Booth: Digital Audio- and Voice-Based Tools for Inclusion in Education and Everyday Life

Zeki Öztürk and David Smida
THM - University of Applied Sciences
BliZ - Study Centre for Blind and Visually Impaired Students
Gießen, Germany
e-mail: consulting@bliz.thm.de

***Abstract*—Visually impaired persons encounter considerable hurdles in reading text and operating computer programmes. Whereas able-sighted people rely on screen output and mouse or touchpad navigation, blind and heavily ill-sighted users can not. Particularly those who lose eyesight later in life, in many countries constituting the majority of visually impaired people, find it impossible to learn Braille. These persons therefore have to resort to low-threshold, high performance digital aides. The Centre for Blind and Disabled Students at Technical University Mittelhessen, BliZ, have almost 25 years of experience in advising blind students and staff and interested organizations in using or providing such aids. This counseling is manufacturer-independent and based on best-of-breed experience of BliZ staff. In a booth at IARIA conference, camera systems, visual screen readers, smartphones with a variety of additional software and voice output, among others, will be on display for demonstration, the participants' personal experience, and subject-oriented discussion.**

Keywords—Inclusion in Education; Inclusion in Everyday Life; Overhead Camera System; Assistive Technologies; blind and visually impaired students.

I. INTRODUCTION

Assistive technologies of students, such as screen magnification devices and (mobile) workstations with speech output and Braille display, shown in Figure 1 and digital accessibility in higher education build an important fundament for equal opportunity and inclusive education at Universities and University of Applied Sciences [1] [2].

Visual impairments are categorized in the following three stages:

- mild visual impairment: < 30% vision,
- severe visual impairment < 5% vision and
- blindness < 2% vision.

The eye with the stronger vision is decisive [3]. The showcased auxiliary tools for magnification are utilized by severely visually impaired people. No optic corrective actions, such as glasses or magnifiers, suffice.

The electronic magnification aids are also utilized by blind people, who still possess a small remaining percentage of sight, e.g., Macular Degeneration. However, blind people primarily work with refreshable braille display or use audio output.

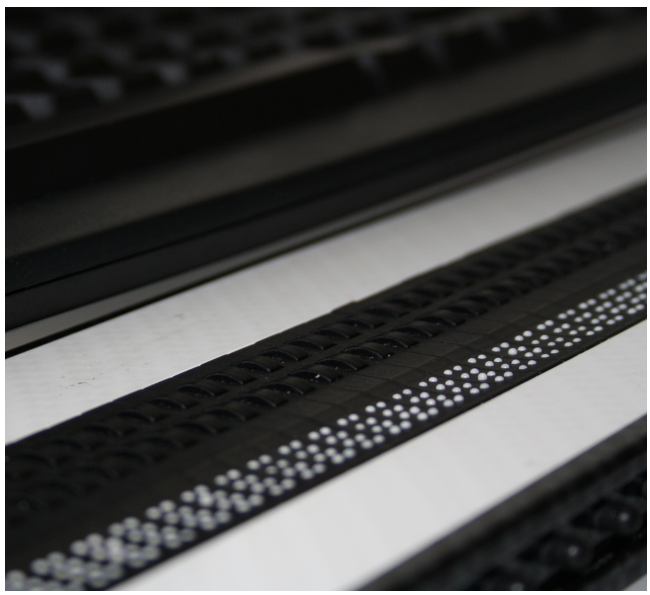

Figure 1. Braille display shows, the content of the source device in Braille.

The following article describes how Assistive Technologies for blind and visually impaired students may be used in higher education.

II. DIGITAL AUDIO- AND VOICE-BASED TOOLS

Among others, the following technologies and devices will be shown. In Figure 2, a device for reading text from print material and regarding printed pictures and objects can be seen. Steering of the camera is achieved by functional buttons. Via Bluetooth, the captured picture is displayed on the computer screen. Magnification can be up to a hundred times using a special software.

For users with a rest vision, this technology enables to read text and see pictures that would otherwise be inaccessible in portions and put them together in their imagination. With the same technology, also presentations and speeches can be recorded and magnified on a spectator's screen. As the technology is intuitive, newly-affected visually disabled persons can easily access print and IT contents. An advantage over the screen reader is that also print materials are made accessible on the one hand and the user remains approachable for discussion on the other.

 ISBN: 978-1-68558-084-1

Figure 2. Overhead Camera System in Combination with Multitudinal Magnification.

A mobile solution for all everyday situation is provided by smartphone apps as seen in Figure 3. Inversion of colours does not only allow better conception of shapes and letters, but enables also users with color blindness, which with 10% of the population is one of the most frequent, albeit slight, visual impairments.

Reading signs, identifying signals of traffic signs, and navigation by map augmentation are among the most important capabilities for independent life. But also sightseeing is possible by considering snapshots on-site and deciding which detail will be worth to explore further.

Figure 3. Smartphone with Magnification and Color Inversion Technology.

As pictures can be shared by virtual drives and bluetooth, this method is highly inclusive and fosters communication with sighted people.

Moreover, it is more affordable than many other options. The devices shown in Figures 2 and 3 are also capable of reading text aload with integrated screen readers and voice-guided commands as already known e.g., from Google Assistant or Apple Siri.

In self-study and non-interactive situations, voice-based „reading and writing“ may be one of the most accessible and quickest options. It is left to training and personal preferences, to which extent the audio channels are used. All options have in common, that they are particularly valuable to persons for whom magnifying glasses or eyeglasses constitute too weak aids.

III. CONCLUSIONS

This paper shows that devices, together with a number of special software, will be on display on the booth. A visually disabled counsellor of the BliZ - Centre for Blind and Disabled Students at Technische Hochschule Mittelhessen will navigate through various possibilities for addressing ill-sightedness. Moreover, a specialist for digital accessibility will narrate about the implications of training and job integration of visually impaired students and personnel. Though the pictures in this exposé may at first sight look trivial, exploring low-threshold offerings in-depth will enable participants of the Special Track to further understand the needs and possibilities of digital accessibility for near-blind users. On-site counselling for special projects is available on request.

REFERENCES

[1] S. Voß-Nakkour, L. Rustemeier, M. M. Möhring, A. Deitmer, and S. Grimminger, Digitale Barrierefreiheit in der Bildung weiter denken: Innovative Impulse aus Praxis, Technik und Didaktik, Translation: Thinking ahead to digital accessibility in education: Innovative impulses from practice, technology and didactics, 1st ed., Universitätsbibliothek Johann Christian Senckenberg, Frankfurt, 2023. DOI: https://doi.org/10.21248/gups.62773.

[2] F. R. Sharma and S. G. Wasson, Speech recognition and synthesis tools : Assistive Technology for Physically Disabled Persons; International Journal of Computer Science and Telecommunications, vol. 3, issue 4, pp. 86-91, April 2012.

[3] WHO. Blindness and vision impairment. [Online]. Available from: https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment 2023.04.06

 ISBN: 978-1-68558-084-1