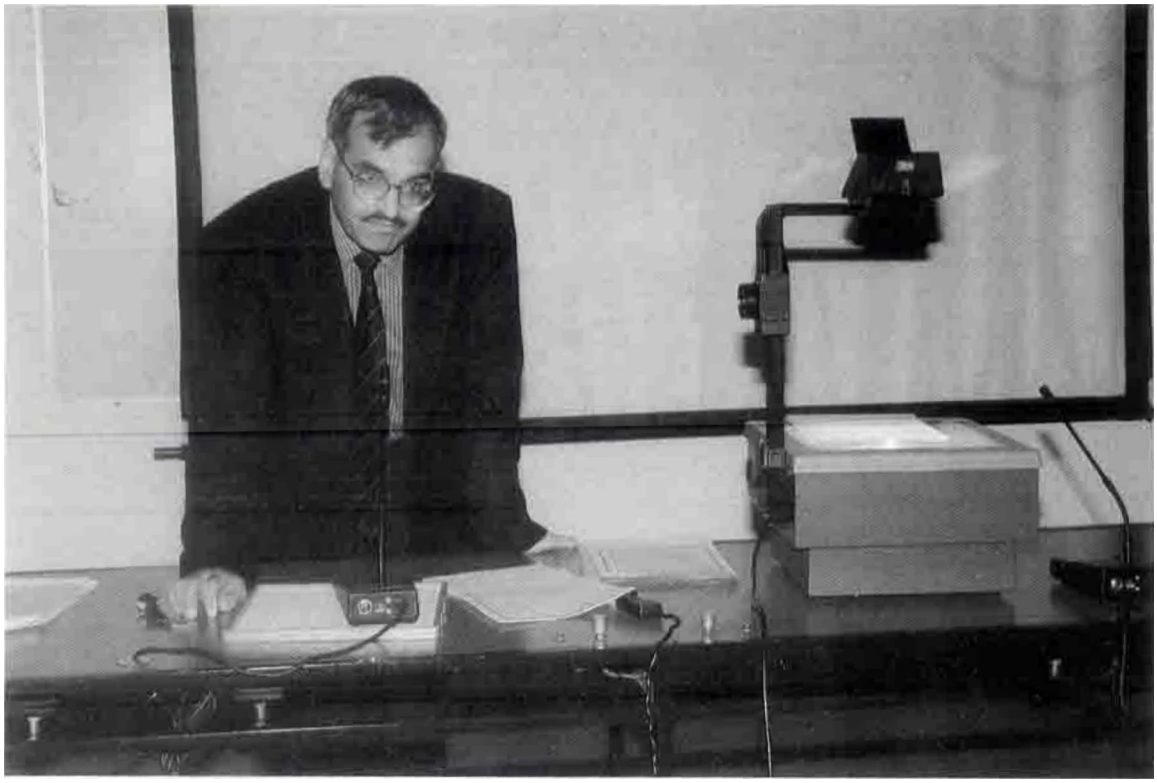
Mr. R. Saha, Director, Ministry of Science and Technology, Govt. of India
introducing the Business Session II.



Dr. S. K. Guha, (extreme left), Professor,
Bio-medical Engineering, Indian Institute of Technology, New Delhi chairing the Business Session III.

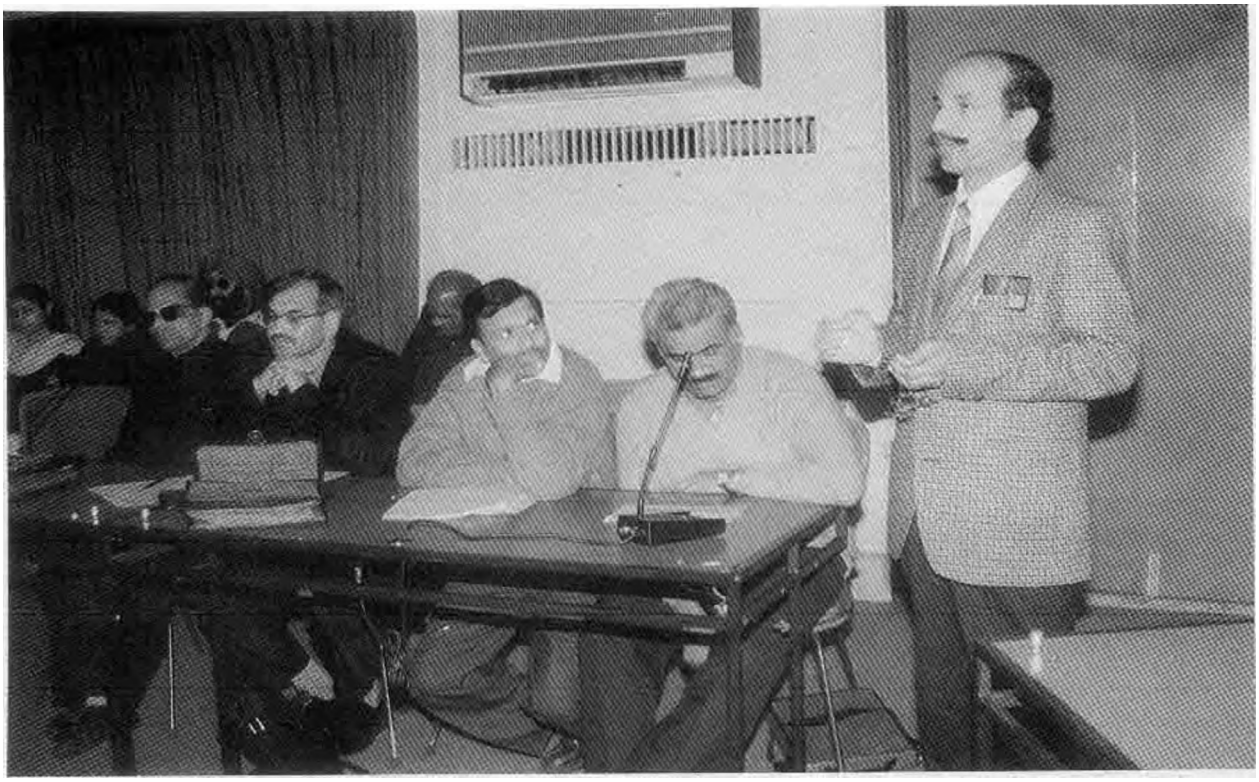
●

Mr. Suhhash A. Datrange, (Centre), Exe. Director, **N. A. B., Mumbai,**
chairing the Business Session IV.



Dr. Bhushan Punani, Executive Director, Blind People's Association, Ahmedabad
making his presentation.

Dr. J. B. Parikh, Director, Minal Engineering Limited,
explaining the main features of 'Minal Brailler' manufactured by them.



Col. K. Radhakrishan, Director (Operations). Worth Trust,
speaking in the conference about Perkins Brailler' assembled by them in India.

Dr. V. P. Verma, Professor of Philosophy, Delhi University, Delhi, chairing the Business Session V.

Mr. Vileen Shah, President, Braille America, U.S.A.,
explaining the main features of `Usha Braille Translation Software'.

Mr. S. R. Das, Sr. Director, Deptt. of Electronics, Govt. of India, New Delhi, presenting his paper.

Prof. (Mrs.) Neerja Shukla, Head, Deptt. of Youth & Children with Special Needs, N.C.E.R.T., New Delhi, highlighting the Educational Aids developed by them for the Visually Handicapped.

Mr. Manoj Hatoj (Centre), Research Officer, Ministry of Social Justice & Empowerment (Technology Mission Mode), Govt. of India, New Delhi explaining the Govt.'s Scheme for development of Technology for the Disabled.

UNRESOLVED ACCESSIBILITY HURDLES
A CONSUMER'S PERSPECTIVE

By : Geetha Shamanna
Secretary at
CBM SARO (S) Office Bangalore, India.

At the outset, it must be emphasised that this presentation is neither an attempt to belabour the inadequacies of the currently available accessibility devices and/or software, nor is it a utopian wish list. It is merely an effort to suggest realistic improvements and changes in approach in order to reduce barriers and enhance technological access to the visually impaired.

Reduced, and in some cases, lack of technological accessibility can be attributed to the following reasons :

I. Birth of the Graphical User Interface;
2. Fast-progressing technology;
3. Emergence of the Internet;
4. The cost factor.

- The issue of accessibility came to prominence with the birth of the now all-too-familiar Graphical User Interface (GUI) monster. With the emergence of Microsoft Windows and subsequent packages, user interfaces have become increasingly graphics-oriented. This transition from a text-based display to a graphical-oriented display system poses unique challenges for the blind computer users. GUI's ubiquitous presence can be observed practically in every field of technological development.

Despite screen reader developers' efforts to make these GUI-based Operating Systems more accessible to the visually impaired, despite Microsoft's alleged attempts (through its Active Accessibility Programme) to make their new releases more keyboard-friendly, problems still persist. In an age when the plug-and-play phenomenon has completely pervaded the computer industry, visually impaired computer users still require to be adept programmers in order to get optimum response from even the most popular and highly competent screen readers in the market. While most avid sighted users of Windows may never have heard of window classes, window handles or control ID's, their visually impaired counterparts not only have to grapple with the intricacies of Windows programme structure, but also have to devise ways to manipulate it. The performance of average and above-average Windows screen readers currently available in the market depends, to a large extent, on the end user's mastery of its scripting language. Constant releases of new versions of applications/operating systems, particularly the 32-bit ones, further aggravates the problem. As a consequence, a substantial number of visually impaired

computer users are switching from the acutely unreliable Windows operating Systems to Linux.

- The ever-increasing popularity of the World Wide Web, a segment of the Internet, has brought to the forefront another problem stemming from the Graphical User Interface. With Web site designers catering to an ever-rising demand for graphics-oriented sites, web pages with frames and image maps clutter the Internet. Screen readers do not always fully succeed in interpreting these visual representations, rendering these sites nearly inaccessible. This partly explains the tendency among visually impaired Net users to cling on to Lynx, the speech-friendly, text based browser.
- Another area where the Graphical User Interface has made an impact is the accessibility of CD-ROM's. Encyclopaedias, dictionaries and a wealth of other invaluable resources available in that compact form are also beyond the reach of visually impaired users.
- To top it all, specialised software/equipment for the blind have always been unaffordably expensive.

Given the complexity and variety of problems, any quest for a panecea would be unrealistic. Screen readers, text-based browsers or graphics-free CD's are not the solution either.

Major software companies should work in close co-operation with screen reader developers in order to incorporate certain minor but essential features so as to make Operating Systems/applications speech-friendly and increase adaptability.

By adding labels to graphic symbols or including a text-only link on Web pages, Web designers could enhance the accessibility of their Web sites. Screen reader developers could also devote more resources towards achieving this end.

- CD-ROM manufacturers should aim at developing speech-friendly viewers in order to enhance data accessibility.
- Finally, financial institutions and the government should introduce flexible credit schemes in order to assist visually impaired individuals purchase the exorbitantly expensive equipment and software.

Although adaptive technology has developed in leaps and bounds during the past two decades, the prospect of its complete amalgamation with mainstream technology still remains a distant dream.

APPLICATION OF TECHNOLOGY FOR ENHANCING EDUCATIONAL OPPORTUNITIES FOR THE VISUALLY HANDICAPPED CHILDREN

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INTRODUCTION

Education is the primary and the most powerful vehicle for transporting any segment of society right into the centre of socio-economic, cultural and political corridors of power. If we go by the figures of the National Sample Survey Organisation's Report 1991, only 0.49% visually handicapped are covered by any service for education. Lack of education generates silence and according to former French President, Mitterrand, "Silence nourishes oppression." Hence, though I am deeply pained but not surprised at continous and powerful avalanche of oppression suppressing the visually handicapped in the country.

An ideal mix of low, intermediate and high technology inputs in adequate quantity and of good quality may be able to alter this dismal scenario at primary and secondary levels. Due to heavy constraints of time, I shall briefly touch a couple of points only for improvement and developments.

IMPROVEMENT IN INTER POINT BRAILLE SLATE

The country has recently developed an inter point braille slate made of ABS plastic material. A government publication claims, "with the use of this frame at least 40% consumption of braille paper can be saved". But, this saving depends entirely on the four pin-like projections on the underside of the slate's window plate.

My personal study reveals that these pins get destroyed within a month at best in more than 90 % cases. Consequently, the 40% saving evaporates in no time.

It is most urgently needed to find appropriate material and technology for making these pins durable and render the equipment capable to serve its claimed purpose.

Moreover, some paper manufacturing units will have to be convinced for making the braille sheets of the appropriate size to suit this frame for attaining the goal of paper saving in reality.

IMPROVEMENT IN BRAILLE TECHNOLOGY

In spite of several high-tech gadgets, the Braille remains, and will continue to be, the cheapest medium of acquisition and dissemination of information among the vast majority of the people with visual handicap in developing countries in the foreseeable future. Hence, some suggestions for its improvement are :

1. Experiments for micro/jumbo Braille cell :

No technological initiative has been taken in this direction so far. It is high time to experiment this technology. It may enable us to produce braille literature in micro and jumbo cell forms also to meet - the requirements of different groups of visually handicapped people.

2. Braille Teaching Machine :

Being a Teacher Educator myself, I come across visually handicapped children as well as their teachers in different situations. For a variety of reasons, Braille teaching/learning standards are deteriorating rapidly. There is an urgent need to arrest this undesirable trend.

A mechanised and/or electronic braille teaching machine can be developed. Among other functions, it may present various braille shapes, words, sentences etc. on the display sheet by pressing buttons. Such a machine can go a long way in improving our braille teaching and learning techniques tremendously. I am ready to discuss my ideas with the desirous technologists for its development.

3. Concept Development Board :

Several studies suggest that visually handicapped children are poor at concept development. A concept development board may be developed to facilitate their easy concept formation. The board may have a plastic display sheet. A three dimensional shape of various items/objects may appear on it by typing the necessary word or name of object in braille. It will enrich their braille skills as well as concepts.

4. Handy Braille Writer :

I visualise a handy braille writer to be a mechanised device, one third eat the standard Perkins Brailler in size and weight. It will have the brailler-like keyboard but the paper will not role on a roller, instead it will go into open space after being written. The writer must be capable of writing on both sides of the paper. Only then, it can serve the needs of Indian blind at secondary or at college level since carrying it will be so easy.

CONCLUSION

The need of the hour is to make the technology available to the blind which is developed. Usually, many items developed remain confined to exhibitions only inspite of loud claims to the contrary. Moreover, even at the cost of some risk also, I would like to qoute Ms. Helen Keller who said, Not blindness, but attitude of the seeing to the blind is the hardest burden to bear." I am afraid, I agree with her in totality. With all politeness and friendliness at my command, I wish to communicate to my technologist friends - please appreciate the importance of working **with** the blind instead of working **for** them. Please consider the views of the **critically minded blind** also while developing any piece of technology. The **yes-minded** blind are neither your friends nor ours.

ACCESS TO PRINT MATERIALS BY BLIND AND PHYSICALLY HANDICAPPED INDIVIDUALS

By : Ruth J. Foss
Head. Collection Development
National Library Service for the Blind
and Physically Handicapped
The Library of Congress, USA.

America's multicultural and multiclass society has throughout its brief history been influenced by print. Very early on public library advocates argued that making the "best reading" available would strengthen democracy. Today, a public library can be found in virtually every community in America, each as different as the number, the needs, and the interests of its users. In the course of the past two hundred years, just as access to print has evolved from the domain of the elite to the right of the American public, so too has access to information, which will shortly become the focus of our thoughts today.

Before we focus on the present, however, much less the future, it might be helpful to sketch a little background for you, to show how the United States has developed a programme to provide access to print for those unable to read or use standard print materials. The scene begins, not in libraries, but in schools. In 1829, only fifty-three years after the signing of the Declaration of Independence, the Commonwealth of Massachusetts passed a law to provide education for the blind, legislation that ultimately resulted in what is now known as the Perkins School for the Blind, New York State and Pennsylvania soon followed until, by the end of the nineteenth century, all but a few states had established such schools.

What was in those schools for the blind? We know that it was a collection of books in some form of tactile braille. At the Perkins School, the director devised a system of modified letters known as Boston Line Type, which was widely used elsewhere. But once Louis Braille's system of six-dot cells was officially adopted in Paris in 1854, the Missouri School for the Blind began using it and, as its use spread, the Howe Press, affiliated with Perkins, began to produce textbooks in a form known as American braille. More or less simultaneously, another dot code was developed in New York. This New York Point was adopted in Kentucky by the American Printing House for the Blind, which became the official printer for school books in the United States in 1S79, that is, fifty years after the Massachusetts law was enacted. For older people, particularly those who did not learn braille in school or those who had lost their sight as adults, Moon type, a simplified system based on standard print capital letters, was introduced in the United States in 1880.

However, once these students left school, their need for access to print

materials continued. Many schools for the blind made their libraries available to blind adults in their communities.Some public libraries added braille books to their collections, but often so few that avid readers soon had read every braille book available. Gradually these arrangements changed. For example, the Boston Public Library became the first library for the blind after it received a gift of eight embossed books in 1868. A Free Circulating Library for the Blind opened in New York in 1896, and by the time it became part of the New York Public Library in 1903, it had 1,649 books and 492 pieces of music in its collection for the blind.

Meanwhile, in 1897, when the Library of Congress moved out of the Capitol building and across the street to its magnificent Italian Renaissance-style home that we now know as the Thomas Jefferson Building, a special reading room for blind people was established. *That All May Read,* an NLS publication that discusses our programme in detail, describes this special room as follows: "Embossed books and music were circulated, and readers were asked to name the books and the style of printing they preferred. One hour of oral reading each day, a weekly recital, art gallery visits, garden parties, dramatic entertainments, river excursions, and teas were part of The Library's programme." My, how things have changed!

On the 3rd of March 1931, the Library of Congress was authorized to initiate the Books for the Adult Blind Project, and the pace finally began to gain momentum. Four months later, on the first of July, the first braille titles were procured for the collection. In 1932, "talking books" were being developed by the American Foundation for the Blind, and in 1933, a sound reproducing machine was produced. Congress intervened again in 1934, this time to approve "free mailing" of talking books. And by 1935, the Library of Congress Books for the Adult Blind project, which had become the "talking-book" programme, was in full operation.

As remarkable and as rapid as these developments were at the time, the next significant changes did not come until 1952, when the original (1931) mandate to serve blind adults was extended to children. The programme expanded again in 1962 to provide instructional music materials, and once more in 1966 to include individuals with other physical disabilities that prevent the reading of regular print materials.

Today, under a 1996 special provision of the U.S. copyright law and with the permission of authors and publishers not covered by this amendment, the National Library Service for the Blind and Physically Handicapped (NLS) provides a collection of full length books and magazines in braille and recorded formats. These materials, as well as playback machines, are distributed to a cooperating network of libraries, where they are circulated to eligible borrowers,

them. As I said earlier, that two most important considerations of any library are the people it serves and the interests or needs of its users. We are no different.

Although I have by now mentioned schools several times, the National Library Service mission is to provide the kind of books one would expect to find in a public library. But, as our name implies, the community we serve is neither small nor local, it is national. Anyone living in the United States, or any American citizen living abroad, who is unable to read or use standard print materials as a result of temporary or permanent visual or physical limitations is eligible for the programme. Approximately two million persons with some form of visual impairment and another million with physical conditions such as missing limbs, paralysis, and insufficient strength or muscle coordination, may receive service. Our readership currently is approaching 800,000, and is growing more diverse every day. How then do we know what they need or want?

First, let us consider what the American Library Association (ALA) has to say on this subject. ALA defines the public library as an institution that exists to provide materials that will assist patrons to

- educate themselves continually;
- keep pace with progress in all fields of knowledge;
- become better members of home and community;
- discharge political and social obligations;
- be more capable in their daily occupations;
- develop their creative and spiritual capacities;
- appreciate and enjoy the works of art and literature;
- use leisure time to promote personal and social well-being; and
- contribute to the growth of knowledge.

NLS subscribes to this mission statement, with the understanding that the books selected for our programme are intended for the layperson rather than the scholar, even though some public libraries in America actually resemble academic libraries rather closely.

In addition to meeting these somewhat lofty goals for readers, another vital function of public libraries is to provide recreational reading of the type one might expect to borrow from a local public library, or be able to purchase in a bookstore. Since readers requiring materials in special formats do not have these options, the National Library Service seeks to make so-called recreational material available for those who are interested.

At this point you may be wondering why I continue to mention local public libraries when the National Library Service is indeed a national collection.

Consider, if you will, that blind and physically handicapped readers live in many different parts of the country, not just in central locations and that most public libraries cannot begin to provide either the materials in special formats or the service that NLS can make available. Although the libraries that make up the National Library Service network vary greatly in size and budget (some are too small to shelve and circulate braille, some lend machines exclusively), only a federally funded library programme, such as NLS, is capable of providing a national library service that makes many more titles available to patrons than would otherwise be possible at the local level.

While we are on the subject of funding, perhaps this is a good point to discuss how the National Library Service handles its book budget. Please consider that approximately 65,000 titles were published in the United States alone last year. Obviously, not all of these 65,000 titles are appropriate; that is, they are likely be too scholarly or the text may be too dependent upon visual elements. However, it is largely our budget that determines how many titles we can reproduce in special formats each year. That number is generally limited to about 2,000 titles, which makes the selection process very difficult. First we seek to provide a balanced collection, meaning that we attempt to select 55% fiction 45% nonfiction, 70% current 30% retrospective, and 80% for adult/ young adult readers and 20% for juveniles each year. Fortunately, many National Library Service network libraries are able to supplement the national collection with materials of local interest. Most NLS and network-produced materials arc in English. Each year NLS also produces about twenty-five titles in Spanish, which is fast becoming our second language. We are also building a collection of special foreign library materials, which includes a few English-language titles produced abroad, but most often foreign languages that we arc unable to produce. Although, as you can imagine, in the Washington area we have no difficulty in finding narrators for almost any language a patron requires, we have neither the staff nor the capability of ensuring the accuracy or the quality of such recordings. The foreign library materials that we purchase are extremely limited in number, usually five to ten copies of each title. They are housed in a central location and shipped to readers as needed.

Selection, as important as it is to the National Library Service, is only one part of the ongoing process of building this national collection. We constantly evaluate the current status of the collection, occasionally weeding materials, such as outdated information on diabetes, or travel books that describe what facilities a national part has for handicapped visitors. We must also consider whether a particular subject or an author is adequately represented. In this process we are guided by a written selection policy that helps us to determine whether a subject is out of the scope of the National Library Service collection, or if it needs to be supported by newer material. No part of the NLS collection

is sufficient to support independent research. Generally we must support the selections we make with at least two favourable reviews from nationally distributed sources, such as those found in library journals like *Booklist,* or newspapers, including the *Washington Post* and the *New York Times* — hometown newspapers and the recommendations of friends are not enough...

Once we acquire print copies of a book, we examine the content further to determine its suitability. If it is a book about computers, will it be usable by someone who does not use Windows, will it appeal to our readers (the majority of whom are over 65), and is audio or braille the most appropriate format (most of our patrons use recorded titles rather than braille). For the most part we avoid producing titles in more than one format. On the other hand, the National Library Service wants to encourage braille literacy and will, therefore, occasionally produce a title in both audio and braille formats. For many years the National Library Service tended to produce books determined to have lasting value in braille, or sometimes those that lend themselves to reference-type use, such as a cookbook. More recently, at the request of patrons who prefer to read a book for themselves, or who read braille exclusively, we have begun to include more light reading for braille readers. Thus, NLS sometimes expends a considerable amount of effort in creating a balanced braille collection in addition to the much larger recorded collection.

Besides making these decisions, we must keep in mind the tastes and preferred formats of all our readers. So too must we provide books that appeal to children from preschool age through young adulthood. For our younger readers we produce a limited number of picture books in a print/braille format. This process requires taking copies of the original print book apart and inserting braille textual overlays before they are reassembled. Print/braille books are very popular and very expensive. We also try to select titles that will encourage older children to continue to read for pleasure once they have done their schoolwork.

One considerable difference between the National Library Service and the average public library is that, because our readers do not have the option of browsing a few pages of a book, of scanning its table of contents, or even perhaps of glancing at a picture on the cover to determine their interest, we provide an annotation that briefly describes the contents and the flavour of each book. In addition, particularly in works of contemporary works of fiction, we indicate whether a book contains strong language, violence, or descriptions of sex. This should not be viewed as censorship, but without the ability to examine a book-in-hand, such information gives readers, who may find this type of material offensive, an opportunity to reject it.

The National Library Service accelerates the production of high profile

titles, such as current bestsellers, when possible, so that readers have some hope of gaining access to the same books that families and friends are discussing. We are also alert to major literary awards, such as the Pulitzer Prize, the Caldecott and Newbery Medal Awards for children's literature, and the Nobel Prize which, of course, is given for a body of work, not for a specific title. Again, if such prizes or awards are announced before the book is produced, we add that information to the annotation.

It is also National Library Service policy to produce all titles in a series and to provide each title in a series in the same format. This policy does not apply necessarily in instances where multiple titles may involve the same character, but otherwise stand alone.

As I said at the beginning, a library must be responsive to the readers it serves. The National Library Service makes a serious effort to solicit and consider the needs and interests of patrons. For many years now the National Library Service has hosted an *ad-hoc* committee now known as the National Advisory Group on Collection Building Activities, to provide a forum for obtaining patron advice. The group is comprised of four librarians from the NLS network of libraries who represent their geographical regions, four patron readers-at-large who are free to present their own points of view; a representative from each of the major national consumer organizations (the American Council of the Blind, the Blinded Veterans Association, and the National Federation of the Blind); and another network librarian who serves as a children's and young adults' consultant.

So far I have described for you only how we select the books for the National Library Service collections. We also, if you recall, provide a number of magazines in both braille and recorded formats. Not to worry! I have no intention of starting all over again — besides, the selection process for magazines seldom changes. We recently completed a major study of our magazine programme, the first in more than twenty years, with the result that we currently offer patrons braille and recorded subscriptions to seventy some magazines (Network libraries may also request copies to be circulated).

Finally, it's all very well to build a national collection, but it helps only if readers have access to it. Such access is provided through a variety of magazines, catalogues, and bibliographies in several formats, through automated sources, and through reader advisors in our network libraries. Magazines primarily list what has been produced in a particular format in the two-month period since the previous edition. For example, *Talking Book Topics* (TBT), lists all recorded titles that have become available to readers since the last issue. Similarly, *Braille Book Review* (BBR) does the same for braille. These titles may also contain brief announcements, and other useful information.

Catalogues, such as the *Cassette Catalogue, Braille Books,* or *For Younger Readers,* which lists juvenile titles, are annual or biennial cumulative listings that provide access by subject, as well as author and title. All catalogues are produced in appropriate formats as well as large print. Bibliographies are irregular publications produced as funding permits. The major source of information a bout books for blind and physically handicapped readers is the NLS *Union Catalogue,* which currently lists the special format holdings of titles available in the United States, Canada, Ireland, Australia, and New Zealand. Discussions continue with other countries wishing to list their holdings. The *Union Catalogue* is available on CD-ROM and through the Internet.

We simply cannot leave the subject of access, however, without noting a dream of creating a world library of alternative format materials. We realize there is no library anywhere that can provide a collection of materials which fully meets the needs of the community it serves, and no library anywhere can rely on interlibrary loan arrangements to meet its needs, and no library anywhere can guarantee that just because it is able to locate a little that it can also provide access to it. We must, therefore, find a way to share our resources, and libraries with special formats should begin to share the dream to link access electronically. Perhaps some of you heard Rosemary Kavanagh, Executive Director of the Canadian National Institute for the Blind (CNIB) library, and Michael Moodie, NLS's Research and Development Officer, speak about this dream at the International Federation of Library Associations' (IFLA) General Conference this past August. They concluded that this "is a dream based on cooperating jurisdictions, consistently prepared databases meeting commonly accepted cataloguing standards, linking records, and building a digital library. Linking libraries for the blind is not a different concept from the distributed virtual catalogues of the new millennium and it is only a first step towards the goal of [providing the] best content [or what our forefathers called the "best reading."] The tragedy would be if libraries for the blind missed the opportunity or arrived upon it too late, and that well into the next millennium information and books continue to arrive in the hands of blind people long after the general population has consumed them and in such marginal [numbers] that comparable access and library service still are only an illusion to be fully embraced."

Suddenly, the community we serve has become global in size!

ADAPTIVET TECHNOLOGY FOR VISUALLY IMPAIRED PERSONS

By : Dr. Bhushan Punani
Executive Director,
Blind People's Association, Ahmedabad, India

Electric motor rewinding, production and testing of electrical home-appliances and assembly of electric components is convenient for a visually impaired person. The major limiting factors are non-availability of testing equipment and non-shock soldering devices. To fulfill this gap, the Blind People's Association has developed two instruments :

CONTINUITY TESTER :

It has been developed by using two transistors (BC 148 and AC 128), one resistance (47 Kilo-ohms), one capacitor (0.02UF), one speaker (8 Ohms, 500 MW), two testing probes, one PCB and one assembly case. Use of 1.5 volts DC current ensures safety of the user. As it reflects difference between high to low resistance and current leakage, it is sensitive. As tone resistance can be altered by changing the capacitor value and it emits audio output, a visually impaired person can use it conveniently. As no electric AC current is required, it can be used in the field conditions. It is compact, easy to carry and low cost.

SPOT WELDING :

It has been developed by using 5 Kg E-type lamination cord, one bobbin, 25 and 16 S.W.G. Copper wire, one carbon rod, one combination plyer, metal box and one line cord wire. As it has low voltage with high amperage current, it is safe for VIPs. No flux or tin is required for its assembly and it uses only copper. It is portable, low cost and there is no need for dry soldier. It can, however, be used only for copper wire soldering.

PRAGNA SKETCHING DEVICE

(Sketching-pen for visually impaired children)

Mr. Dilip Bhatt, father of a low vision child and volunteer of Blind People's Association has developed an innovative sketching device which enables a visually impaired as well as a low vision child to create simple sketches and line diagrams out of a thread. It is based on using acrylic thread as *"writing ink"* and nylon fabric fastener "velcro" strips as a *"writing slate"*.

Acrylic thread of a contract colour that works as refill is passed through the empty body of open ended ball pen, keeping the other end attached to the Bobbin spool. The thread is wound on the spool that rotates about a wire axle, attached to the upper part of the ball pen. Nylon fastener stripes are stitched together width wise and pasted on the wooden board to make l' x1' slate area.

The child holds the pen as any other normal pen for a sighted person, and makes contact of the thread over the slate surface. Keeping continuous touch with the surface, the child glides the pen in different directions and the thread delivery is maintained smoothly through the rotating spool.

A line can be terminated by snapping off the thread by using a sharp stationary blade. A continuous running thread can also make different shapes like circles, rectangles,curved lines, letters, graphic symbols, maps etc. The drawn picture can be easily "erased" by simply pulling away the thread from the slate surface and rewinding it again over the spool. The child can immediately feel the shape by moving fingers over the thread surface and add, correct or erase the line quickly. It enables interaction of the child with the writing media and encourages drawing of various objects. A low vision child may see the shapes by holding the board close to eyes.

Advantages :

- **Self operated excellent user-friendly device and serves as useful educational media for the teaching personnel.**

- **The device operates on *"draw as you think"* concept which is better as compared to other available tactile devices where *"embossing"* is carried out on the reverse side of paper, sheet metal etc. to get "mirror image" of the actual profile.**

- **Simple design using readily available components.**

Note : Mr. Dilip Bhatt, Inventor of the Device, received the National Award during 1997.

SENSORY STIMULATION

A child with multiple disabilities is one who has impairments in two or more sensory organs. The combination of visual impairment with other sensory impairments leads to a unique and distinct disadvantage in the learning and

communication processes of each child. It is also sometimes very difficult for medical specialists to accurately diagnose the extent and magnitude of the disability as well as residual and functional abilities.

The **BPA** has set up a Sensory Stimulation Room with three objectives :

- Sensory stimulation of children with multiple disabilities,
- sensory training in use of residual abilities,
- asssessment - clinical and functional aspects.

The room is equipped with :

a) Strobes, lasher lights, spotlights, mirror ball, focus light, ultraviolet lights to measure tracking, fixating and use of vision,

b) resonance boards, stimulation box for stimulating toddlers, vibrators, sound devices of different frequencies and intensities,

c) tactually stimulating surfaces of different qualities arranged in the room to stimulate the child and encourage it to explore with its sense,

d) suspended objects of different surfaces, lengths, textures to encourage the child to explore, feel and process this information meaningfully.

The Room has been designed by the National Institute of Design (Ahmedabad) and developed under the guidance and with the support of the Sense International. The room has a myriad of lights of different intensities and qualities from strobes to ultraviolet to flashers. These are arranged in specific places from the ceiling, floor and walls to assess the extent of residual vision and also effectively measure the extent of gaze fixation, tracking and moving. The lights are also used for stimulating children with low vision to effectively harness vision. The room encourages the stimulation of the other two senses of touch and hearing equally. There is a tactile corner and a resonance board for stimulating the tactile senses of especially young toddlers.

The room also has installed a variety of auditory devices for encouraging the use of residual auditory abilities and for harnessing senses for identifying, discriminating and processing sounds, its origin and quality. With the stimulation, the child learns to understand its residual ability and to use the same in day to day life. The sensory stimulation room thus helps in concept development and communication through other senses and Integration of different sensory information.

TEXT EDITING AND ACCESS MANAGEMENT (TEAM) SYSTEM FOR THE VISUALLY HANDICAPPED

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Abstract :

"Text Editing and Access Management (TEAM) System", for the visually handicapped is an excellent spin-off Nuclear Research in service of mankind and has far-reaching social effects on the status of the blind community. The system opens better prospects for integrated education, rehabilitation and higher status employment opportunities to the visually handicapped.

The TEAM system has been developed under Windows95 environment and works with any PC having windows multimedia capabilities and any windows compatible sound card, and a specially designed braille keyboard. Based on the feedback obtained from the users at NAB New Delhi, Blind Graduates Forum Mumbai, All India Institute of Speech and Hearing Mysore, NRDC New Delhi and NAB Mumbai, the system has been upgraded from time to time and made very user friendly. The paper describes the development stages which have resulted in the current version — TEAM 95, which can be used by a visually handicapped person with no previous experience of using computers. The paper also describes the various features of the system and the areas where this adaptive technology product can be put to use.

1. Introduction :

"The benefits of reading should be made available to everyone."

We have progressed to the information age, where information and knowledge flow across the globe in a matter of minutes. Low vision and blindness should not interfere with one's ability to acquire knowledge. In order to use the personal computer, accessibility aids are required by visually impaired people. These include ***Screen reading tools*** to provide audio interpretations of text and other visual elements on the screen, ***Screen magnification tools*** to adequately see on-screen information and specially designed input devices.

Screen reading tools currently available in the market, attach themselves to word processors and read the selected portion of the text on the screen and is usable only by sighted persons as the flow of information is through visual feedback. All commands work on the click of the mouse. The software provides no audio assistance for tasks such as selecting commands, selecting a particular document to read, entering text, changing the various speech parameters etc. Therefore the visually handicapped cannot independently operate this system without the help of a sighted person. Software programmes are available that enlarge or alter the colour of information on the screen for people with visual impairments. However all these accessibility tools are not integrated into a single product.

In developing systems for the visually handicapped our efforts have been to provide the fundamental accessibility aids i.e. screen reading, screen enlargement, easier input mechanism, all integrated into a single product.

2. Generation and Pronunciation Text System (GPTEXT) :

The philosophy behind developing GPText was to make it usable by a wide spectrum of users from an elementary level to a full-fledged reading/ writing machine. Hence the braille keyboard was limited to Grade 1 braille. The current trend in the PC market has made available powerful machines at an affordable cost. By adding minimum hardware and software it is possible to build a powerful system. This system was built around a standard IBM-PC AT with an add-on PC compatible phoneme based speech synthesizer card, electronic Braille keyboard and Text to Speech engine.

The Braille keyboard is designed around the single chip micro-controller. It performs key scanning, Braille code interpretations, conversion to ASCII code and transmission to PC via serial port. All 68 printable ASCII code are provided and the keyboard conforms to Grade 1 Braille code standard. Push button switches have been arranged in the same configuration as in the standard Brailler.

The text to speech conversion software is based on letter to sound rules of English. English needs more than 300 letter to sound rules to correctly pronounce majority of words, for an unlimited vocabulary speech synthesizer. However, many words violate basic pronunciation rules and have to be treated as exceptions. The text to be spoken is passed through a series of transformations and converted to phonemes.

The conversion to the hardware-defined phonemes was done in two steps. In the first step, the sentence to be spoken was translated into International Phonetic Alphabet (IPA), and in the second step these IPA phonemes were mapped into a phonetic coding compatible to the hardware. Assignment of the correct duration to each phoneme is used to produce emphasis, depending on position, neighbour, number and context.

The phoneme based speech synthesizer hardware provides the voice output capability for the system. The inflection and timing of the phoneme to be spoken are controllable by the driver. This help in producing the right kind of emotion while speaking. The time interval in which the phoneme has to be spoken has been experimented to produce most natural sound output.

The system was integrated with a flat bed scanner to enable reading of printed matter. The page scanned is passed. through an Optical Character Regonitor (OCR) for recognition of characters. The recognized text is then spoken aloud.

2.1 Limitations of GPText :

While the text-to-speech engine could render the individual words successfully, while speaking sentences it became monotonous as it lacked human prosody. Also, it was not possible to control speech parameters for comfortable hearing. It was also not possible to produce different voices. In addition, the software runs under DOS and supported only the proprietary speech synthesis hardware.

3. Text Editing and Access Management System (TEAM) :

Due to the above mentioned shortcomings of GPText and based on feedback received from users such as NAB Delhi, Blind Graduates Forum Mumbai, All India Institute of Speech and Hearing Mysore, it was decided to develop a new version of the system, running on Windows 3.1 operating platform. Also due to emergence of PC's with in-built audio hardware, we designed the system such that speech can be synthesized through a standard sound card, rather than specialized and custom hardware. The system consisted of a standard PC (486 and above) with a sound card, braille keyboard, Text Assist text-to-speech engine and TEAM software.

The system works with Sound Blaster 16 sound card. Using Sound Blaster's "Text Assist" utility, which gets attached to the word processing software, in this case "TEAM", it was possible to synthesize high quality continuous speech. From TEAM it was then possible to control some of Text Assist's text to speech functions. The speech quality improved significantly, but it was not possible to provide access to change the various speech parameters for comfortable hearing as another utility called "Control Panel" had to be launched separately and could not be integrated into the application.

To assess the usefulness of mouse to a visually handicapped, so as to make them aware of modern methods of input, most of the text interaction was also made possible through the mouse. The horizontal sensitivity of the mouse was reduced and a complete audio feedback was provided for tracking the mouse. Vertical sensitivity was also reduced so that the mouse would not move to the next line unless it was brought down by at-least three lines and reference was always brought to the first word of the line. However it was concluded that the standard mouse was not very convenient to use and complete interaction

would be provided through keyboard.

3.1 TEAM for Robotron :

The Robotron Rainbow is a personal reading machine for the vision-impaired persons. It comprises of a scanner, an OCR, a speech synthesizer and an easy to operate 8-button keyboard. It is possible to change various speech parameters like volume, speed, voice, pitch etc. to suit the user's convenience. The user can scan documents of multiple pages and store it. However there is a limit on the number of pages it can store (approx. 30 pages of text). Therefore the text has to be transferred to PC for permanent storage. The visually impaired users cannot independently transfer the data to PC.

TEAM for Robotron was developed to provide additional facilities such as text entry, access, editing, storing etc. The ROBOTRON can be operated remotely from the PC through TEAM software. It functions as a speech synthesizer and scanner coupled with an OCR. The communication interface between TEAM and Robotron has been developed. All features of TEAM are now available to the Robotron user.

4. TEAM_95 :

The text-to speech software "Text Assist" works only with the Creative Sound Blaster card. It was required to make the system functional with any industry standard sound card. Also to overcome some of the shortcomings of TEAM and implement a few suggestions obtained from NRDC Delhi, a new version of the system "TEAM 95" was developed which runs under Windows95.

The system comprises of a standard PC equipped with any 16 bit soundcard complying with Window multimedia system, a flat bed scanner, OCR software, text-to-speech engine, braille keyboard and TEAM 95 software.

The Software Development Kit (SDK) from Lernout & Hauspie was used to integrate state of the art text to speech technology in TEAM 95. L & H SDK is a Windows based software package for application developers and prototyping. The text-to-speech system (TTS) is composed of three basic parts. The Linguistic Module converts the input text into a phonetic transcription. The Phonetic Module calculates speech parameters, and the Acoustic Module uses those parameters to generate synthetic speech signals. Application Programming Interfaces (API) are available for functions such as for initiating and stopping the Text-to-Speech synthesis, selecting the correct exception dictionaries, as well as loading the proper application and language. Application design tools include an editor to develop personal

exception dictionaries. Vocabulary can be optimized for pronunciation of proper names etc.

4.1 Feature Set of TEAM 95 :

Although we have maintained the same feature set in all the above systems, over the course of development the system has been very easy-to-use by wide range of people, from school going children to the highly educated professionals.

Scan : TEAM 95 integrates a scanner and an OCR for reading documents required in day-to-day business, school and personal activities. Pictures are automatically excluded and text with multiple columns is read correctly. Users can scan text from a variety of printed material, including books, magazines letters etc. The scanned text is first recognized, then read aloud to the user by the Reader.

Reader : TEAM 95 allows users to read documents already created, and stored as a file. Complete audio assistance is provided right from selecting the commands, browsing through files in the directory, accessing documents from different media. The user can adjust the rate at which the document is read. The users can also select from any one of the nine voices and change the pitch or volume for comfortable hearing.

Writer : For preparing text documents, user can input text either through the Braille keyboard or through PC keyboard. The text as it is being entered, is spoken aloud and the user can specify whether the feedback is letter by letter or by word. It is also possible to edit existing documents. Find and Replace options are also supported. Multiple find/replace can also be carried out on a given word. When the search is excited, the reference is on the word last found. After the document is complete it can be printed or saved.

Magnification and Contrast mode : TEAM 95 provides a magnification mode for partially blind users. The text that is displayed can be zoomed to a size that is comfortable to read. For better contrast TEAM 95 provides the user with a palette of colours to choose from which he can select background and text colours.

Conversation mode : A special mode has been provided which allows the visually handicapped to communicate with the deaf and dumb (D & D). The protocols are designed such that the conversation carries on naturally between two persons. The blind user uses the braille keyboard and the deaf & dumb user uses the PC keyboard. For the D&D, text is displayed on the screen in separate windows. For the blind, text that is entered is spoken aloud. Two

different voices are used to differentiate the two users.

5. Areas where this technology can be put to use :

Home : It opens up a world for disabled people, who previously had to depend on others to read to them.

School : Blind and visually impaired students often have difficulty in finding live readers. Now it is possible to read aloud almost everything from textbooks to magazines to news etc. Assignments can also be completed with the help of this system.

Library : Books and printed matter in libraries can be made accessible to the blind community. Since the books available in Braille are limited, this provides them opportunities to read other books. Since headphones can be provided, the users will not disturb other patrons.

Co-operative work : Blind and Deaf & Dumb can use this system co-operatively for many combined projects by expanding conversation mode. We feel that with the help of this mode, Blind and D & D make up one complete person. This opens up many new avenues for both communities.

6. Conclusion :

Interactive and easy to use, the system is effective in helping users gain reading independence. For most of the users it opens up a world of reading never experienced before. Visually handicapped with the help of this system can interact independently with text documents like a sighted person. They can create, access, listen, store, correct, append, search, print or emboss text documents using this system.

ULTRA SONIC TORCH
& INFRA-RED OBSTACLE DETECTOR

By : Prof. K.A. Chandrasekharan
President and Director General, Faith-India

INTRODUCTION

Mobility is the basic need of every being. For that, one should be aware of the surroundings, fully oriented to the environment and able to see or feel obstacles on the way. So this brings the importance of an assistive device that will help the visually impaired in mobility and hence the relevance of a better mobility aid like ultrasonic torch.

At present a common mobility aid of a visually handicapped in India is a White Cane. Our attempt here is to develop electronic based devices at a reasonable cost affordable to larger user population. Therefore, we initiated development of two products namely :

1. Ultrasonic Torch
2. Infra-red Obstacle Detector

1. ULTRASONIC TORCH

This aid is enable to detect obstacles using ultrasonic sound waves. Other informations that can be recognised are given below :

a) Distance of the obstacle from the user,
b) whether the object is in motion or stationary and
c) recognising the size of the object (only possibility).

This aid will look like an ordinary torch that doesn't produce any light but will produce high frequency sound waves above 20,000 Hz. This high frequency sound waves can't be sensed by human ears. The selected frequency will be much higher than the hearing sense ability of most other creatures also. These sound waves will hit the object and the waves such reflected or echoed will be captured back by the torch. The time taken by the sound waves to travel to and fro the torch and the object will be related to the distance to object from the torch and reflected chain of pulses will be related to the size of the object. The data received by the aid is converted into audible frequency. By training and practice one can feel the obstacles using this ultrasonic torch under development.

Basic Implementation :

There will be a transmitter, a receiver — an ADSP chip, for signal processing and a speaker for data output.

How to use :

Torch has to be held towards the direction of movement and the ON button to be pressed to sense the object on the movement way. Then the aid will give audio output, which can even be connected to an earphone.

2. INFRA-RED OBSTACLE DETECTOR

This aid has a limited purpose of detecting the object only in a constant distance in a fixed range. This will be the least expensive aid. This aid will also look like a torch but the difference is that this will produce the infra-red waves, not sound waves. Infra-red is the electro-magnetic radiation that one can't see-. The rays produced from this aid will hit the object and will be reflected back and such reflected rays will be captured back by a sensor. In other words the rays produced will not be received back, if there is no object on the way. When rays are reflected and received back, the aid will produce an audio beep informing the user about the presence of an object or obstacle on the movement way. The range of detection distance can be changed by adjusting the sensitivity of pre-amp in the sensor section. Interference from external light can be prevented by the process of modulation and de-modulation.

Basic Implementation :

Infra-red emitting diode will emit modulated pulses which will strike on the object. Reflected pulses will be sensed by Infra-red sensor which will be having a lens infront to concentrate the ray at the centre. The received signal is amplified and it will trigger the Beeper circuit.

How to use :

It is a torch like device which is handy to use and less expensive. Adjust the range at which the object has to be detected by turning the knob on the torch.

Both the aids presented above are almost nearing the completion of development. Prototypes are expected to be ready in two or three months period and it may take another six months field trials, feed back and to bring out the final product.

PROGRAMME FOR VISUALLY HANDICAPPED

By : S. R. Das

Sr. Director, Deptt. of Electronics, Govt. of India.

Electronics has potential for improving standard of living and quality of life of people offering appropriate technological solution. Use of computer technology with IT application, virtually all barriers can be overcome.

In sectors relevant to rehabilitation of physically handicapped, development of computerised automatic Braille printing system was endeavour to this direction.

The project entitled BRAILESCRIPT, a desktop computer has been adapted to produce books and literature in Braille, which was hitherto being done manually with all its attendant pitfalls and delays that resulted in a huge gap between demand and supply of Braille books to school children. An ordinary typist with no knowledge of Braille can transcribe books and other text materials into Braille form. The system is capable of transcribing Indian languages besides English to Bharati Braille form. It is currently working in Regional Braille Press, Narendrapur (near Calcutta). Presently Bengali, Assamese, Oriya, Manipuri, Devnagari and English have been incorporated and Marathi and Kannada is under development. A large print display is also being developed for partially blind people. The technology know-how has now been transferred to WEBEL for developing a production model for commercialisation.

As extension of above, "IT for rehabilitation of handicapped" a project is under consideration for implementation. This is based on the development of a network-centric computer facility for imparting education and training to the visually handicapped persons. The network will connect an urban resource centre and rural nodal centres to provide among other things various learning materials and information in Braille form.

NATIONAL BRAILLE LITERACY PROGRAMME

Programme :

1. **Centralized Curriculum and Education Standard.**
2. **Generation of Curriculum Material.**
3. **Generation of out book and Reading Materials.**
4. **Providing Centralized Library facilities with remote access on Network and Internet (Text in Braille form, CD-ROM/Floppy etc.)**
5. **Development and Induction of Appropriate Technology.**
6. **Coordination with various Blind Schools, Agencies and Govt. Organisations.**

Features :

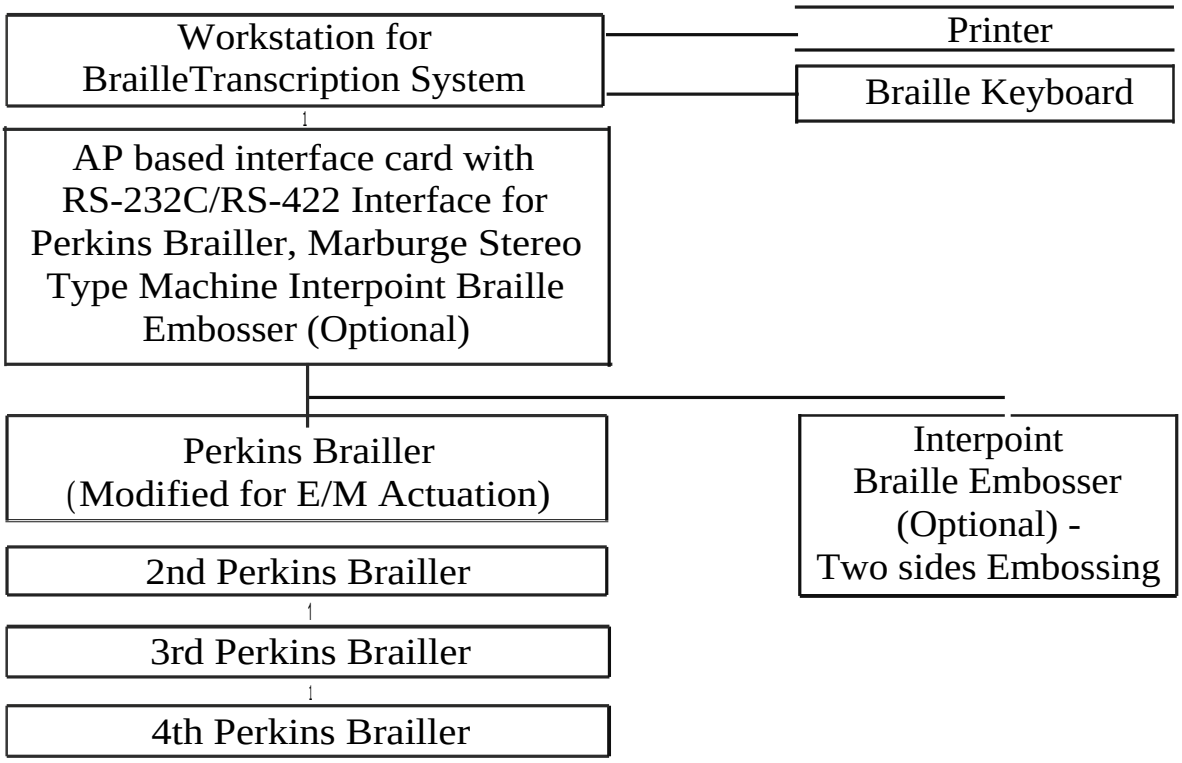
1. **Multi-media Multi-lingual**

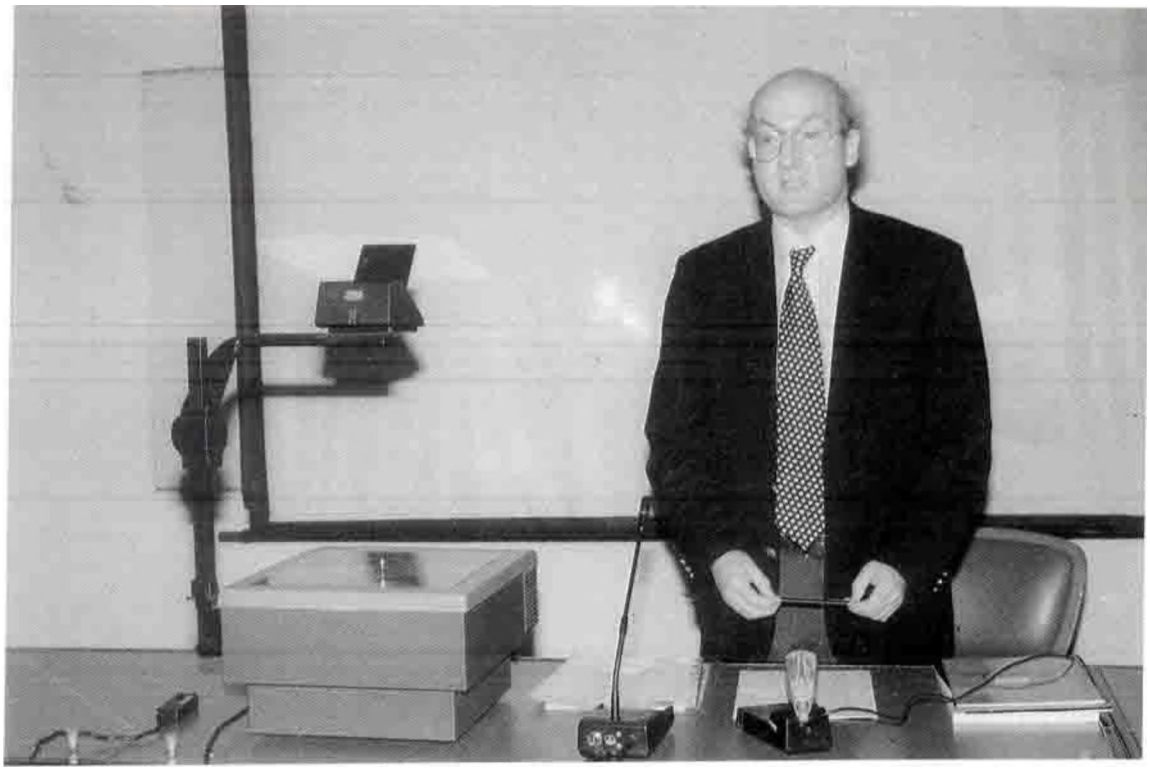
2. Computer based solution.
3. Networking facilities for remote connectivity.
4. Internet linking.

Technology Requirements :

1. Scanning of Multi-lingual Text and conversion to Braille print.
2. Transcription of text written in English and Indian languages into **Braille** print.
3. Conversion of computer text to Tactile device simulating Braille.
4. Text to Voice.
5. Braille to Text.
6. Braille to Voice.
7. Braille Dictionary.
8. Braille Typing Self-teaching Aids with Voice support.
9. Character size magnification on TV or Computer terminals.
10 Learning and using Braille Mathematics.

BRAILESCRIPT





Dr. John Gill, Chief Scientist, Royal National Institute for the Blind, London
delivering the Keynote Address.

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Mrs. Ruth J. Foss, Head Collection Development, National Library Service for the
Blind and Physically Handicapped, The Library of Congress, U.S.A. presenting her paper.

Mr. A. K. Mittal (extreme left), Conference Co-ordinator & Vice-Chairperson, W.B.U. Committee on Technology introducing the Conference.

Blind Consumers looking at Low-Tech and lligh-Tech devices at Exhibition.