

# **Trends in Assistive Technologies and Digital Accessibility**

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# Overview

- Introduction
- State of the Art
- Future trends in assistive technologies
- Final remarks

# Introduction

Zürcher Hochschule  
für Angewandte Wissenschaften

**zhaw** School of Engineering  
InIT Institut für angewandte  
Informationstechnologie





VersaBraille (1982)

First refreshable Braille display



Outspoken (1989)

First screen reader for graphical user interfaces

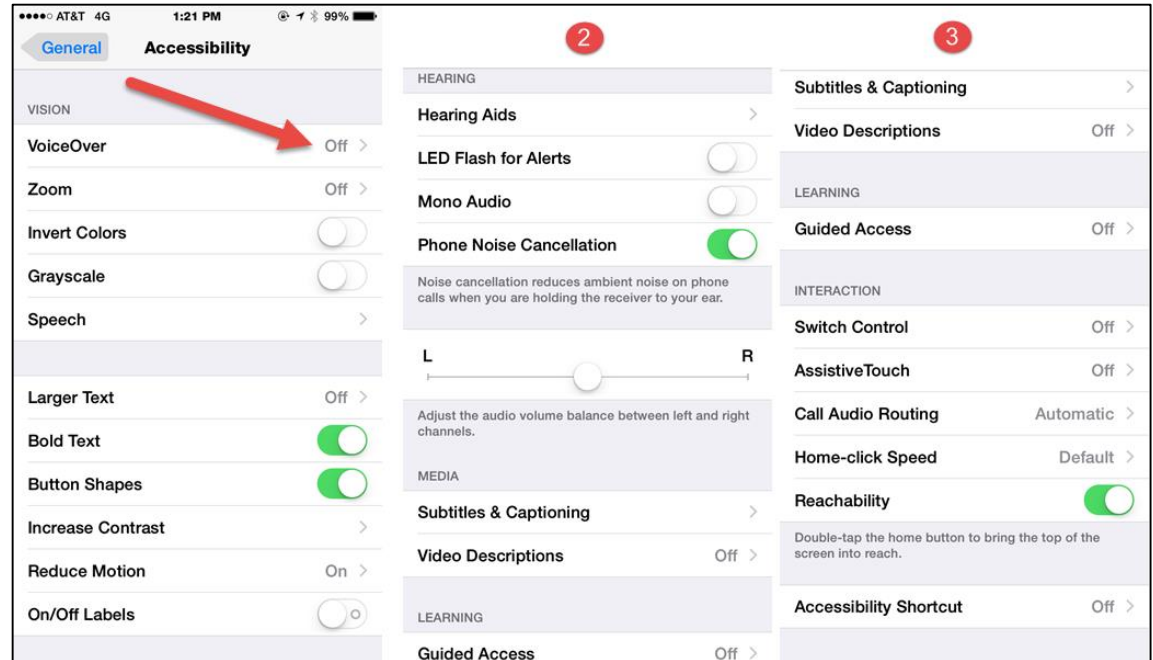
Web access for the blind (WAB) (1996)

ETH project



# Assistive technologies (AT)

- Built-in assistive technologies in mainstream products
- Specialized devices



- ATs for primary users
- ATs for secondary users

## National and international competence center on ICT accessibility

### Research and Development

- Accessible education (funded by Hasler Foundation 2008)
- web and document accessibility
- Automatic sign language translation

### Training

- CAS in accessible web design, PDF accessibility
- Word and PowerPoint accessibility

### Services

- Tactile printing
- Graphs, text (3D)
- Swisscom

# Accessible Education

- PAVE
- Microsoft Accessibility Plugins



The image shows the PAVE website interface. At the top is the PAVE logo and navigation links: Introduction, FAQ, Background Information, Contact, DE, and EN. Below the navigation is the heading 'Four steps to an accessible PDF'. The text explains that PAVE can be used to make PDF documents accessible and to interpret conventional reader programs correctly. It mentions that the ICT Accessibility Lab of the ZHAW School of Engineering developed PAVE and is making it available free of charge for personal use. A diagram illustrates the four steps: 1. Upload your PDF document to PAVE. 2. PAVE will make the automatic corrections. 3. Simply make the remaining corrections yourself in PAVE. 4. Now you can download the accessible PDF document. The PDF document will remain on the PAVE server for a maximum of three weeks, unless you delete it manually beforehand. At the bottom is a button labeled 'Start PAVE'.

**Four steps to an accessible PDF**

You can use PAVE to make your PDF documents accessible and to interpret conventional reader programs correctly. It does not change the visual layout of your PDF. The [ICT Accessibility Lab of the ZHAW School of Engineering](#) which developed PAVE, is making it available free of charge for personal use. Give it a try! If you want to make a large volume of PDFs accessible, please [contact us](#).

1. Upload your PDF document to PAVE.  
**Please note:** The maximal allowed file size is 5 megabytes.
2. PAVE will make the automatic corrections.
3. Simply make the remaining corrections yourself in PAVE.
4. Now you can download the accessible PDF document. The PDF document will remain on the PAVE server for a maximum of three weeks, unless you delete it manually beforehand.

[Start PAVE](#)



# Awards



2006:  
Credit Suisse Award



2009:  
Biene Award



2014:  
PAVE  
ICCHP



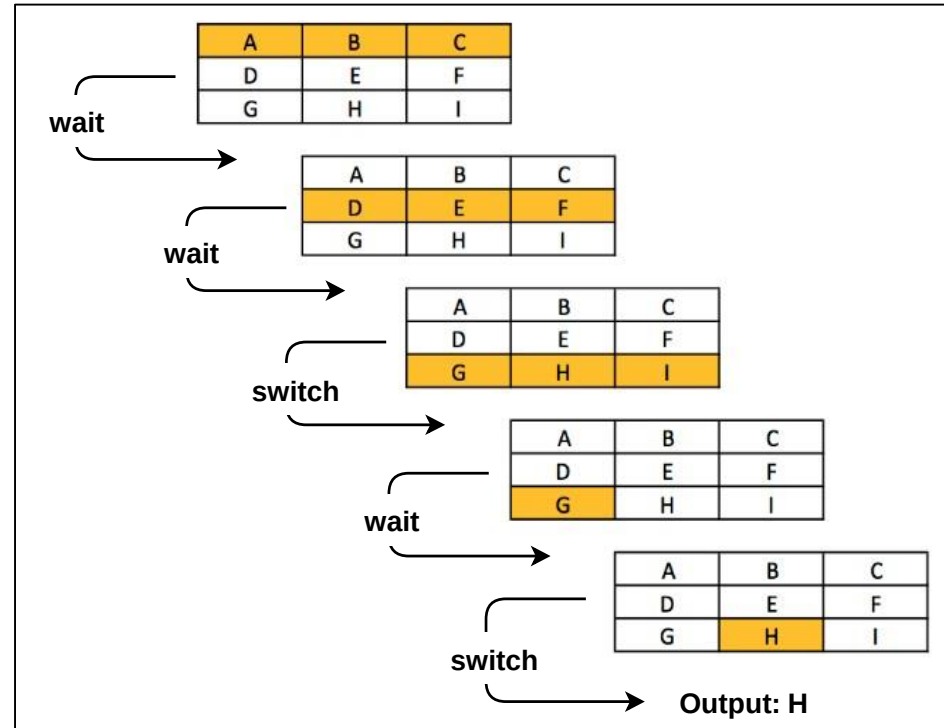
2016:  
UNESCO Prize  
for Digital  
Empowerment  
of Persons with  
Disabilities



# State of the art

# AT for mobility impairments

- Mechanical switches
- Sip-and-puff switches
- Surface-electromyography (SEMG)
- Video-based gesture recognition
- Eye-tracking
- Audio input



# AT for mobility impairments

## Tobii (eye tracking)



# AT for mobility impairments

## Wheelmap

The screenshot displays the Wheelmap.org website interface. At the top, the logo 'wheelmap.org' is accompanied by the tagline 'Rollstuhlgerechte Orte finden'. Navigation links include 'Über Wheelmap', 'Karte', 'Projekte', 'News', 'Presse', and 'Kontakt'. A search bar with the placeholder 'Nach Ort suchen' is present, along with filters for 'WC' and 'Essen & Trinken'. The main map area shows Zurich with various accessibility icons (green for full, orange for partial, red for not accessible). A popup for 'Bar Hotel Seefeld' is open, showing its location and accessibility status. The popup includes a section for 'Rollstuhlgerechtigkeit' with three options: 'Voll Rollstuhlgerecht' (green), 'Teilweise rollstuhlgerecht' (orange), and 'Nicht Rollstuhlgerecht' (red). It also has a button to 'Hilf mit und markiere den Toiletten-Status!'. The bottom of the page features social media links for Twitter and Facebook, a user profile '689314', and a footer with 'Hauptförderer', 'IMMOBILIEN SCHUTZ 24', 'Impressum', 'Ein Projekt der', and 'SOZIALHELDEN'.

wheelmap.org  
Rollstuhlgerechte Orte finden

Über Wheelmap Karte Projekte News Presse Kontakt

Nach Ort suchen

WC Essen & Trinken

Zoomen näher heran, um mehr Orte zu sehen

Bar Hotel Seefeld  
Zürich > Essen & Trinken > Pub

Rollstuhlgerechtigkeit:

- ☐ Voll Rollstuhlgerecht
- ☐ Teilweise rollstuhlgerecht
- ☐ Nicht Rollstuhlgerecht

Hilf mit und markiere den Toiletten-Status!

Details

Data: © OpenStreetMap contributors, Icons: CC-BY-SA Maps Icons Collection

689314 Twitter Like 3

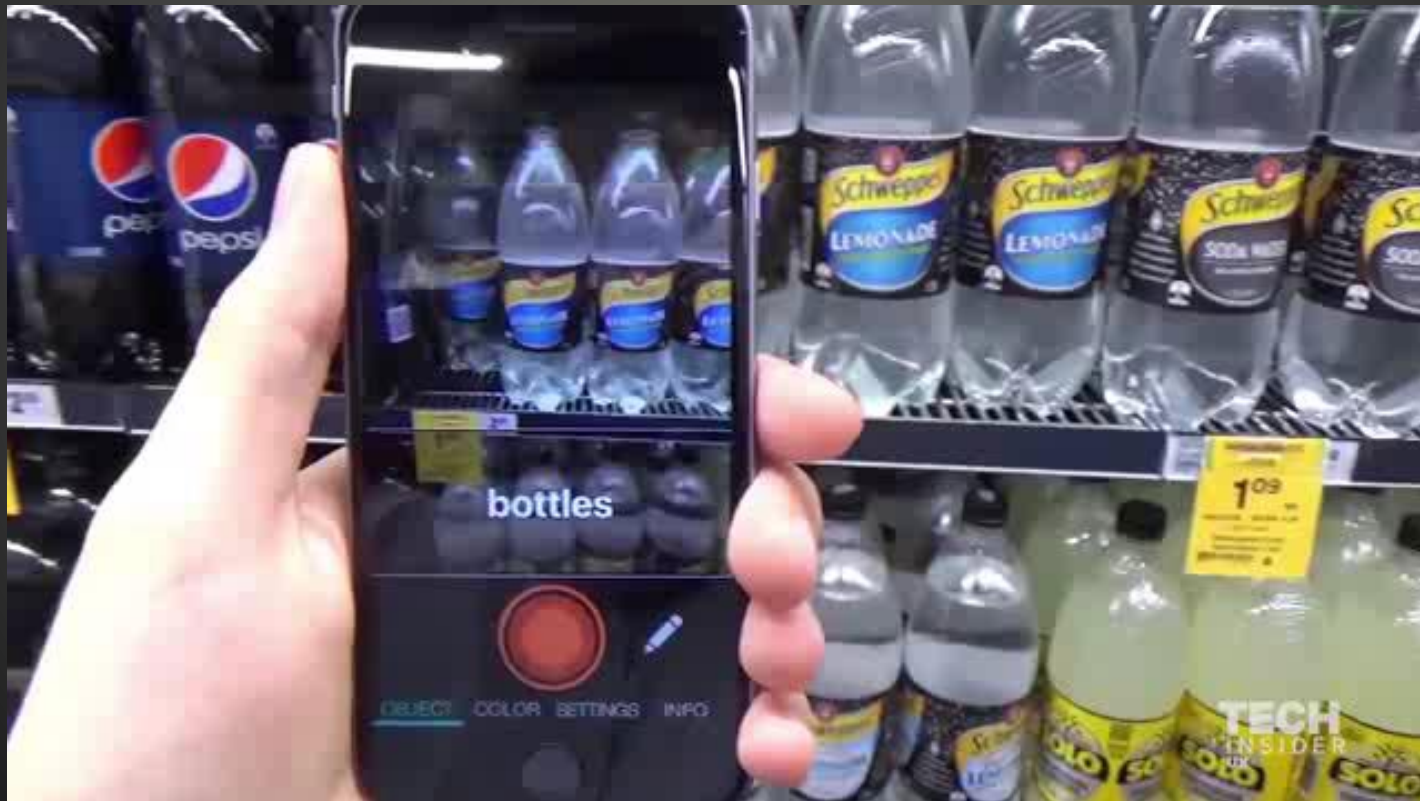
Hauptförderer IMMOBILIEN SCHUTZ 24 Impressum Ein Projekt der SOZIALHELDEN

# AT for vision impairments

## Demo VoiceOver (iPhone)

# AT for vision impairments

## Aipoly Vision

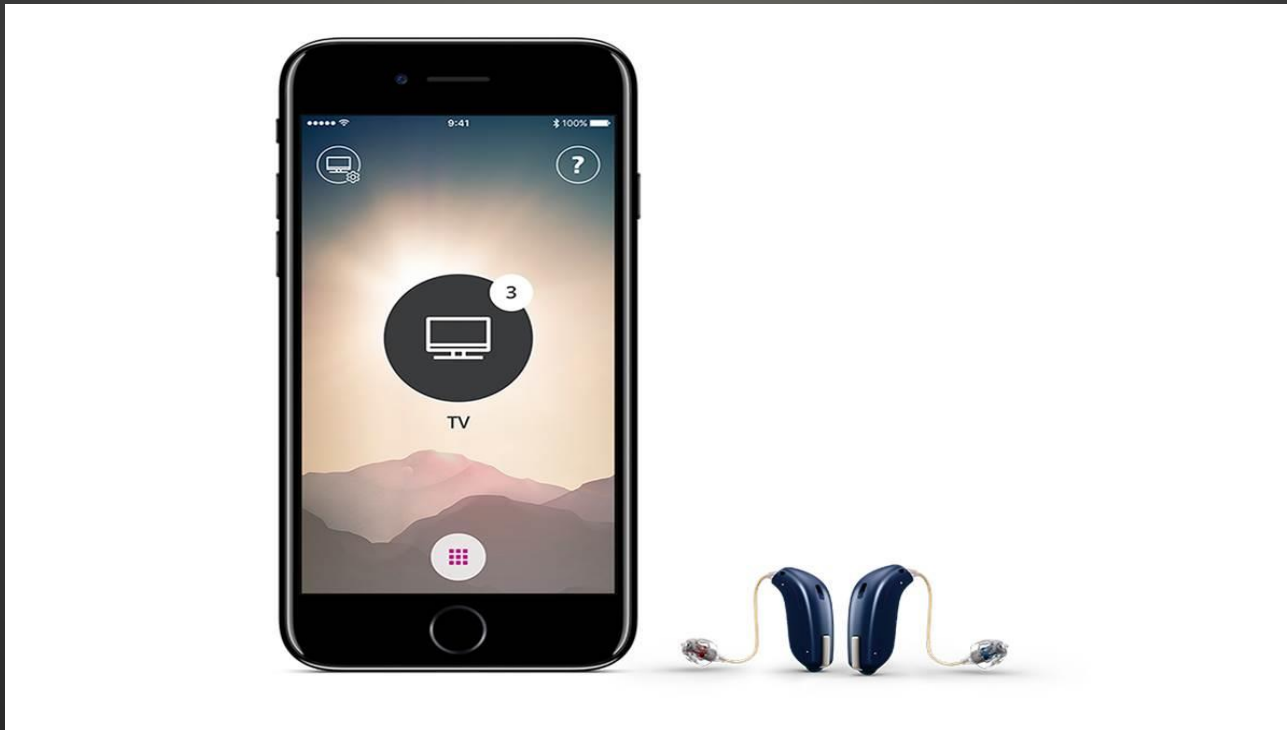




# AT for hearing impairments

## Oticon Opn

- Internet of Things
- Machine learning





# AT for speech impairments

## Talkitt



# Future trends in assistive technologies

# Scenario 1.1: Vision impairment

## MIT: Wearable navigator



The system consists of:



a depth camera  
and computer



a refreshable  
braille display



and a haptic  
vibration belt

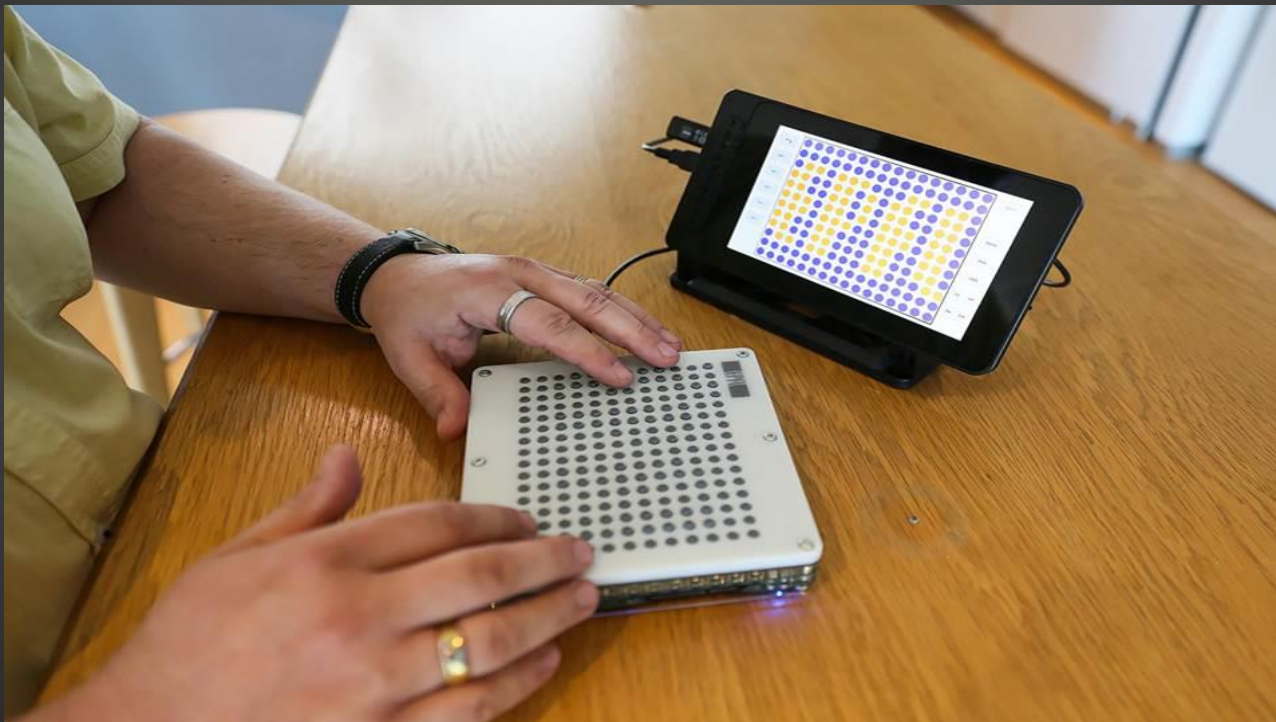
# Scenario 1.2: Vision impairment

## Microsoft Smart Sunglasses



# Scenario 1.3: Vision impairment

## BlindPad





# Scenario 2.1: Hearing impairment

## AI Lip Reader (artificial intelligence)



# Scenario 2.2: Hearing impairment

## SignAloud (artificial intelligence)





# Scenario 3.1: Mobility impairment

## Brain-Computer Interface



# Scenario 3.2: Mobility impairment

## Self-driving wheelchair





# New Technologies

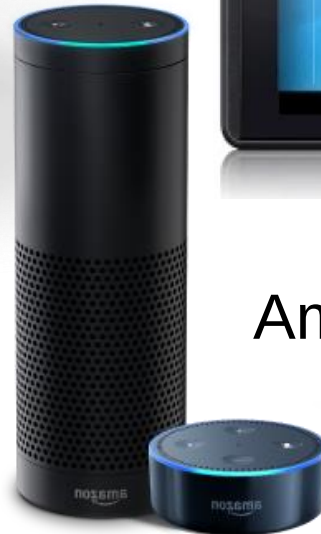
Google Tango



Microsoft HoloLens



Amazon Echo



Google Home



# Final remarks

- Don't reduce PWDs to their disabilities
- Consider PWDs as equal counterparts
- Practice Universal Design
- Involve PWDS from the beginning in accessibility projects
- Collaborate with experts in digital accessibility and assistive technologies



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PAVE: <http://www.pave-pdf.org/>



# Thank you!

