Accessibility Capstone

Richard Ladner
University of Washington

What We'll Do Today

• Capstone Administration
• Introductions
• Disabilities
• MobileAccessibility Project
• Ideas for Projects

Goal of Capstone

• Design, build, and test accessibility applications on the Android platform.
• Present results.
  – Code in the open source MobileAccessibility repository or other repository
  – Short paper
  – Poster and presentation

Teams

• Work will be done in teams to be determined in the next week.
• Initial practice projects will be done individually in first two weeks.
• Each team will have a mentor that will meet with team on a regular basis.
• Teams will meet with instructor and TA on a regular basis.
Instructors and Mentors

• Richard Ladner
• Shani Jayant (TA)
• Shiri Azenkot (Mentor)
• Shaun Kane (Mentor)

Tentative Schedule

• 01/05/10 - Introduction to Mobile Accessibility Applications
• 01/07/10 - Introduction to Android Platform and Development Environment
• 01/12/10 - Project Assignments and Teams Assigned
• 01/14/10 - Team Meetings (TBA)
• 01/19/10 - Concept Presentations for feedback
• 01/21/10 - Team Meetings (TBA)
• 01/26/10 - Work plan presentations for feedback
• 01/28/10 - Team Meetings (TBA)
• 02/02/10 - Team Meetings (TBA)
• 02/04/10 - Team Meetings (TBA)
• 02/09/10 - Team Meetings (TBA)
• 02/11/10 - Prototype presentations for feedback
• 02/16/10 - Team Meetings (TBA)
• 02/18/10 - Team Meetings (TBA)
• 02/23/10 - Team Meetings (TBA)
• 02/25/10 - Team Meetings (TBA)
• 03/02/10 - Team Meetings (TBA)
• 03/04/10 - Team Meetings (TBA)
• 03/09/10 - Final Project Demonstrations
• 03/11/10 - Poster Session

Grading Criteria

• Functionality of the accessibility application(s) - Does it actually work as intended
• Quality of the code - Can the code be adopted by others as part of an open source effort
• Innovation - Is the application novel
• Impact - Does the application have impact on the lives of people with disabilities
• Quality of written report
• Quality of the poster and presentation
• Effort - Was the student's effort proportional to the overall team effort (A team is expected to have equal effort from each member)

Web Page

Students

- Acuario, Christine Marie
- Behmer, Jason Michael
- Bouchet, Malik
- Escarez, Toby Leon
- Hollier, Janet Ruth
- Knox, Stillman Matthias
- Kwan, Steven
- Langley, Megan Moriko
- Oh, Moon Hwan
- Scotland, Joshua David
- Shen, Amanda Maria
- Yapit, Hussein

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

Demographics US Population

Source: U.S. Census Bureau, Survey of Income and Program Participation, 2002

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
Braille

- System to read text by feeling raised dots on paper (or on electronic displays). Invented in 1820s by Louis Braille, a French blind man.

```
   a       b       c       z
   and     the     with    mother
   th      ch      gh
   Z       3
```

Mode characters: cap and num.

Text-to-Speech (TTS)

- Invented in 1960s at Bell Labs
- One original motivation for blind people to have books read to them (Kurzweil)
- Screen Readers
- Quality Criteria
  - Naturalness
  - Understandability
  - Speed

MobileAccessibility

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

Platform

- Video camera
- Microphone
- GPS
- Compass
- Accelerometer
- Human input
  - Keyboard
  - Touch screen
  - speech
**Infrastructure**

- Text to Speech API
- Eyes Free Shell

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**V-Braille**

Making Braille accessible using the touch screen and vibrator

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**Current Mobile Accessibility Apps**

- Color Detector (Camera, local)
- Location Finder (GPS, network)
- Compass (Compass, local)
- Bar Code Reader (Camera, network)

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**Ideal Group**

- [http://www.ideal-group.org](http://www.ideal-group.org)
- Speaking Pad V1.2.0: [http://apps4android.org/speaking_pad.htm](http://apps4android.org/speaking_pad.htm)
- iAugComm V1.0.0: [http://apps4android.org/iaugcomm.htm](http://apps4android.org/iaugcomm.htm)
- SMSpeaker V1.0: [http://apps4android.org/smspeaker.htm](http://apps4android.org/smspeaker.htm)
- Talking Caller ID V1.0.0: [http://apps4android.org/Talking_Caller_ID.htm](http://apps4android.org/Talking_Caller_ID.htm)
K-NFB Reader Mobile

- Optical Character Recognition
- Focalization
- GPS
- Cell Phone

Bar Code Reader

- SCAN GOSPEECH (MODEL SC100)
- i.d. Mate II

Braille Notetakers

- Braille Sense
- BrailleNote

BrailleNote with GPS
**DeafBlind Communicator**

**MorseSMS for Deaf-Blind**

- The program "reads" out incoming SMS in Morse code for blind/deaf-blind people by vibrating
- Sending of SMS by typing in the letters in Morse code (Dit/Dah)

**Vibrators**

**Variety for Projects**

- Six Projects (2 students per project)
- Variety of Disabilities
  - Blind
  - Low-vision
  - Deaf-blind
  - Deaf
  - Limited speech
  - Limited memory
- Variety of inputs
  - Buttons
  - Key Board
  - Touch Pad
  - Speech
- Variety of outputs
  - Visual Magnification
  - Speech
  - Vibration
  - Bluetooth to alt. device
- Variety of sensors
  - Microphone
  - Camera
  - GPS
  - Compass
  - Accelerometer
- Network
  - Web service
  - Mechanical Turk
  - Local
Variety of Access Goals

- Everyday living in the home
- Transportation / mobility
- Education
- Communication
- Games

Criteria for Projects

- Doable in one quarter
- Accessibility
  - Target group can use it
- Usability
  - Easy to learn
  - Easy to use
- Impact
  - Makes a difference
- Novelty
  - Not totally obvious

Local Examples

- Color Detector
  - Blind, camera, speech output
- Color Coordinator
  - Color blind, camera
- Sound detector
  - Deaf-blind, microphone, vibration output
- Augmented Speech (Symbol to Speech)
  - Speech limited, touch screen, speech output

Network Examples

- Location finder
  - Blind, GPS, speech output
  - Deaf-Blind, GPS, Braille output
- OneBusAway application
  - Deaf-Blind, Braille output
- OCR
  - Blind, camera, speech output
- Speech to Text – for face to face communication
  - Deaf, microphone, text output
More Ideas