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.

Geerat Vermeij

TV Raman
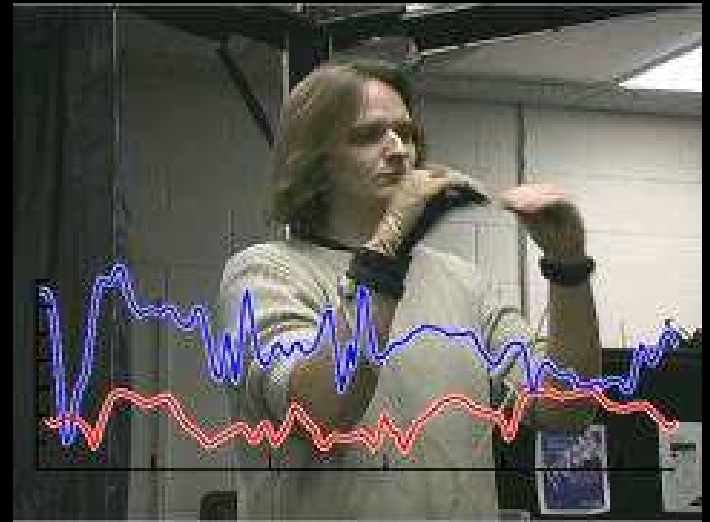
Christian Vogler

Chieko Asakawa

Jeanine Cook

Stephen Hawking

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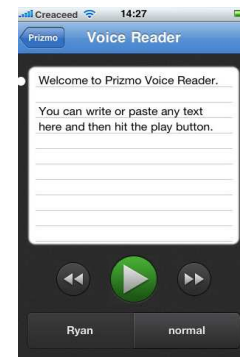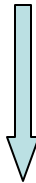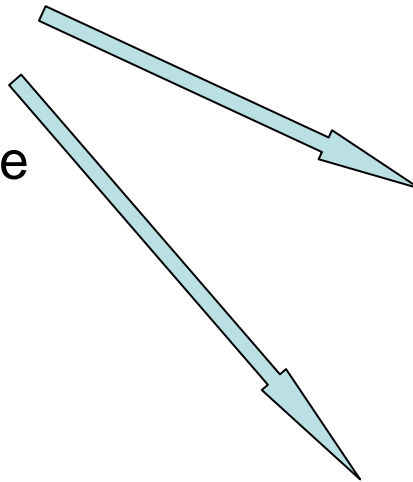- Other Mobile Projects

OCR Story

KNFB Reader Mobile

Kurzweil Machine
Circa 1976

iPhone Prizmo

Accessibility Innovations Matter

Innovations for
People with Disabilities

→

Solutions for
Everyone
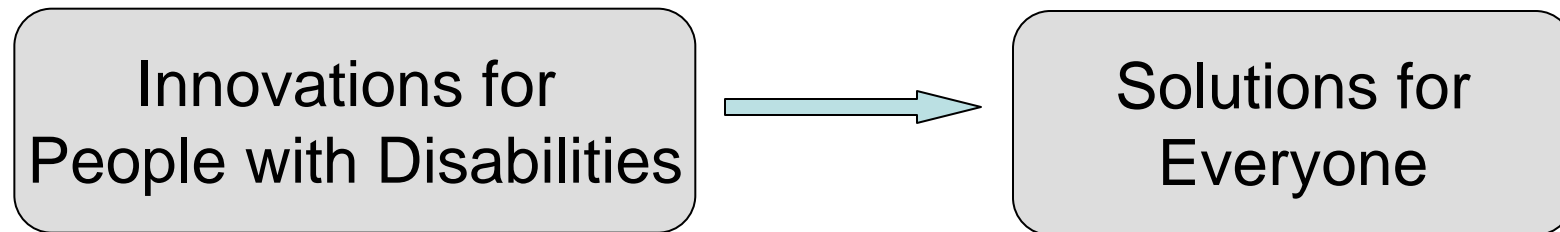
- ❑ Telephone
- ❑ Personal texting
- ❑ Speech recognition
- ❑ Speech synthesis
- ❑ Electric toothbrush

Personal Texting by Deaf People

TTY used by deaf people
in their homes
circa 1970

Modern TTY with
built-in acoustic modem

SMS texting
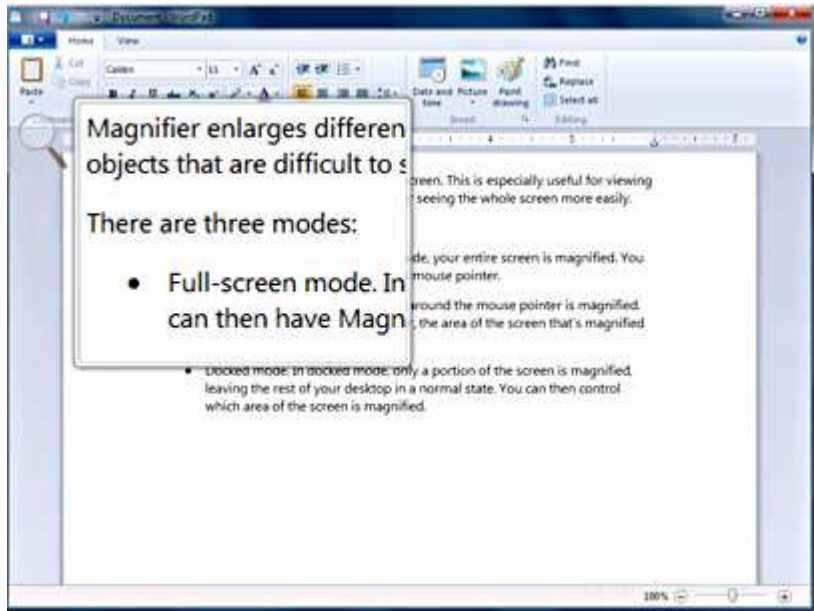
Speech Recognition for Hands Free Access

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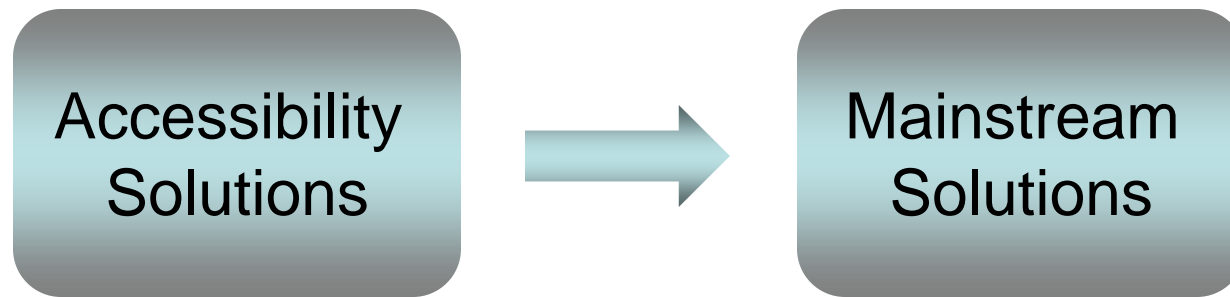

Mobile Speech Recognition
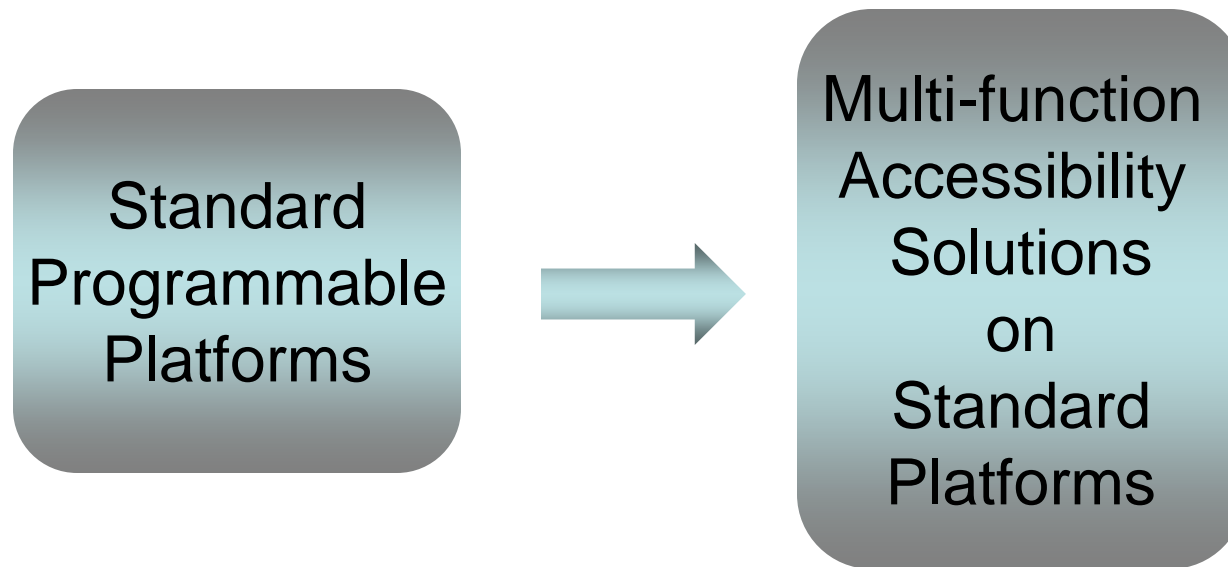
Built-in Accessibility

Windows 7 Magnifier

iPhone VoiceOver

Trend

Accessibility Solutions → Mainstream Solutions

New Trend

Standard Programmable Platforms → Multi-function Accessibility Solutions on Standard Platforms

Laptops, tablets, notebooks, phones,… are programmable!!

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MobileAccessibility Project
bridge to the world for blind, low-vision and deaf-blind people

Speech output

SMS

Web Services

Smartphone

Braille Input/Output

GPS
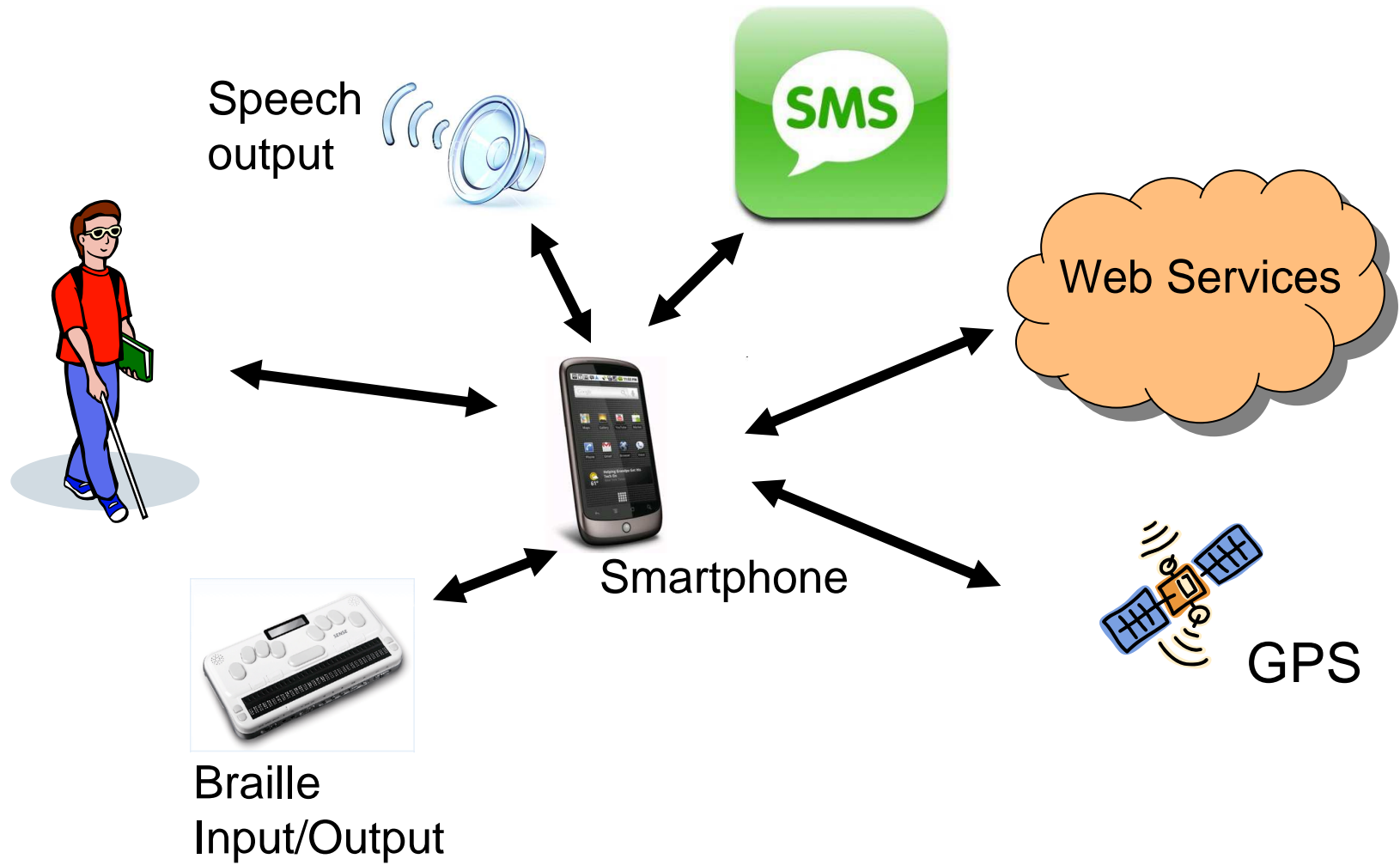
Platform

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

Alternative Platforms

iPhone

Windows phone

Color Identifier

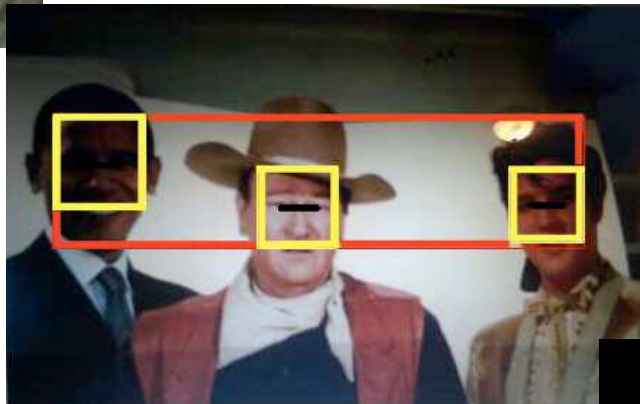# Currency Reader

"Twenty Dollars"

iPhone
Android
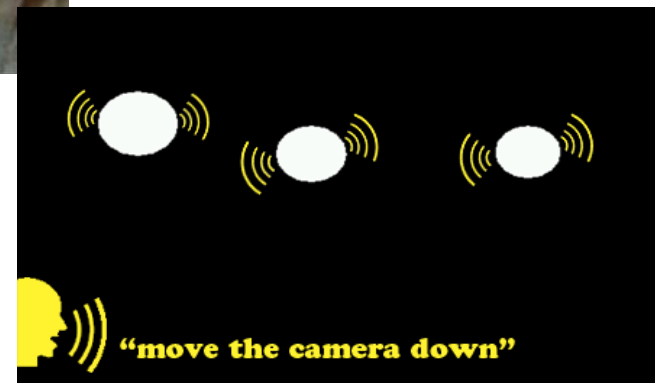
Blind Portraits
Chandrika Jayant

Portrait

Find Faces

Vibrate and Speak
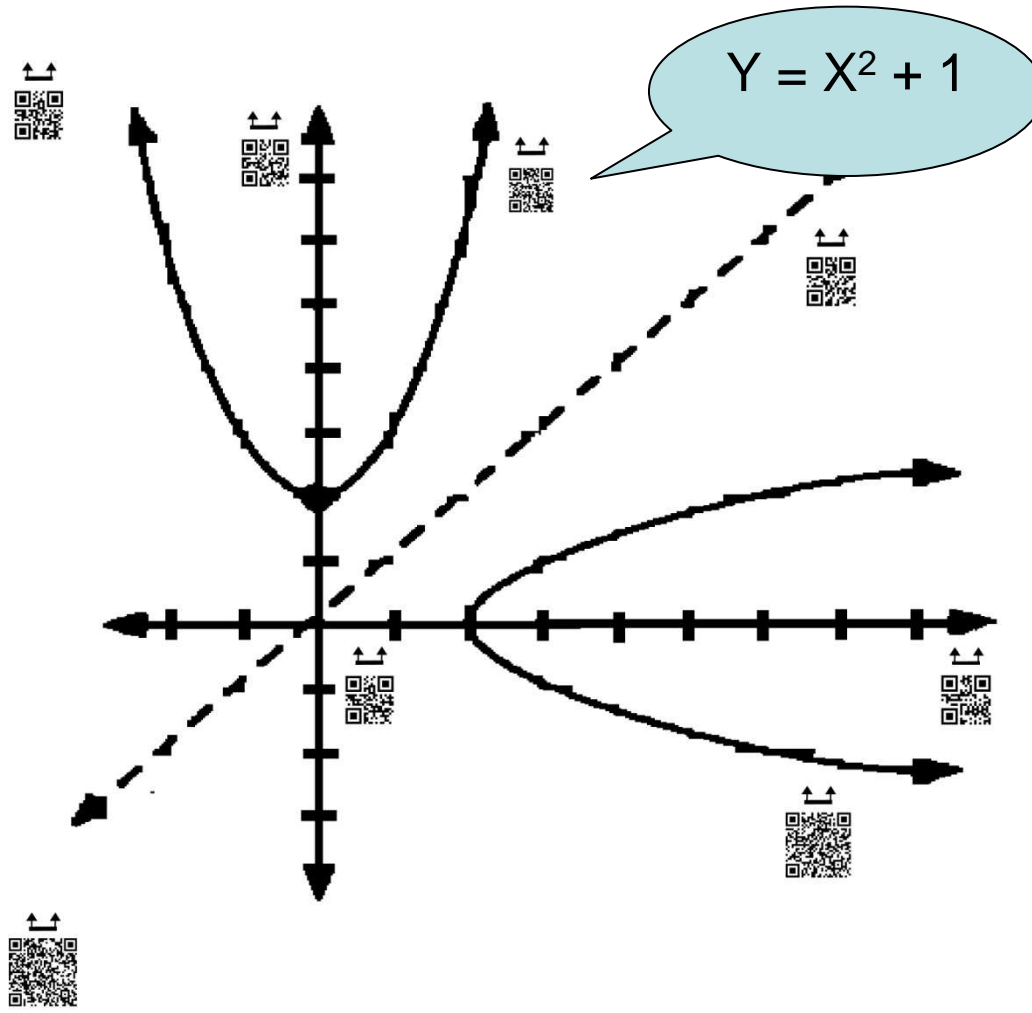
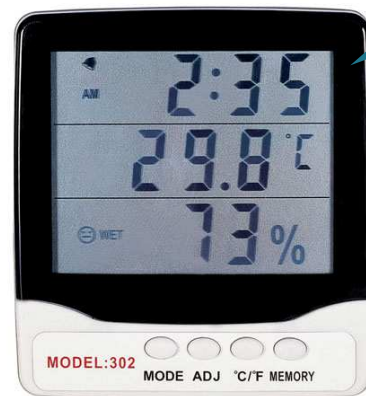# Talking Barcode Reader
Chandrika Jayant

Tactile Graphics
Josh Scotland, Chandrika Jayant

Appliance Reader
Chandrika Jayant, Tom Guo

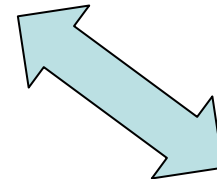It is 2:35 AM, at 29.8 Celsius, and 73% humidity.

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

GoBraille
Shiri Azenkot

Refreshable Braille
Display, WiFi Enabled

Google Maps

OneBusAway

GoBraille
Repository

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Ideal Group

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

Project Possibility

http://projectpossibility.org/index.php
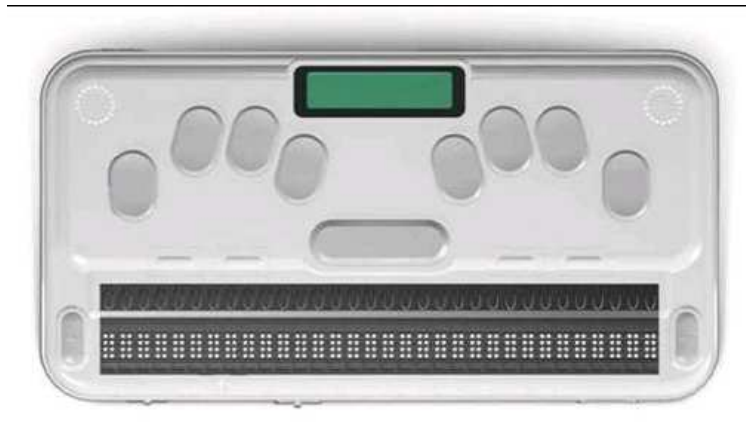
Braille Notetakers

BrailleNote

Braille Sense

29

Braillenote with GPS

DeafBlind Communicator

VizWiz

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

"What does this street sign say?"

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

Video

Research

- Computer Vision
- Multi-sensor integraton
- Artificial Intelligence (AI)
- Human-Computer Interaction (HCI)

User Centered
Design