

2007 Annual Report



Rehabilitation Engineering Research
Center for Wireless Technologies

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Dear Colleague,

It is a great pleasure to present to you the Wireless RERC 2007 Annual Report. The Wireless RERC was launched in 2001, as a research partnership between Georgia Tech and the Shepherd Center, to explore new applications of emerging wireless technologies to benefit people with disabilities. Since its inception, the Wireless RERC has become a recognized leader on issues and solutions related to accessibility and usability of mobile wireless products and services for people with disabilities. In acknowledgement of this leadership role, the Wireless RERC was awarded a new grant of \$4.75 million from the US Department of Education's National Institute on Disability and

Rehabilitation Research to continue this work over the next five years.

This 2007 Annual Report presents highlights and accomplishments of work completed by the Wireless RERC during its 6th year of operation. Some of the most noteworthy accomplishments for 2007 include:

- Version 2.0 of the Survey of User Needs was initiated, providing a second look at the usage of mobile wireless technologies by people with disabilities and problems encountered in use. Over 1,200 survey responses were received in 2007, representing people with disabilities throughout the US. Preliminary findings have been shared with industry and were used in a Wireless RERC filing to the FCC regarding Hearing Aid Compatibility compliance of cell phones.
- The Technology Policy team submitted several FCC filings and, as a result, research of the Wireless RERC was cited in subsequent comments published by the FCC. In addition, monthly publication of the highly acclaimed Technology and Disability Policy Highlights continues, reporting on national technology policy issues and events of interest to individuals with disabilities.
- Formative work was completed on a new project examining advanced auditory interfaces for mobile wireless devices. This work involved compiling a "knowledge base" of findings from auditory perception research and interface needs for effective communications.
- A second new project is examining technology approaches for transmitting emergency alerts during catastrophic events to wireless devices. The goal of the project is to generate recommendations for the FCC concerning the most feasible approach to ensure equal access to emergency alerts by people with disabilities. In 2007, mobile client software was developed and tested that is capable of intercepting incoming SMS alerts and presenting alerts in alternative formats and not impeded by various settings of the phone.
- Another new project is exploring technology solutions to provide a means for summoning assistance by individuals who have significant communication limitations (e.g., deaf person who uses a text messenger but not a cell phone). Work on this "Deaf 911 System" generated a device that emulates a TTY on a cell phone, providing deaf users with direct and easy access to emergency services. Deaf users can dial 911 from a cell phone and communicate with the 911 operator through an Instant Messaging style interface.

Knowledge translation efforts of the Wireless RERC in 2007, included completely revamping the center's website (www.wirelessrerc.com), 24 presentations at professional meetings and industry events, 10 publications in professional and trade periodicals, four regulatory filings, and training seminars on universal design in wireless technologies for staff of AT&T, Sapient (a marketing, business operations, and technology company), and IDEO (a design consulting firm specializing in communication and information technologies). Of particular note is the impact of these efforts in encouraging AT&T Mobility to adopt universal design as an integral part of its business philosophy. Quoting from a recent press release from AT&T:

"It is our goal that the concept of 'design for all' is not viewed as a constraint but as a catalyst for innovation across the industry," said Carlton Hill, vice president of Marketing for AT&T's mobile unit. "We believe that, by making our methodology on Universal Design available for all to see, we can show the importance and value of creating wireless products and services that are usable and beneficial to as many people as possible. The end result will be more choices for more consumers."

In an effort to encourage application developers and handset manufacturers to consider the needs of customers with disabilities when designing products and services, AT&T released to the public its Universal Design style guide and credited the Wireless RERC for our efforts in encouraging the company's adoption of universal design.

In closing, we hope you enjoy this annual review of our accomplishments. Please feel free to share your feedback and any suggestions you have for future directions of the Wireless RERC.

Sincerely yours,

Michael L. Jones, PhD

Co-Director

Helena Mitchell, PhD

Co-Director



The Wireless RERC and its Core Projects

The Rehabilitation Engineering Research Center on Wireless Technologies (Wireless RERC) was founded in 2001 with two primary aims: 1) to promote equitable access to and use of wireless technologies by persons with disabilities and 2) to encourage adoption of Universal Design in future generations of wireless technologies. To accomplish these aims, the Wireless RERC has initiated eight individual but inter-related research and development projects.

Four research initiatives are investigating user needs, technology policy, and promising applications of wireless technologies to promote independence for people with disabilities. R1 - Facilitating User Centered Research is designed to establish a research portal to communicate to industry the needs of people with disabilities for wireless technologies. The project involves an ongoing assessment of needs as they pertain to existing and emerging applications of wireless technologies.

The RERC's Consumer Advisory Network (CAN) serves as a critical part of the Center's participatory research approach. Its members provide the RERC with consumer data via an updated and expanded Survey of User Needs, focus groups to discuss specific wireless applications, and structured simulations to evaluate new prototypes. R2 - Customer-driven Usability Assessment aims to enhance the usability of future generations of cell phones and other wireless devices by assessing the usability of existing devices and sharing this information broadly. An interactive website is being developed to disseminate user-generated usability information to customers, developers, and retailers of mobile wireless devices. Project R3 - Collaborative Policy Approaches to Promote Equitable Access involves developing, implementing, and evaluating specific policy initiatives related to wireless technologies and services. R4 - Advanced Auditory Interfaces is intended to develop, test and disseminate guidelines for design of advanced auditory interfaces for cell phones and other handheld electronic devices.

Four development projects aim to promote equitable access to and use of wireless technologies by persons with disabilities through development of prototype designs. D1 - Alternative Interfaces continues work on development and adoption of industry standards for universal remote consoles. D2 - Real-time Location-based Information Services expands on previous development of a personal captioning system by addressing the needs of patrons with vision or hearing impairments in three different venues – exhibit spaces, airports and hospitals. D3 - Development of Wireless Emergency Communications is examining wireless communication technology to ensure individuals with disabilities have access to alerts and warnings during major emergencies. D4 - Ensuring Access to Emergency Assistance is developing technologies to ensure people with significant communication impairments are able to signal the need for assistance in emergency situations.

A summary follows of 2007 accomplishments and plans for 2008 for each of the RERC's core projects.



Research Projects

Project R1: Facilitating User Centered Research

Project Director: Jim Mueller (jlminc1@verizon.net)

Since its founding, the Wireless RERC has been guided by its research on user needs. The Survey of User Needs (SUN) has yielded a large body of data on the usefulness and usability of wireless technologies from more than 1,200 people with disabilities. Members of the Consumer Advisory Network (CAN) have offered insight into these data through focus groups, product testing, and other direct participation in RERC activities.

During 2006 and 2007, the Survey of User Needs (SUN) was revised with input from both CAN members and industry partners. The result is a much-simplified SUN 2.0 that more effectively meets the expressed information needs of wireless carriers and device manufacturers. Since launching the revised SUN in April 2007, data have been gathered from more than 1,200 consumers, and nearly 800 have elected to join the Consumer Advisory Network. Over the past year, CAN members participated in focus groups, usability testing, information dissemination, and promotion of universal design.

Findings from R1 are being used in the RERC's development projects, policy initiatives, and in our efforts to assist the wireless industry to better address the needs of customers with disabilities.

2007 Accomplishments:

- Received over 1,200 responses to the SUN.
- Increased CAN membership to nearly 800 individuals with disabilities.
- Conducted September 2007 focus group on wireless security and privacy issues with a group of CAN members who have mobility impairments.
- Administered online survey on hearing aid compatibility with cell phones via the RERC website as a follow up to the 2006 RERC HAC survey.
- Used data in RERC filing to the FCC regarding the Hearing Aid Compatibility compliance of cell phones.
- In response to a request for SUN data from Vodaphone Italia, initial findings were shared, along with an agreement of ongoing data-sharing with their similar 4-year survey of elderly customers.

Plans for 2008:

- Increase size and diversity of SUN database to reflect nationwide population of persons with disabilities.
- Conduct regular analysis of SUN data (including longitudinal comparisons between 2001-2006 SUN and current survey).
- Conduct focus groups to gain insight into important issues identified through the SUN 2.0.
- Provide opportunities for CAN members to participate in RERC research and development projects.
- Update personas per SUN 2.0 findings (personas are composites of the characteristics of diverse individuals who have completed the Survey of User Needs).
- Disseminate SUN 2.0 findings through consumer organizations, CTIA – The Wireless Association, industry contacts, and published articles in professional and popular media outlets.

Project R2: Customer Driven Usability Assessment

Project Director: Jim Mueller (jlminc1@verizon.net)

The goal of the project is to promote universal design in future generations of wireless products through a customer-driven approach to usability assessment and sharing of assessment findings with both consumers and industry. This project builds on our previous success in development of field-testing and user-screening methodologies for handheld wireless devices. This work demonstrated the impact of environments and situations on the usefulness and usability of mobile wireless devices, especially for users whose abilities are significantly limited by these situations and environments.

Project R2 was designed to refine the user-testing methodology for use across the increasing variety of mobile devices in real-life situations and environments faced by people with disabilities. Another aim of the project is to evaluate the effectiveness of an interactive website for conveying user-test results to both consumers and industry.

2007 Accomplishments:

Initially, advisors and reviewers recommended partnership with a commercial internet organization for this project, and several promising relationships were developed. However, basic accessibility barriers in these partners' websites could not be overcome cost-effectively. Thus a separate internet site was developed. During the first year, the internet itself continued to evolve. Web blogs, discussion boards, and peer-to-peer internet sites such as Facebook, MySpace, Disability Nation, etc. became increasingly popular. Content management was made more convenient with the development of open-source software such as Plone. These developments helped direct the evolution of the project's "internet vehicle" from a commercial website partnership to a discussion forum with considerable flexibility for responding to user direction.

Despite this extended evolutionary process, the internet site was nearly ready for launch in 2007 (MyWirelessReview officially launched on 2/25/08). While this development continued, the user-testing methodology was tested and refined through consultation with industry experts and through product testing by members of the Consumer Advisory Network (CAN).

Plans for 2008:

- Launch of www.mywirelessreview.com (MWR) on 2/25/08
- Promote participation in MWR among CAN members, disability groups, and industry partners
- Continue user testing of wireless devices with CAN members and post results on MWR site
- Evaluate effectiveness of MWR in reaching consumers and industry

Project R3: Collaborative Policy Approaches to Promote Equitable Access

Project Director: Paul M.A. Baker, Ph.D., AICP (paul.baker@cacp.gatech.edu)

Initial policy efforts focused on municipal wireless networks and wireless emergency alerts. Project staff took steps to determine the extent to which access issues are addressed in planning municipal WiFi networks and determined the steps that need to be taken to ensure that equitable access is assured, including consultation with municipal entities and other interested public sector actors. The Wireless RERC has also taken the lead in development of a disability and technology policy collaborative with several partnering RERCs, Research and Training Centers, and Disability Business Technical Assistance Centers (DBTACs). The overall purpose of the Collaborative Policy Network (CPN) is to examine public policy issues that influence equitable access to technology (particularly wireless and telecommunications technology), identify opportunities to inform and influence policy decisions supporting equitable access, and evaluate the impact of policy initiatives on technology access.

2007 Accomplishments:

- Four FCC filings were submitted on behalf of the Wireless RERC and addressed significant issues related to public safety and the development of broadband technologies, including: “Amendment of the Commission’s Rules Governing Hearing Aid Compatible Mobile Handsets”, WT Docket No. 07-250 filed on Dec. 16, 2007. The RERC’s research was referred to in FCC comments.
- A special issue of *Assistive Technology*, focused on technology policy, was commissioned and edited by project staff (planned Fall 2008 publication date).
- Ten issues of *Technology and Disability Policy Highlights (TDPH)* were published. TDPH reports on national and local public policy events, recent wireless technological advances, political activities and tracks emerging issues of interest to individuals with disabilities.
- Four publications (articles, book chapter, technical paper) were completed and five professional presentations made disseminating work of the RERC Technology Policy team.
- By invitation, a “policy charrette” course was designed and taught at Temple University’s School of Communication and Theatre. The graduate course (5 students) applied planning design processes to develop policy alternatives for community issues. The course was convened in a hybrid face-to-face and online format focused on the issues impacting municipal wireless network utilization in Philadelphia, and deployment of a public access wireless network in the Free Library of Philadelphia system, including issues of accessibility.
- Expanded collaborative policy activities, including a grant submission with John Bricout (University of Central Florida) on accessibility of wireless library networks, and research on municipal wireless networks with Jarice Hanson, U Mass – Amherst.
- Ongoing policy consultations and contributions to RESNA policy statements as member of RESNA’s Government Affairs Committee (GAC).
- Policy consultations (regarding accessibility of municipal WiFi systems) with the Free Library of Philadelphia, City of Decatur (GA), and Georgia Technology Authority.

Plans for 2008:

- Our examination of municipal wireless broadband networks has been expanded to include wireless network access in public libraries. The project will survey the accessibility of existing wireless networks in public libraries in 16 southeastern cities. In collaboration with the Southeast DBTAC, we will assess programmatic accessibility of the networks, supporting documentation and websites, as well as survey and interview library personnel, to identify policy barriers and opportunities for increased community utilization of public library wireless networks.
- Online social networking software/platforms will be explored as a support for the Collaborative Policy Network.
- Continued monitoring of Federal policy, regulatory and legislative activities, and collaboration with key policy interested stakeholders.
- Continued policy collaboration with RESNA and other pertinent organizations.

Project R4: Advanced Auditory Interfaces for Wireless Technology

Project Director: Bruce Walker, PhD (bruce.walker@psych.gatech.edu)

Developing advanced auditory menus depends on 1) understanding what an auditory interface needs in terms of communicating information to the user; 2) documenting what approaches have been tried, and what success they had; and 3) exploring additional design possibilities. With this base of knowledge in place, "informed brainstorming" can generate new display concepts, which can then be implemented and evaluated. The primary efforts in the first year of Project R4 were to create this knowledge base, currently in the form of a Technical Report. With the knowledge base in place (and constantly evolving), we are able to take a systematic path through the many design possibilities.

While the knowledge base discusses all kinds of design options, project staff have begun to study enhancement of a single "local" menu first, as opposed to an entire hierarchical menu structure. The team is trying to improve a single 1 x N auditory menu, like the contacts list on a cell phone. We are looking at ways to provide better and faster movement and search through the menu items; push menus versus pull menus; and context cues that serve as auditory "scroll bars." The team has implemented prototype menus for each of these design options and is evaluating both preference and performance with non-disabled participants. We have begun to replicate and extend these studies with visually impaired participants. Research will continue with various kinds of menus. On the development side, interface tools are being built to help programmers develop auditory menus and example auditory interfaces are being implemented on a range of desktop and mobile platforms.

2007 Accomplishments:

- Technical Report documenting current knowledge base of information about auditory perception and requirements for auditory interfaces was completed and disseminated.
- Research findings were presented in two professional presentations.
- Sensation and Perception course was offered with an enrollment of 50 undergraduate and 20 graduate students.
- Dr. Walker was awarded the Helping Hands Service Award from Atlanta's Center for the Visually Impaired. This is a significant honor, awarded annually by the Board of Directors of the Center for Visually Impaired.

Plans for 2008:

- Collect data from a broader population (currently mostly GT undergrads). Plan to disseminate the knowledge base to industry.
- Work on getting findings implemented into the deeper levels of the mobile devices.



Development Projects

Project D1: Alternative Interfaces for Wireless Technologies

Project Director: Ed Price (ed.price@imtc.gatech.edu)

This project continues the RERC's work on the development of V2 standards for universal remote consoles (URC) and promotes industry adoption of alternative interfaces to consumer electronic products--including mobile wireless devices.

In the past year, project staff participated in the continuing development of the V2 URC standards. The most important activity was helping to address technical issues in the 5 standards drafts that needed to be corrected before a final draft could go to the ISO/IEC JTC1 SC35, the international committee that covers user interface standards. Once all technical issues were resolved, the 5 standard drafts were approved without dissention by the countries on the committee. Ed Price, D1 Project Director, is one of the international representatives to ISO/IEC JTC1 SC35, a committee that also oversees standards related to accessibility.

In addition, project staff participated in the URC Consortium, a group of industry and other interested parties that are working to promulgate the V2 URC standards into use in consumer electronics devices. Finally, work continues on making the Georgia Tech GVU Aware Home capable of universal control. A new ad-hoc wireless infrastructure and lighting system is in the process of being installed, which will allow for improved control of the home environment by devices designed for use by all persons regardless of ability.

2007 Accomplishments:

- Movement of V2 standards to voting by ISO/IEC JTC1, setting up their release as an international set of standards - a necessary step as a majority of the products hoped to be V2 compliant are manufactured in Asia.

Plans for 2008:

- Prototype work deferred until the summer 2008 to allow time for tools to catch up. Resources allocated for this project were re-deployed to step up development efforts on Project D4.

Project D2: Real Time Location-Based Information Services

Project Director: Leanne West (leanne.west@gtri.gatech.edu)

This project addresses the location-based and person-specific information needs of patrons with hearing or vision impairments in three different venues--exhibit spaces, airports, and medical facilities. Although focused on services for people with sensory impairments, the benefits are applicable to every visitor in the target settings and, as such, illustrate the RERC's emphasis on universal design in wireless products and services.

2007 Accomplishments:

- Project staff provided software development assistance to the Atlanta VA Medical Center for implementation of Talking Braille Signs. Talking Braille signs use an RFID enabled wall sign that “talks” to a custom RFID badge worn by the user. The software was written to allow the RFID badge to communicate with a cell phone via Bluetooth. The badge gives location feedback to the user via cell phone, which in turn, provides audible output to guide/assist the user.
- In order to gain user insight to help determine how Location-Based Services might improve air travel, the travel experiences of individuals who are visually-impaired were assessed. The Airline Travel Survey was administered online via the RERC website to a total of 84 respondents.
- Project staff also regularly participated in discussions with people who are blind or visually impaired at the Atlanta Center for the Visually Impaired. Discussions ranged from the experiences of blind/VI users at museums to the experiences of these individuals when using airports for travel.
- Project staff worked with Delta Airlines to begin development of a system permitting passengers to interact with a check-in kiosk via Bluetooth. The Georgia Tech team developed and validated in a prototype the underlying architecture for a software program that will allow a cell phone to control check-in at a kiosk via Bluetooth.
- Several RFID chips and Bluetooth dongles were purchased for testing in different “real-world” location-based applications. The devices were tested for connectivity speed, ease of use, and reliability.

Plans for 2008:

- For the airport application, team members will continue to work with Delta Airlines to understand their databases and equipment. A full demonstration of kiosk check in will be created. The project team will seek to demonstrate overhead announcements at the Portland Airport through a partnership with the RERC for Accessible Transportation at Oregon State University. Lastly, speech recognition software will be tested for airport gate attendant input to the system.
- For the museum application, the project team plans on adding text capabilities to the Guide by Cell system that is already in existence but currently only has audio output. In addition, staff will work with Guide by Cell to perform a user test to see if the audio that museums currently use is appropriate for patrons with visual impairments.
- For the hospital application, project staff will work with the Atlanta VA to interpret results of their testing. In addition, staff will continue testing RFID and Bluetooth as possible wayfinding components for a hospital setting. A laboratory test will occur during 2008.

Project D3: Wireless Emergency Communications

Project Director: Helena Mitchell, PhD (helena.mitchell@cacp.gatech.edu)

Catastrophic events such as Hurricane Katrina highlight the importance of our nation's emergency alerts system. Project D3's objectives are to: 1) examine several technological approaches to transmit specific emergency alerts and warnings to wireless devices; 2) evaluate potential interoperability issues associated with interconnection with other systems, 3) develop prototypes of promising technological approaches to deliver local and targeted alerts and warnings to wireless devices in accessible formats; 4) field test working prototypes; and 5) generate recommendations for the FCC concerning the most feasible approach to ensure equal access to alerts and warnings by people with disabilities.

In 2007, project staff sought information on different types of message sources, determined devices suitable for testing, evaluated industry and government progress on proposed technical approaches, developed a "mock gateway" to send and receive messages, created software to run the tests, and identified field testing sites.

2007 Accomplishments:

- Development and testing of mobile client software that is capable of intercepting incoming SMS alerts and presenting alerts in alternative formats and not impeded by various settings of the phone. Customized presentation modes address accessibility for users who are blind/low vision. The software also features the ability to: enable or disable the service; change the geographic location for alert monitoring; and recognize an incoming alert of critical importance and override any muted sound or vibration settings on the phone. Moreover, the alert attention signal transmitted by the software is identical to the EAS alert tone familiar to the hearing population.
- Completed preliminary work in preparation for field tests in 2008. This work included:
- Coordinated and designed field test parameters and drafted pre- and post-test questionnaire;
- Acquired 10 AT&T 3125 phones for use in field trials (AT&T also contributed SMS and data capabilities for the phones); and
- Created a blind-accessible version of the Windows Mobile WEC Client, including development of a customized screen reader using CMU's Flite Text-to-Speech engine.
- Produced comments for FCC Notice of Proposed Rulemaking regarding the Commercial Mobile Alert System (CMAS). Comments addressed making the CMAS accessible to people with disabilities and recommendations for expediting availability of the CMAS to the public and encouraging wireless carriers to participate in the CMAS.
- The Wireless RERC was cited several times in the FCC's Second Report and Order and Further Notice of Proposed Rulemaking on the Emergency Alert System (EAS) FCC Docket No. 04-296.
- Drafted a handout presenting 12 Considerations for Accessible Emergency Communications.
- Dr. Mitchell participated as a member of the FCC's Consumer Advisory Committee, the National Emergency Preparedness Coordinating Council (NEPCC), and the eC3 (National Electronic Commerce Coordinating Council) Emergency Governance Workgroup.

Plans for 2008:

- Field-test the prototype system and software with the target population. Field testing of the WEC prototype for deaf and hard of hearing users will occur in June, in tandem with the NTID Conference, billed as a pre-conference workshop.
- Review test results and, using feedback from test participants and the Panel of Experts, refine the prototype system and software.
- Release the assessment study, Government & Industry Progress in Emergency Alerts for People with Disabilities.
- Monitor regulatory proceedings and prepare and file recommendations with relevant regulatory bodies.

Project D4: Ensuring Access to Emergency Assistance

Project Director: Thad Starner, PhD (thad.starner@cc.gatech.edu)

It is important that all people be alerted to pending threats, such as tornadoes, chemical spills, and terrorist alerts. However, it is equally as important that they be able to summon assistance when needed. This development project explores technology solutions to provide a means for summoning assistance by individuals who may have significant communication limitations (e.g., deaf person who uses a text messenger but not a cell phone) or limited dexterity to use a cell phone (e.g., person with tetraplegia). Although originally planned to begin in 2009, the timetable for this project was stepped up because of the success of preliminary development work and its potential significance for the deaf and hard of hearing community. This preliminary work resulted in a Deaf 911 System that emulates a TTY (teletypewriter) on a cell phone, providing deaf users with direct and easy access to emergency services. Deaf users can dial 911 from a cell phone and communicate with the 911 operator through an Instant Messaging style interface. The software TTY then encodes the text as TTY signals and sends it over the voice channel. Incoming TTY signals are decoded and displayed as text.

2007 Accomplishments:

- Development and preliminary testing of a prototype Deaf 911 System that emulated a TTY.
- Presentation of this work at one professional conference.

Plans for 2008:

- Further field testing of the Deaf 911 device with individuals who are deaf or hard of hearing; collaboration with industry partners to develop software for additional wireless platforms (currently works only on cell phones using the Linux operating system).
- Explore commercialization of device with wireless industry.



Training and Dissemination Projects

Knowledge Translation Efforts

Dissemination of knowledge generated from the RERC's research and development efforts is critical to ensure that it is translated into new products and applications, and useful tools and strategies. Several efforts are underway to promote translation of new findings into practice. Two formal RERC projects were initiated in 2007 to promote knowledge translation. These projects are intended to: 1) advance awareness among consumers and industry about accessibility issues and available solutions to improve access to wireless devices and services; and 2) provide opportunities for advanced-level research training for university students on the accessibility and universal design of wireless devices. In addition, RERC personnel are very actively engaged in dissemination efforts to promote knowledge translation, including presentations to professional and consumer audiences, and print and electronic publications. And finally, the work of the RERC is disseminated through citations in a variety of online media outlets, magazine articles, and FCC regulatory documents.

Project T1: Promoting Awareness of Access and Usability Needs for Wireless Products Project Director: Jim Mueller (jlminc1@verizon.net)

RERC staff regularly communicates with wireless customers with disabilities. This contact, along with findings of our Survey of User Needs and focus groups, demonstrates that a significant obstacle to equitable wireless access is a lack of awareness -- on the consumer side, regarding accessibility and customization options of available products, and on the provider side in understanding the usability needs of customers with limitations due to disability or age. Project staff have undertaken initiatives to address these obstacles among consumers and industry, including manufacturers, carriers, and retail sales staff.

2007 Accomplishments:

- Collaboration with the Alliance for Telecommunications Industry Solutions (ATIS) in development of a training video on mobile phone/hearing aid compatibility (HAC).
- Regular participation in the Wireless Technology Forum, an Atlanta-based commercial industry organization.
- Workshop on Universal Design for 30 AT&T employees. This workshop was designed to increase attendee's awareness of the importance of meeting the needs of diverse customers.
- Seminar on user testing at the RESNA conference in Phoenix, AZ conducted in collaboration with Molly Story of the RERC on Accessible Medication Instrumentation.
- Industry training seminars on universal design in wireless technologies to staff of AT&T, Sapient (a marketing, business operations, and technology company), and IDEO (a design consulting firm specializing in communication and information technologies).
- Publication of a quarterly RERC Industry Newsletter that highlights various project updates specifically geared towards informing industry on the RERC's activities.

Plans for 2008:

- Release and promotion of HAC video to audiologists and consumer groups; distribution and evaluation of HAC video along with HAC consumer guide.
- Continued participation in ATIS workgroup in development and support of technical and operations standards relevant to wireless access for people with disabilities.
- Ongoing industry training in universal design.
- Dissemination of RERC findings to industry, including SUN 2.0 findings, focus groups, and results of field tests of wireless emergency communication systems through industry publications, conferences, and web events.
- Liaison with wireless industry partners to support the technology needs of other RERC projects.
- Continues publication of RERC Industry Newsletter

Project T3: Building Research Capacity in Wireless Accessibility and Usability

Project Director: Maribeth Gandy (maribeth@imtc.gatech.edu)

This project provides opportunities for advanced-level research training on the accessibility and usability of mobile wireless technologies by people with disabilities.

The project consists of graduate research traineeships, graduate and undergraduate courses at Georgia Tech related to equitable access to wireless technology, conference tutorials and workshops for researchers in rehabilitation and the technology fields. In the past year, there has been a significant increase in the number of students at Georgia Tech working on Wireless RERC-related class projects. This increase is in large part a result of the courses taught by RERC project directors Thad Starner, PhD (College of Computing) and Bruce Walker, PhD (School of Psychology).

2007 Accomplishments:

- Courses with RERC-related projects:
- Jones, B. (2007, Spring). Designing the Retirement Community of Tomorrow. Georgia Tech College of Architecture course 8833.
- Starner, T. and Zeagler, C. (2007, Spring). Mobile and Ubiquitous Computing. Georgia Tech Computer Science course 7470.
- Walker, B.N. (2007, Spring). Sensation and Perception. Georgia Tech School of Psychology Course 3040/6014. Enrollment of 50 undergraduate students and 20 graduate students.
- Mitchell, H. (Fall 2006 and Spring 2007). Regulatory Process in Telecom Policy (emphasis on inclusive technology planning and accessible emergency communications). Graduate course module PUBP 6514.
- "Student Project Ideas" page was added to RERC website. It includes projects sponsored by Shepherd Center and a variety of centers within Georgia Tech.

Plans for 2008:

- Build the student project ideas database with input from industry and Wireless RERC faculty.
- Explore opportunities for student internship placement.
- Foster interest in RERC-related research by showcasing student projects in conjunction with Georgia Tech Disability and Diversity Days Assistive Technology Fair.

Presentations

Baker, P. (2006). Information technology, collaboration and service delivery. (Discussant and Chair). Twenty-Eighth Annual APPAM Research Conference. Madison, WI.

Baker, P. and Bell, A. (2007). Accessibility in municipal wireless networks: System implementation, policy, and potential barriers for people with disabilities. ICA Pre-conference Workshop "Mobile Communication: Bringing Us Together or Tearing Us Apart?" 57th Annual Conference of the International Communication Association, San Francisco, CA.

Baker, P. (2007). Policy Charrette Project: Communities in the Connected Metropolis - The Philadelphia Free Library. School of Communications and Theatre. Temple University, Philadelphia, PA.

Brashear, H. (2007) Emerging assistive technology for the deaf community. Early Hearing Detection and Intervention Conference, Salt Lake City, UT.

Gandy, M. (2007). Wearable computing for persons with disabilities. International Symposium on Wearable Computing. Boston, MA.

Haberman, V. and Story, M. (2007) Listening to the voice of the consumer: How to involve people with disabilities in user research and development. RESNA Annual Conference. Phoenix, AZ.

Jones, M.L. (2007). Universal Design – Unlocking and expanding markets for mobile technologies. Executive Workshop on Innovative Technologies Reshaping the Mobile Business. Constanta, Romania.

Mitchell, H. (2007). Emergency communications and people with disabilities: Using next generation alerts to reach critical populations. CSUN Technology and Persons with Disabilities Conference. Los Angeles, CA.

Mitchell, H. (2007). The Role of policymaking in mobile technology development. Panel Moderator, Executive Workshop on Innovative Technologies Reshaping the Mobile Business. Constanta, Romania

Mitchell, H. (2007). The FCC and industry: Managing public safety emergency communications and commercial wireless broadband deployment. Information Communications Technology (ICT) Workshop, Georgia Tech, Atlanta.

- Moon, Nathan W., Baker, P.M.A., and Bell, A.** (2007). Technological access barriers for people with disabilities: Wireless RERC and policy change. Proceedings of the California State University, Northridge Center on Disabilities' 22nd Annual International Technology and Persons with Disabilities Conference, Los Angeles, CA.
- Mueller, J.** (2006). Users with Disabilities Guide Usability of Wireless Products. Worldwide webcast presentation for World Usability Day.
- Mueller, J.** (2006). Universal Design and User Testing. Worldwide webcast presentation for World Usability Day.
- Mueller, J.** (2007) Interview with Larry Wanger for Disability Nation, online news magazine for people with disabilities.
- Mueller, J.** (2007). Universal Design: Concepts for community and workplace integration, keynote presentation, Department of Rehabilitative Services Conference, Staunton, VA.
- Palladino, D. & Walker, B. N.** (2007). Learning rates for auditory menus enhanced with spearcons versus earcons. Proceedings of the International Conference on Auditory Display (ICAD 2007), Montreal, Canada.
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Widening the Wireless World Research center promotes accessibility to wireless technologies for people with disabilities.

by Jane M. Sanders

THE WIRELESS WORLD is gradually opening its doors to people with disabilities because of new research, policy and consumer demand.

Significant contributions to the research and policy components of that equation come from work at the Wireless Rehabilitation Engineering Research Center (RERC) co-directed by the Georgia Institute of Technology and Shepherd Center, an Atlanta-based rehabilitation hospital. Now in its second five-year federal grant, the RERC is seeing some fruits of its labor.

Later this year, a wireless captioning system developed at the Georgia Tech Research Institute (GTRI) and licensed by SightLine Media will debut in movie theaters across the nation for beta testing. It will offer new, unobtrusive technology to allow people who are deaf or hard of hearing to enjoy Hollywood's latest films.

People who are paralyzed and those who cannot speak have new opportunities to enhance their quality of life with wireless devices, as well. For example, patients with limited mobility can now control iPods with a specially interfaced wireless remote. And those rendered speechless by injury or disease can now use their voice-augmentation devices, which synthesize speech, to make phone calls thanks to an interface designed to work with BlackBerry wireless devices. Both advances are the work of researchers at Shepherd and Georgia Tech.

On the policy front, the Federal Communications Commission included in a recent final rulemaking report a recommendation from the Wireless RERC that any new digital technology platforms must be accessible on various devices to give full access to people with disabilities.

"The Wireless RERC has been successful in promoting equitable access to wireless technologies for people with disabilities," says Helena Mitchell, co-director of the Wireless RERC. "We've been able to do so because we don't just do research and development, but we get information out to policymakers and to industry."



photo by Gary Meek

Leanne West, senior research scientist in the Georgia Tech Research Institute, demonstrates the wireless captioning system that will debut in movie theaters under the name "SightLine HotSpots."

Mitchell is also the executive director of Georgia Tech's Center for Advanced Communications Policy, which oversees the RERC along with Mike Jones, Shepherd Center's vice president of research and technology. Funding for the RERC comes from the U.S. Department of Education's National Institute on Disability and Rehabilitation Research (NIDRR).

"Wireless technologies are growing in importance for users who are disabled and those who are not," Jones says. "We're excited to have continued funding so the Wireless RERC can do more to promote access to these technologies for everyone."

The concept that Jones alludes to is universal design – the idea that improving usability for people with disabilities will improve usability for everyone. It is a driving force behind the Wireless RERC's work, the directors say.

As the RERC enters its sixth year, it is continuing initiatives begun in its first five years of funding and starting some new efforts, Mitchell notes. Here are some highlights of that work:

The Wireless RERC will create a gateway to send wireless emergency announcement messages, such as tornado warnings, to laptops, PDAs and WiFi-enabled cell phones. "People with disabilities would be able to receive emergency alert feeds in their devices that would pick up signals from multiple sources of emergency messages," Mitchell explains. "The major advantage is the messages would arrive in a format appropriate for each user."

Researchers will develop the technology in 2007, then field test the software and gateway in four U.S. cities in 2008 and 2009 and finally present their findings to the FCC for use in its rulemaking activities on emergency alert systems, Mitchell adds.

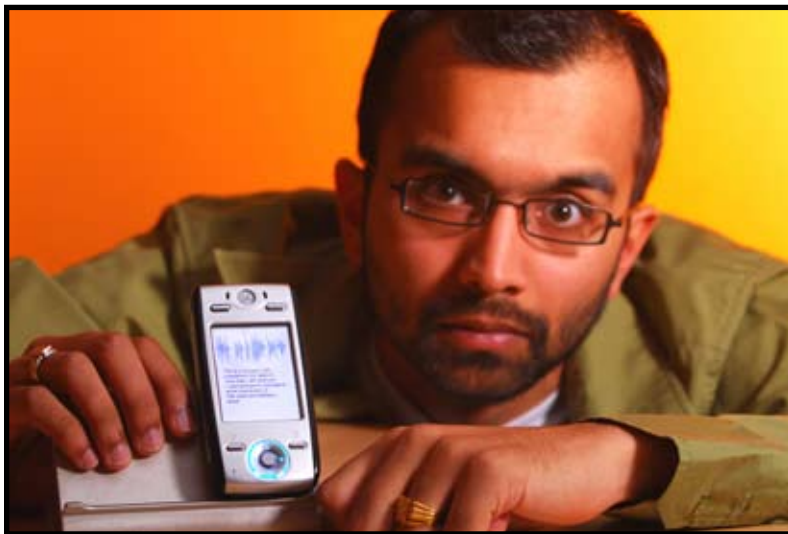


photo by Gary Meek

Georgia Tech graduate student Nirmal Patel and Associate Professor of Computing Thad Starner, not pictured, are devising technology that enables people who are deaf to more efficiently use their mobile devices to access Enhanced 911 services.

In a related project, researchers are devising technology that enables people who are deaf to more efficiently use their mobile devices to access Enhanced 911 services – which automatically inform police of a caller's location. College of Computing Associate Professor Thad Starner and graduate student Nirmal Patel envision a system that would open a regular voice channel to police via 911. When activated, the service – accessed by just the touch of a single button on a cell phone – would transmit a pre-recorded message to police letting them know the caller is deaf and in an emergency situation. Then police could track the call and listen in on what's happening at the scene as they dispatch help.

In an extension of the wireless captioning technology, GTRI senior research engineer Leanne West is creating location-aware systems for airports, hospitals, museums and aquariums. These systems would augment the visits of venue patrons by sending location-relevant text, audio and/or video via the patrons' WiFi-enabled "smart" cell phones. It would benefit people with disabilities, as well as others, she says.

"We want to get users the information based on where they are, much like a personalized 'You are Here' map," West explains. For example, at the Atlanta Veterans Administration Medical Center, West is working with researcher David Ross and his colleagues who are creating "Talking Braille Signs" to provide directions to patrons with vision impairments. The current design uses infrared technology for communication between signs and a "smart" badge that patrons must wear. GTRI researchers are working with Ross to take information from the badges and send audible directions to patrons via their Bluetooth-enabled cell phones. The ultimate goal is to implement the technology in all public buildings, Ross says.

People who are blind are hindered from using cell phones because the interaction with them is largely visual. Users select actions from various menus on the cell phone display. But research led by Bruce Walker, an assistant professor of psychology and computing, is addressing how best to use sound to convey cell phone menus.

"It's fortunate for people who are blind that we can readily convert cell phone menus to auditory interfaces," Walker says. "Some manufacturers are already doing this, but not doing it that well." Walker believes his group's research, which will include input from users who are blind, can help manufacturers improve usability – something companies recognize consumers are demanding.

In a project expanded from the Wireless RERC's first five years, people who have disabilities are helping Shepherd Center and Georgia Tech researchers evaluate wireless products such as cell phones, for manufacturers who have requested this feedback. Researchers have partnered with the Web site myrateplan.com to provide some of this feedback and their cell phone usability testing results. They expect to have the information available on the Web site by late 2007. There also will be an online forum for users to report their usability experiences.