MobileAccessibility

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motivation

Mainstream cell phones becoming more powerful and sensor-driven

+ Web services becoming more prevalent (human and automated)

= Access & independence for blind, low-vision, deaf-blind users on the go
overview

• Background
• MobileAccessibility Project & HCI Challenges
• Camera Focalization
• Project Ideas
• Getting Started with Android
• Questions
background

Blind, low-vision, deaf-blind users left out of the mobile revolution

Need for low-cost assistive services for mainstream mobile devices

GOAL: Mobile Phone as Portable Accessibility Tool

*improve cost, sustainability, and adoption*
motivating scenarios

Which door is the ladies' bathroom?
Am I at my destination bus stop yet?
What brand of cereal is this?
I need to find my other red sock.
What is my thermostat set to?
What appetizers do they have here?
How do I walk to the Suzzallo Library from here?
mobileaccessibility

Design and Evaluate:

(i) intelligent, multi-modal, mixed-initiative client interfaces to the phone
(ii) Intuitive interfaces for human web service providers for adequate latency and quality
(iii) mediating interfaces between clients and remote services
web services

• Mechanical Turk
• Volunteers
• Automatic + Fallback- Hybrid
• Common Repository
• Studies
  • Scope of requests
  • Intuitiveness, speed, accuracy, and feasibility
  • Try to find some baselines
platform

- Android G1
  - More phones rolling out (DROID)
  - Open platform
  - Easier to develop on than iPhone
- Text to Speech API
- Eyes-Free Shell (VoiceOver for iPhone)
prototypes

• Barcode reader (building on zxing)
• Location finder
• Color recognizer/ color scanner
• One Bus Away
• iPhone GPS navigation for low-vision (iWalk)

• Possible benefits from leveraging more vision
my focus

Semi-autonomous focalization + Camera interaction techniques

Allow blind and low-vision people to successfully use their cameras to provide the necessary information to an application/service to reach their goal
related projects

• KNFBReader Mobile
• Prototype for camera for blind
• Sensecam
• Touch Screens
• Talking Signs
• Touch Sight
• vO'ICe
usage scenarios

• Reading a menu, currency, documents
• Finding a lost object
• Getting product information
• Enhancing travel information
• Reading environmental text in buildings
• Reading street signs
• Taking well-framed photos
• Art
• Alerting user of pre-expressed interests
• Recognizing faces
camera focalization

- Need real-time interaction
- Field of view and location information
- On board computer vision or remote service
- Snapshot or scanning
- Lower resolution (esp. with video)
- Blur
- Perspective distortion
- Complex backgrounds
- Not ok with regular OCR
camera focalization

Development of prototypes and studies

- kNFB Reader
- OCR with human/auto web service
- Barcode reader with remote information
- Find the red ball in the room
interactions

• Template/ pattern matching
  • General
• Object recognition in environment
  • Specific

• Device-driven with interrupts, or
• Actively queried
user-centered design

- Qualitative and quantitative feedback
- Lighthouse for the Blind
- Deaf-blind community classes at SCCC
- National Federation for the Blind

- Students with disabilities recruited to participate in work directly affecting them
value-sensitive design

- Direct and indirect stakeholders - identify
- Benefits and harms for each stakeholder group
- Relationship to corresponding values
- Conceptual investigation of key values
- Identify potential value conflicts

(Friedman et. al. '06)
longer term goals

• Successful and growing repository
• Enlarge user base
• Make easy for developers to add, share, and iterate on applications (that includes you!)
• Sustainability
project ideas

- One Bus Away - detect location on bus route
- Sound sensor for the deaf-blind
- Bluetooth between cell phone & braille display
- V-Braille
- OCR testing in the wild
- Mechanical Turk studies
- Focalization
project ideas

• Walking Directions
• Track travel with google maps and GPS
• Speech recognition for deaf users
• 911 canned messages for emergencies for deaf people.
• Touch screens/ ATMs
android

• Develop! Download SDK.
• G1 or Emulator
• Eclipse, Ant
• http://developer.android.com/index.html
• Text to Speech API
• Native Code (NDK)
• Our Code Repository
  • http://code.google.com/p/mobileaccessibility/
• ADC next year
discussion

http://mobileaccessibility.cs.washington.edu
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