

New Approaches to Accessibility

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What We'll Do Today

- Disabilities
- Technology Trends
- MobileAccessibility Project
- Other Mobile Projects

Basic Data

- 650 million people world-wide are disabled
- 16% of US population to ages 15 to 64 is disabled.
- 10% of the workforce is disabled
- 5% of the STEM* workforce is disabled
- 1% of PhDs in STEM are disabled

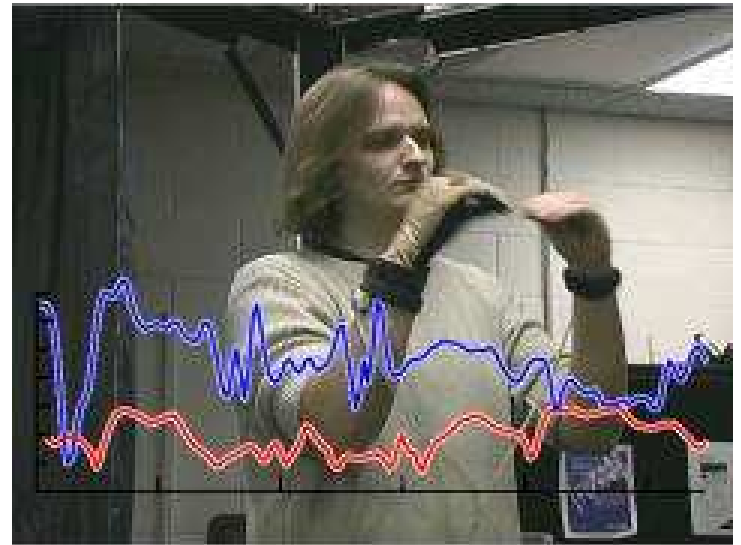
*STEM = Science, Technology, Engineering, Mathematics

Disabilities

- Vision
 - Blind
 - Low-Vision
 - Color Blind
- Hearing
 - Deaf
 - Hard of Hearing
- Speech
 - Ability to speak
 - Stuttering
- Mobility
 - Ability to walk
 - Ability to use hands/arms
- Cognition
 - Dyslexia
 - Short-term memory loss
 - Dementia
- Multiple
 - Deaf-blindness

Models of Disability

- **Medical Model**
 - Disabled people are patients who need treatment and/or cure.
- **Education Model**
 - Disabled youth need special education.
- **Rehabilitation Model**
 - Disabled people need assistive technology and training for employment and everyday life.
- **Legal Model**
 - Disabled people are citizens who have rights and responsibilities like other citizens. Access to public buildings, voting, television, telephone, and education are some of those rights.
- **Social Model**
 - Disabled people are part of the diversity of life, not necessarily in need of treatment and cure. They do need access when possible.



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Personal Texting by Deaf People



TTY used by deaf people
in their homes
circa 1970



Modern TTY with
built-in acoustic modem



SMS texting

Optical Character Recognition for Blind People



Kurzweil Machine
Circa 1976



KNFB Reader Mobile

Speech Recognition for Hands Free Access

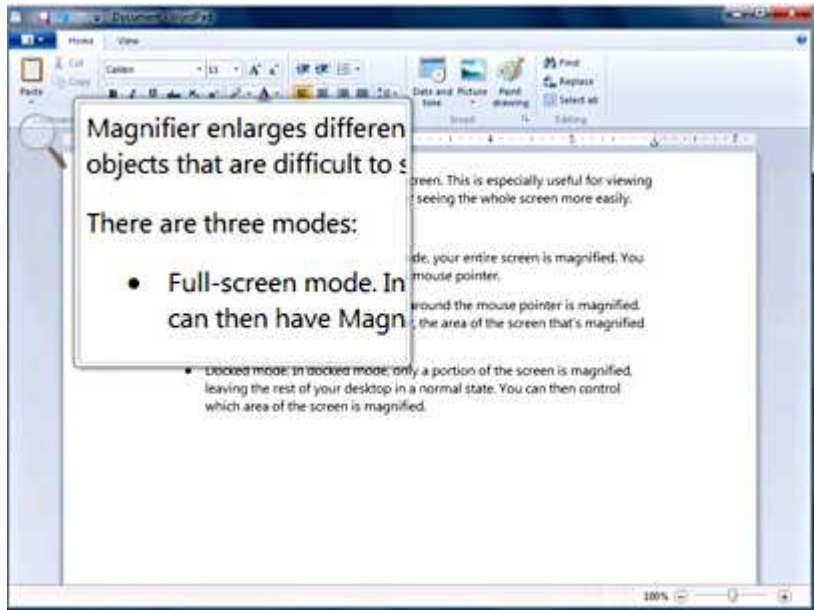


Ray Kurzweil introduced the first commercial large-vocabulary speech recognition software in 1987



Mobile Speech Recognition

Built-in Accessibility

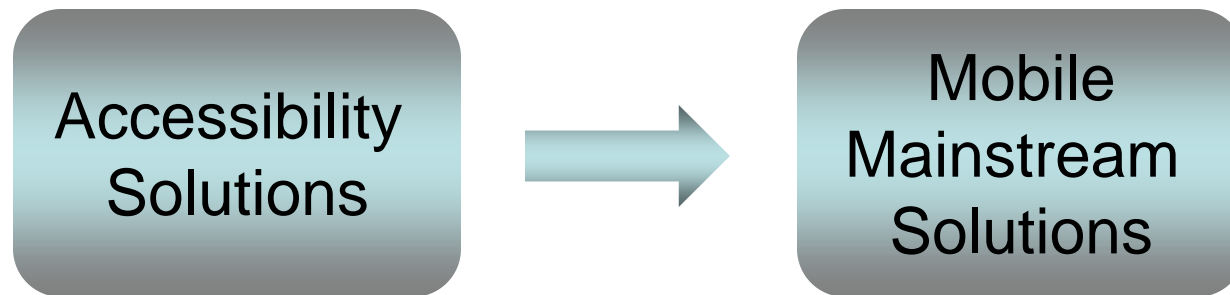


Windows 7 Magnifier

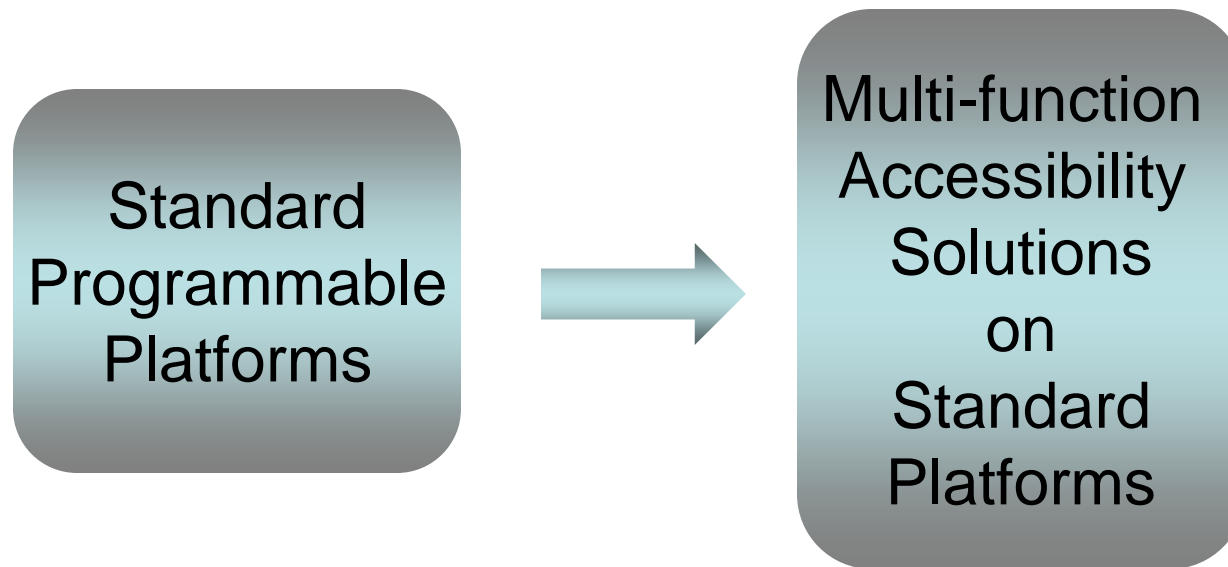


iPhone VoiceOver

Trend



New Trend



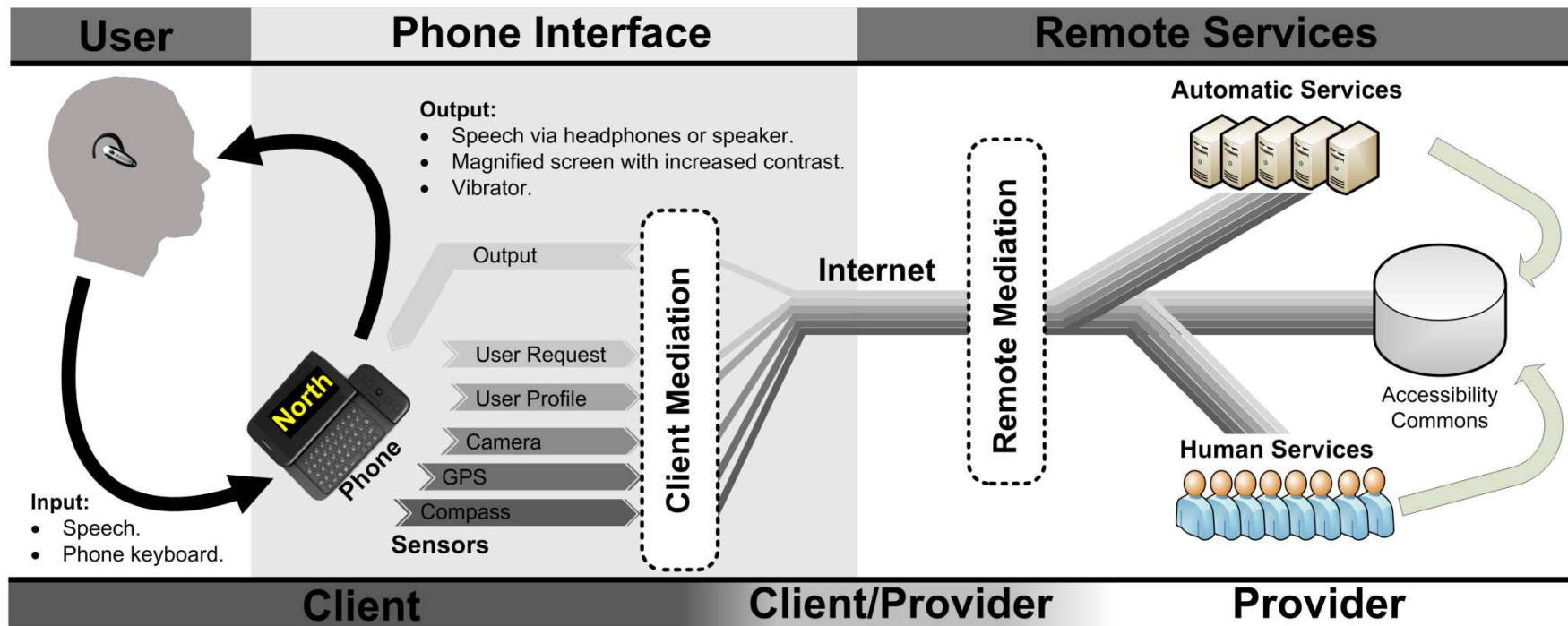
Laptops, notebooks, phones,... are programmable!!

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MobileAccessibility

Bridge to the world for blind, low-vision and deaf-blind people



<http://mobileaccessibility.cs.washington.edu>

Platform

- Sensors
 - Video camera
 - Microphone
 - GPS
 - Compass
 - Accelerometer
- Human input
 - Keyboard
 - Touch screen
 - Speech
- Output
 - Speech
 - Audio
 - Visual
 - Vibration



Alternative Platforms



iPhone



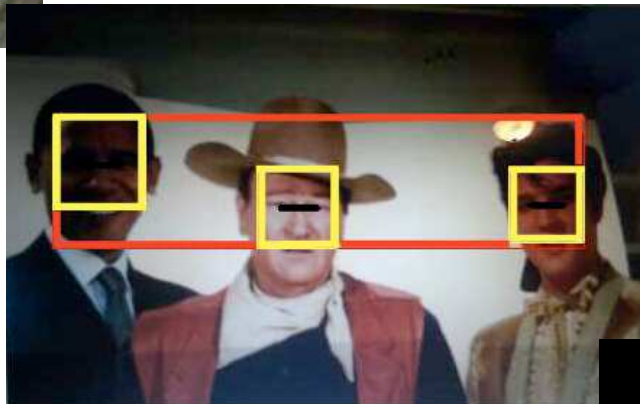
Windows phone

Blind Portraits

Chandrika Jayant

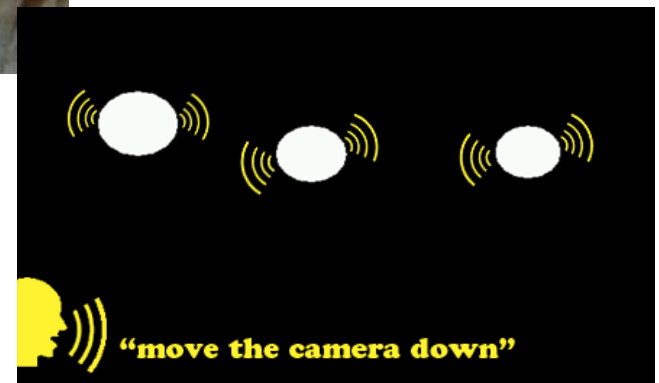


Portrait



Find Faces

Vibrate and Speak



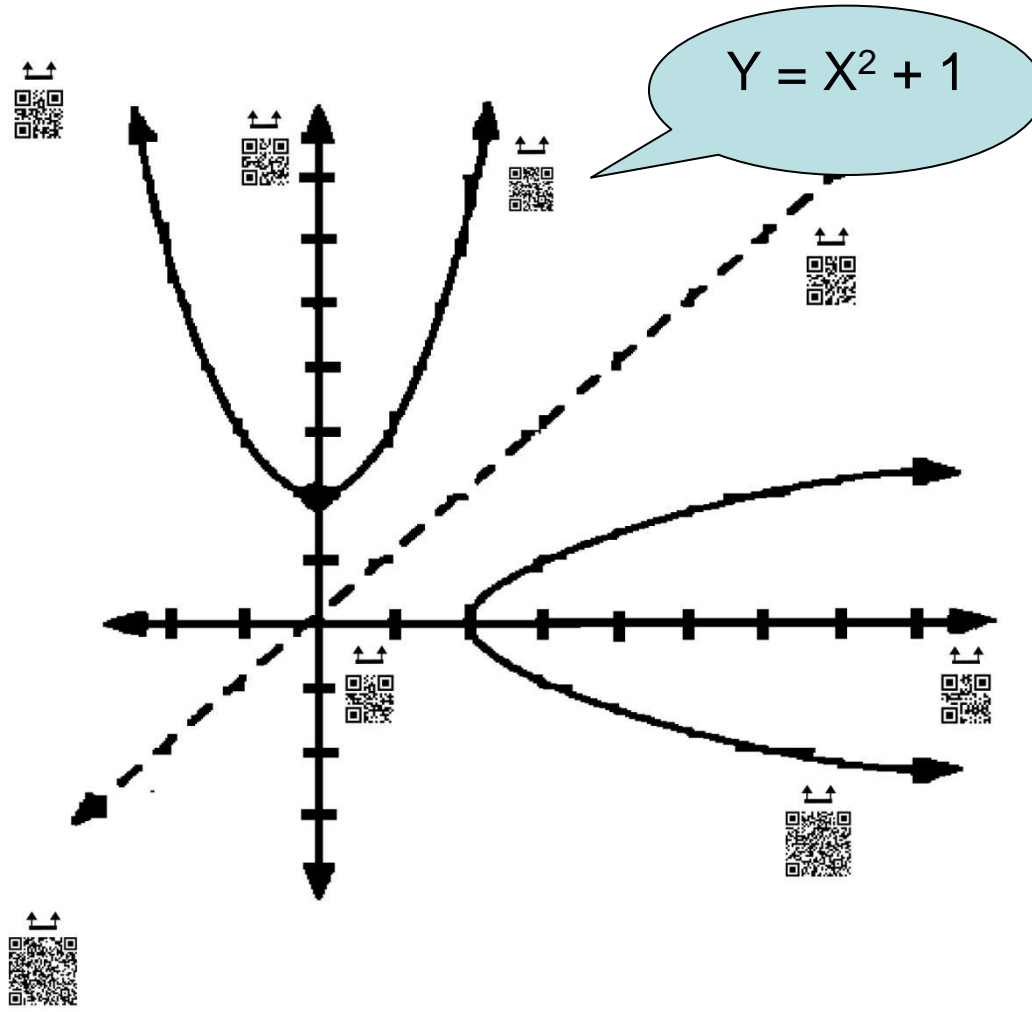
Talking Barcode Reader

Chandrika Jayant



Tactile Graphics

Josh Scotland, Chandrika Jayant



Appliance Reader

Chandrika Jayant, Tom Guo



It is 2:35 AM, at 29.8 Celsius, and 73% humidity.

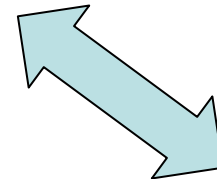
<http://www.mtixtl.com/productimages/oven/box-panel-300.jpg>

GoBraille

Shiri Azenkot



Refreshable Braille Display, WiFi Enabled



Google Maps



OneBusAway



Capstone Projects From 2010

<http://www.komonews.com/news/local/87737592.html?tab=video>

Capstone Projects From 2011

- **The Phone Wand** - Navigating routes using orientation and vibration feedback.
- **Pic2Speech** - Custom augmented speech.
- **Street Sign Reader** - Reading street signs so you don't have to.
- **WhosHere** - Finding out which friends are around you.
- **SwipeSounds** - The sound of gestures.
- **Sound Detector** - Detecting recognizable sound patterns to alert the user.

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Ideal Group



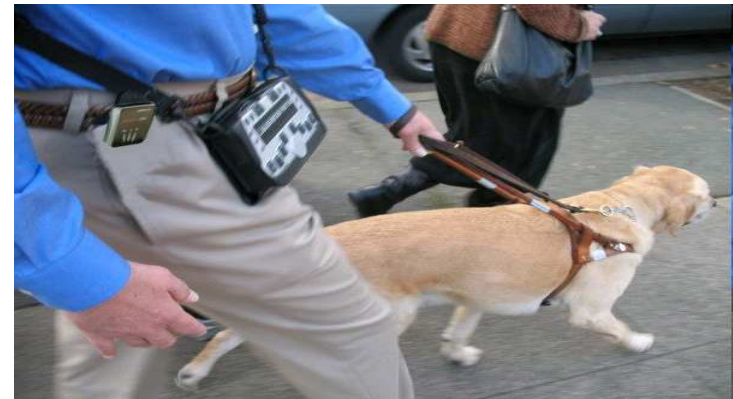
<http://ideal-group.org/sj131264/>

Project Possibility

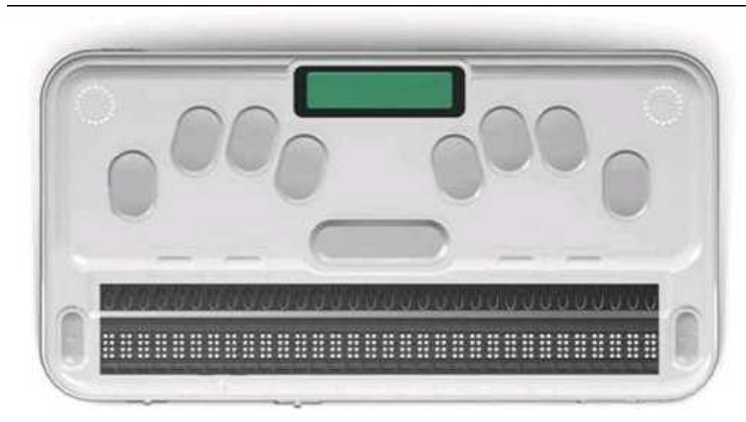


<http://projectpossibility.org/index.php>

Braille Notetakers



BrailleNote



Braille Sense

BrailleNote with GPS



DeafBlind Communicator



VizWiz

- Bigham, Jayant, ... (UIST 2010)
 - Take a picture and send it to humans with a recorded question.



MobileASL

Eve Riskin, Jake Wobbrock, ...

ASL communication using video cell phones over current U.S. cell phone data network

Challenges:

- › Limited network bandwidth
- › Limited processing power on cell phones
- › Limited battery life



Research

- User Centered Design
- Lab studies
 - Control as much as possible
- Field studies
 - Instrument to log data
 - Experience sampling
 - Diaries
 - Surveys

