New Directions in Accessible Computing

Richard Ladner
University of Washington
Computer Scientists

TV Raman
Google

Chieko Asakawa
IBM Japan
Computer Scientists

Raja Kushalnagar

Christian Vogler
Computer Scientists

Anindya “Bapin” Bhattacharyya
Helen Keller National Center
Engineer

Iraq War Veteran
Jonathan Kuniholm
Steven Hawking
Sangyun Hahn
Ph.D. Student
CSE

UW Students

Zach Lattin
Math Major

Students
The Message

• People with disabilities can do almost anything in almost any scientific field.
• People with disabilities are often highly motivated to pursue careers in accessible computing research.
What We’ll Do Today

- Models of Disability
- Data
- Impact of Access Technology
- Accessibility Research
- Empowerment
- AccessComputing
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. Accessibility to public buildings and spaces, voting, television, and telephone 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.
Technology

• **Prosthesis**
  – Augmentation to restore lost function. Call it a “cure.”

• **Assistive technology**
  – Popular in rehabilitation literature. Emphasis on the need for assistance.

• **Access technology**
  – Allows an activity that would be difficult to impossible to achieve without it. Emphasis not on restoring function, but on achieving an end goal by whatever means possible.
  – Examples: Screen readers, video phones, wheelchairs
What We’ll Do Today

• Models of Disability
• Data
• Impact of Access Technology
• Accessibility Research
• Empowerment
• AccessComputing
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
What We’ll Do Today

- Models of Disability
- Data
- **Impact of Access Technology**
- Accessibility Research
- Empowerment
- AccessComputing
- Discussion
Personal Texting by Deaf People

TTY used by deaf people in their homes circa 1970

Modern TTY with built-in acoustic modem

Instant Messaging
Optical Character Recognition for Blind People

Kurzweil Machine
Circa 1976

K-NFB Reader Mobile
Speech Recognition for Hands Free Access

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

UW student 2006
Built-in Accessibility

Windows 7 Magnifier

iPhone VoiceOver

9/21/09
Trend

Accessibility Solutions → Mainstream Solutions
Potential Trend

Standard Programmable Platforms

Multi-function Accessibility Solutions on Standard Platforms

Laptops, notebooks, phones, … are programmable!!
Example: Digital Pen

Tactile Graphic

Digital Pen

Tactile Graphic

Josh Scotland, RL
What’s the problem?

The New York Times

Tuesday, September 15, 2009

Insurers Fight Speech-Impairment Remedy

Insurers, including Medicare, won’t pay for $300 speech solution on an iPhone, but will pay for an $8,000 single function “medical device” for text-to-speech generation.

Why? The iPhone is not considered to be a medical device.
Disabled people viewed only in the medical model.
Possible Future Scenario

• Blind person buys a standard cell phone and data service.
• Downloads accessibility applications to suit needs.
  – GPS application for location and directions
  – Bar code reader
  – OCR application
• Move from medical model to social model
What We’ll Do Today

• Models of Disability
• Data
• Impact of Access Technology
• Accessibility Research
• Empowerment
• AccessComputing
• Discussion
<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982 – 85</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>1986 – 90</td>
<td>5 (2%)</td>
<td></td>
</tr>
<tr>
<td>1990 – 95</td>
<td>15 (5%)</td>
<td></td>
</tr>
<tr>
<td>1996 – 00</td>
<td>19 (6%)</td>
<td></td>
</tr>
<tr>
<td>2001 – 05</td>
<td>88 (23%)</td>
<td></td>
</tr>
<tr>
<td>2006 – 09</td>
<td>158 (20%)</td>
<td>(4 years)</td>
</tr>
</tbody>
</table>

CHI is the leading Human/Computer Interaction Conference in the world.
Other Conferences

- **ASSETS**
  - ACM
- **ICCHP**
  - Europe
- **CSUN**
  - California State University, Northridge
- **ATIA**
  - Industry Conference
- **W4A**
  - Collocated with WWW
WebAnywhere
A screen reader as a web application

- Andrew W. Mellon Foundation Award for Technology Collaboration (2008)
- Microsoft Imagine Cup Accessible Technology Award (2008)
- W4A Accessibility Challenge Delegate’s Award (2008)

http://webanywhere.cs.washington.edu-beta/

“WebAnywhere: A Screen Reader On-the-Go.”
Jeffrey Bigham, Craig Prince, and RL. W4A 2008.
Mobile Accessibility
Bridge to the world for blind, low-vision and deaf-blind people

Jeff Bigham*, Chandrika Jayant, RL

*
V-Braille
Making Braille accessible using the touch screen and vibrator

Will Johnson, Chandrika Jayant, RL

9/21/09
MobileASL
A mobile video phone for sign language users

Eve Riskin
Sheila Hemami*
Jake Wobbrock
Anna Cavender
Neva Cherniavsky
Rahul Vanham
Jaehong Chon
RL
Many undergrads

* Cornell University

Video
ClassInFocus
Making education more accessible to deaf students

Anna Cavender
Kathryn Sullivan
Bill Clymer*

RL

* Rochester Institute of Technology
National Technical Institute for the Deaf

called a pyramid.

And it's categorized as TOP, MOP, and BOP.
Or top of the pyramid, middle of the pyramid,
and base of the pyramid.

And as you can see, the world's population,
about half of it is in the BOP, 2 billion or a
little more than that is
ASL-STEM Forum
Enabling sign language to grow in science

Anna Cavender
Jeff Bigham
Daniel Otero
Caroline Solomon*

Gallaudet University
est. 1864

Web site
Open Problem

• Visual CAPTCHA (for sighted people)

• Audio CAPTCHA (for blind people)

• Text CAPTCHA? (for deaf-blind people)
  “what is the sum of 2 and 4?”
Open Problem

• Visual CAPTCHA (for sighted people)

• Audio CAPTCHA (for blind people)

• Text CAPTCHA? (for deaf-blind people)
  “what is the sum of 2 and 4?”
What We’ll Do Today

• Models of Disability
• Data
• Impact of Access Technology
• Accessibility Research
• Empowerment
• AccessComputing
• Discussion
Design Concepts in HCI

- **User Centered Design**
  - Involve the user at every step
- **Universal Design**
  - Design for all users, if possible
- **Design for User Empowerment**
  - Design to enable people to solve their own accessibility problems
Examples of User Empowerment

• Cell phones become accessibility tools
  – Users download accessibility applications

• Social accessibility
  – Users interact to accomplish an accessibility goal

• Persons with disabilities, with a superior education, can solve their own accessibility problems
Nicole Torcolini Story
What We’ll Do Today

• Models of Disability
• Data
• Impact of Access Technology
• Accessibility Research
• Empowerment
• **AccessComputing**
• Discussion
Goal

Increase the participation and success of individuals with disabilities in computing careers

Richard Ladner, PI
Sheryl Burgstahler, Co-PI & Director

Broadening Participation in Computing Alliance
AccessComputing
Alliance Partners

• Gallaudet University
• RIT/NTID
• Microsoft
• Regional Alliances for Persons with Disabilities in STEM
• Broadening Participation Alliances
• ACM SIGACCESS
Objective 1

• To increase the number of students with disabilities successfully pursuing undergraduate & graduate degrees & careers in computing fields

• Activities: College transition & bridge programs; tutoring; high school, college, **internships**; e-mentoring
Objective 2

- To increase the capacity of computing departments to fully include students with disabilities in computing courses & programs

- Activities: Communities of Practice, Capacity-Building Institutes, Computing Department Accessibility Checklist
Objective 3

• To create a nationwide resource to help students, educators, employers, professional organizations, develop more inclusive programs and share effective practices

• Activities: AccessComputing Knowledge Base (KB) of FAQs, case studies, promising practices; multimedia training; publications and talks
Questions