

A Survey on Assistive Systems

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Abstract— Assistive technology is any hardware or software designed to enable independence for disabled and older people. Technologies are growing up day to day. The disabled and older people are very difficult to adopt new technologies. Disabled people are an important part of our society who has not yet received the same opportunities as others in their inclusion in the Information society. It is necessary to develop easily accessible systems for computers to achieve their inclusion within the new technologies. The main objective of this paper is to review and discuss the assistive systems that help disabled and older people to be drawn nearer to new technologies.

Keywords— Assistive Technology, Information Society, Accessible Systems

I. INTRODUCTION

Assistive technology as shown in Fig 1 is any item, piece of equipment, software program, or product system that is used to increase, maintain, or improve the functional capabilities of persons with disabilities [1]. Assistive technology helps people who have difficulty speaking, typing, writing, remembering, pointing, seeing, hearing, learning, walking, and many other things. Different disabilities require different assistive technologies. The assistive technology can be

- Low-tech: communication boards made of cardboard or fuzzy felt.
- High-tech: special-purpose computers.
- Hardware: prosthetics, mounting systems, and positioning devices.
- Computer hardware: special switches, keyboards, and pointing devices.
- Computer software: screen readers and communication programs.
- Inclusive or specialized learning materials and curriculum aids.
- Specialized curricular software.
- Much more electronic devices, wheelchairs, walkers, braces, educational software, power lifts, pencil holders, eye-gaze and head trackers, and much more.

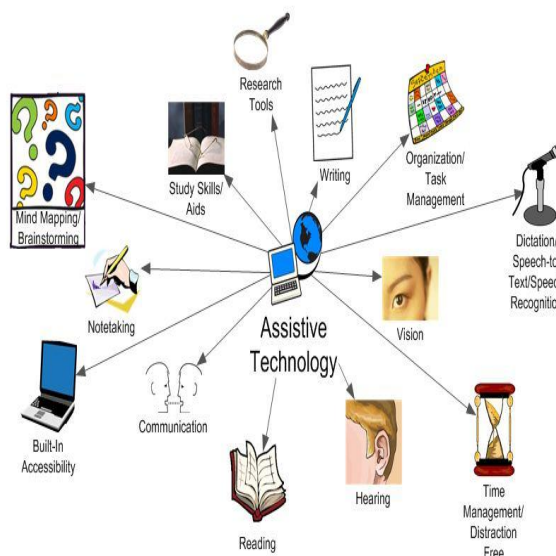


Fig 1: Assistive Technology

Assistive or Adaptive Technology (AT) involves a device or a computer based accommodation that helps an individual with special needs to work around or compensate for a disability and enhancing individual ability [2]. Assistive technologies play an important role in equalizing opportunities for people with disabilities in several aspects of life as this technology enables them to overcome various limitations and obstacles faced in all types of environments [3]. According to the Assistive Technology Act of 1998, “assistive technology means any item, piece of equipment, or product system, whether acquired commercially, off the

shelf, modified or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities". The law goes on to say that, "an assistive technology service is any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology device". These devices, equipment or systems can be very cost effective to schools and the end result will be very beneficial [4]. The Assistive Technology provides various means for a blind or partially sighted person to overcome several barriers such as the need to read print, use of a computer workstation, taking notes and communicating on paper and in electronic settings [5]. The term AT is generic and used to describe assistive, adaptive and rehabilitative devices for people with varying degrees of disability. Essentially, these technologies are aimed at assisting or expanding human function or capabilities [6]. Assistive Technology (AT) can help these children achieve these tasks and also help them perform better academically, socially and even physically [7].

Significance of Assistive Systems:

When appropriate to the user and the user's environment, assistive technology is a powerful tool to increase independence and improve participation. It helps individual people become mobile, communicate more effectively, see and hear better, and participate more fully in learning activities. Moreover, assistive technology supports people to access and enjoy their rights; do things they value; and bridges disparities between people with and without disabilities. It provides the means of access to and participation in educational, social and recreational opportunities; empowers greater physical and mental function and improved self-esteem; and reduces costs for educational services and individual supports. Benefits in areas such as health, mobility and education have been linked to the use of assistive technology. By improving access to education and increasing achievement in school, assistive technology can have a positive socioeconomic effect on the lives of children with disabilities [8].

Given opportunities to flourish as others might, people with disabilities have the potential to lead fulfilling lives and to contribute to the social, cultural and economic vitality of their communities [9]. Assistive technology reduces costs when it supports early childhood development and educational achievement, and avoids repetition of learning missed due to educational barriers. It reduces costs by supporting independent functioning and access to healthcare in lieu of personal support services, and independent community living in lieu of institutionalization. Assistive technology may "reduce the need for formal support services, reduce the time and physical burden for caregivers, [and prevent] falls, injuries, further impairments and premature death [10].

II. TYPES OF ASSISTIVE SYSTEMS

Following are some of the different types of assistive systems.

A. Access and Environmental Controls

Access and control devices as shown in fig 2 allow increased control of the environment or open up access to things in the environment. Some of these electronic controls are switches, special keyboards or mice, and remote controls as well as things that help people get around the community, like ramps, automatic door openers, and Braille signs [11].



Fig 2: Access Control Devices

B. Aids to Daily Living

There are special tools as shown in Fig 3 for daily activities, like brushing teeth, dressing or eating. There include adapted utensils, plates and cups, non-skid surfaces, and specially designed toilet seats and shower stalls [11].



Fig 3: Living Aids

C. Assistive Listening Aids

There are supports that help a student who is either deaf or has a hearing loss. There include hearing aids, amplifiers, captions on TV, and typing telephones [11] as shown in Fig 4.



Fig 4: Hearing Aids

D. Augmentative/Alternative Communication Aids

Communication aids are supports that allow a child who cannot speak, or whose speech is not understood by others, to communicate. They are picture boards, voice output communication devices, communication software and

computers, communication cards with texts, communication board with letters, symbols or pictures and electronic communication device with recorded or synthetic speech [11] as shown in Fig 5.



Fig 5: Communication aids

E. Computer-Based Instruction Aids

Instruction aids are software to help students with learning difficulties in reading, writing, math and other subject areas [11] as shown in Fig 6.



Fig 6: CBI devices

F. Mobility Aids

Mobility aids as shown in Fig 7 are equipments that allow a student with a physical or visual disability to move independently and safely through the community. Such aids wheelchairs, walkers, and adapted bicycles, Walking stick, crutch, walking frame, manual and powered wheelchair, tricycle Artificial leg or hand, leg or hand splint, clubfoot brace Corner chair, supportive seat, standing frame Adapted cutlery and cooking utensils, dressing stick, shower seat, toilet seat, toilet frame, feeding robot[11].



Fig 7: Assistive Wheel chair

G. Positioning Aids

Positioning aids as shown in Fig 8 help a student with a physical disability remains in a good position for learning without becoming tired. Some of them are adjustable chairs, tables, standers, wedges and straps [11].



Fig 8: Assistive Standers

H. Visual Aids

Visual aids are supports that give a student with visual difficulties access to information. These include large-print books, books on tape, magnifiers, talking computer software, and Braille, Eyeglasses, magnifier, magnifying software for computer White cane, GPS-based navigation device Braille systems for reading and writing, screen reader for computer, talking book player, audio recorder and player Braille chess and balls that emit sound [11] as shown in Fig 9.



Fig 9: Assistive Magnifier

III. CURRENT RESEARCH IN ASSISTIVE TECHNOLOGY

Assistive Technology as any tool, equipment, system, or service designed to help develop, maintain or improve a person with a disability to function in all aspects of his or her life. Many researches are ongoing in assistive technology. Some research areas are

- Alternative Human Computer Interfaces for People with Motor Disorders
- AT Centres and Service Delivery Issues
- Design for All and Mainstreaming in Ambient Assisted Living - The Role of Networking
- ICT-Based Learning Technologies for Disabled People
- Power Mobility

- Acceptance and Use of E-health Technology by Older Adults and Professionals
- User Interface Generation
- Standardization within the Assistive Technology Field
- The Development and Implementation of “Remote Care”
- Using the Cloud to Enhance AT

IV. CONCLUSION

Assistive technology is most useful for the people with disabilities and aged people to overcome their disabilities. The main objective of Assistive technology is to give same opportunity for the disable people as that of normal people to access technology. Depending upon the usage the assistive systems can be a software or hardware. This study would help the researchers involved in development of Assistive Applications.

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