PM&R Assistive Technology Programs

Special points of interest:

- Electronic Aids to Daily Living (EADLS)
- Assistive Technology (AT) highlights
- AT Educational Opportunities
- **JULY 13-18, 2013 33rd National Veterans Wheelchair Games Tampa, FL**

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Electronic Aids to Daily Living

…Brian Burkhardt, AT Rehab Engineering

For centuries humans have used intellect and ingenuity to adapt our surroundings to better suit our survival needs and comfort. From simple beginnings of stone tools and the discovery of fire, we have built vast cities full of conditioned ergonomic spaces catering to our needs and desires. Electronic Aids to Daily Living (EADLs) are a modern variant of this adaptation process as it applies to enabling access to the world of electronics and electrical devices to individuals who cannot access the standard controls. Imagine not being able to check your email without the help of a caregiver, or simply not being able to turn on a bedside light. EADLs provide a means for individuals to interact with devices in their environment to achieve personalized goals relating to quality of life, independence, and safety. EADL is a relatively new term for what was previously referred to as an Environmental Control Unit (ECU). The name was changed to more accurately reflect the purpose of ECUs and to relate these products to similar devices like Aids to Daily Living (ADLs), which are more widely approved by private funding sources.

This area of assistive technology encompasses a diverse set of products ranging from remote light switches to custom voice activated home automation systems. The heart of any EADL system is the user. The process of building an EADL system around a user starts with a few questions. What are the goals of the user and how do these translate into specific device control options? What physical and cognitive ability does the user poses and how do these translate into a viable human technology interface. Finally, is the user comfortable with technology? Answering these questions sharpens the focus of the evaluation process and helps select the best technology to best achieve the user's goals.

Most individuals desire access to a telephone, television, lights, fans, and doors. The complexity of the EADL system dictates the available device control fidelity and the quantity of devices under user control. Each device category requires different control interface technologies, each having advantages and disadvantages. One of the most common environmental interface strategies is based on home automation systems, X-10 or Insteon, that control lights, doors, thermostats, and other electro-mechanical devices in the home.

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AT Lab Highlights…Richmond

Richmond AT Center of Excellence was proudly awarded three-year CARF demonstrating that our program and facility met all the quality standard requirements that improve our veterans and active duty service members' lives.

Richmond AT Center continues to outreach to their community through presentations, education for staff and patients. Melissa Oliver presented at the 2013 PM&R Update conference in Park City, Utah discussing the use of AT in Rehabilitation and within the Work/School Environments.

The Richmond VA website also added the AT logo as a live icon for veterans to learn more information about the AT program.

January 2013, the AT Center opened a new mini AT lab in mental health. The occupational therapist in mental health has joined the AT Clinical Team and will be providing AT services in two areas of AT: Adaptive Computer Access and Electronic Cognitive Devices.

AT Rehabilitation Engineering Team is working on four major projects:

- Develop an AT inventory check in/check out system
- Creating an consistent AAC methodology to evaluations and training
- Training on the use of the 3D printer for product development
- Installation of ECU into patient rooms in CLC, SCI, PRC and Acute Care for specific evaluations and training

AT Lab Highlights…Palo Alto

Odette Harris, M.D., M.P.H, Associate Chief of Staff of Polytrauma, Jonathan Sills, Ph.D., Program Director of the VA Palo Alto Assistive Technology Center, and David Horton, Computer Programmer and Psychology Doctoral Student, have developed a tablet based computer application that supports patient education and feedback.

The application was designed to be highly flexible and to be accessible to variety of rehabilitation patient populations. Having completed an operational prototype of the application, the development team is looking forward to a future where the application is made available for use by patients whom receive services through various VA Palo Alto Polytrauma and Physical Medicine and Rehabilitation clinics.

Outreach has been another area that has been a focus for the Palo Alto AT team. Following the successful University of Pittsburgh supported Deep Dive event held at the Palo Alto VA AT Center on September 11th of 2012, many members off the Palo Alto AT team have provided additional education about various AT services. In November and December 2012, Dr. Sills gave a series of invited talks to the Council on Aging in San Francisco California, where he spoke on topics related to assessment of Cognitive Impairment, PTSD, and Electronic Cognitive Devices. In February of 2013, Dr. Sills spoke with VISN 21 Polytrauma Network Staff about AT service delivery. In early March, Palo Alto AT Center staff members Evi Klein, Debbie Pitsch, and Jonathan Sills are scheduled to meet with Stanford University Engineering students whom are interested in designing and developing Assistive Technology devices. In April, during the association of Veterans Affairs Speech Language Pathologists 2013 National conference to be held in San Francisco CA, VA Palo Alto Speech Language Pathologist Evi Klein is scheduled to l give a presentation on AAC Applications.

Other activities include continued preparations for CARF accreditation. CARF intent to survey materials have been completed, and the AT team, along with VA Palo Alto Polytrauma Leadership, are hoping to achieve accreditation for the Palo Alto AT Program under the new 2013 CARF standards.

AT Lab Highlights…Tampa

AT STAFF

The Assistive Technology Program at the James A Haley Veterans' Hospital in Tampa, FL welcomes and introduces the newest member of the team, Richard "Rik" Archer. Rik came on board in December 2012 to fill the full-time position of Rehabilitation Tech for the AT team.

His 20+years of experience in assistive technology, specifically, with augmentative-alternative communication and mounts and extensive network in the AT community, familiarity with the VA Healthcare system and vast experience with our unique population of Veterans and Service Members has resulted in a tremendous addition and asset to the AT program in Tampa. Rik collaborates with clinicians across disciplines throughout the rehab service to support therapeutic needs relating to technology and working towards the development of a specialized spring loaded capacitive mouth stick for individuals with significant physical disabilities. Welcome Rik!

AT DEVELOPMENTS AND PATENTS

The AT program is working in conjunction with the Center of Excellence to develop a motorized, capacitive mouth stick for individuals with significant physical disabilities. It will enable the user to extend and retract the capacitive tip to the necessary length to independently access various touch screen devices. This is accomplished by switches placed in the mouth piece activated by lingual (tongue) movements. A provisional patent has been filed. We are now in the process of developing different mouth pieces for the device.

The modular water sport tool was created to help disabled individuals more easily participate in recreational activities. Specifically, the device was designed to hold kayak paddles and fishing rods for people with limited upper extremity use.

For fishing, the person sits on top of the base with the rod holder facing out away from the body. After casting, the fishing rod is placed into the holder. The maneuverable pipe allows the rod to be moved in the direction of fish. For kayaking, the base is placed under a kayak seat with the pipe facing away from the body. The paddle is secured to the holder using a clip. The ball and socket on the plastic pipe allows the paddle to be used for propulsion or steering. The device can be fitted to individuals of different body sizes and physical capabilities.

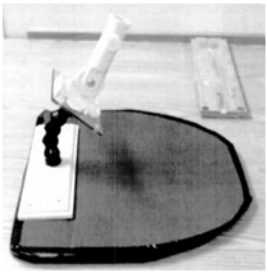
AT NETWORKING AND TELEHEALTH

We continue to network and support other VA Medical Centers with AT needs for general knowledge and patient care through a variety of modalities including telephone contact, email and telehealth. Recently installed webcams and secure telehealth software (MOVI) at our personal work stations allows for the provision of AT service for Veterans and Service Members who are unable to travel to the hospital but have outpatient based clinics closer to their homes.

AT SPACE

Tampa continues with the construction of the new Polytrauma Major Building which is projected for completion this summer. The AT Program plans to house an additional lab space in the new center while maintaining our current space as well in the Transitional Building.

Motorized capacitive mouth stick



Modular water sport Tool

AT Lab Highlights…Minneapolis

Installation of a stand-alone AT computer network with Internet access has been completed. The network extends to the PM&R, VISOR, SCI/D and Speech AT Labs and the inpatient TBI, CVA and SCI/D wards in the medical center. The network enables improved access to adaptive software, WiFi hotspots for device configuration and training and continuing education resources for clinicians.

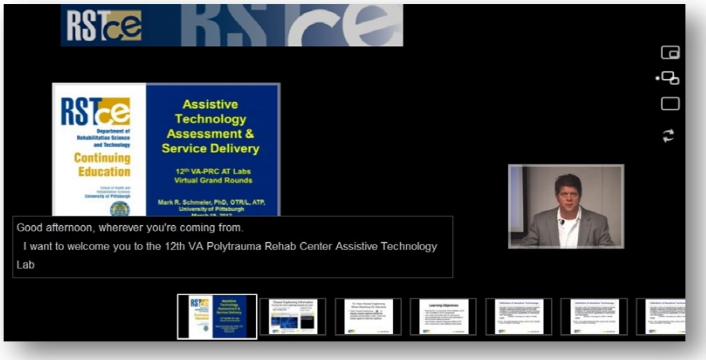
Many PRC clinicians have received a New iPad for use in treating patients and evaluating apps for clinical use. Clinicians currently using iPads include occupational and recreational therapists, speech and language pathologists and psychologists. With an app library of over 175 apps, one student OT is currently working on a project to better organize apps for other clinicians to find just the right app.

Given the high cost of traditional environmental control systems, our rehabilitation engineer and SCI OTs are evaluating smart phone and tablet based apps. These apps have the potential for significant cost savings provided reliable vendors can be identified for installation of these systems.

Assistive Technology Education and Training Opportunities

For the past four years the Department of Rehabilitation Science & Technology at the University of Pittsburgh has been in collaboration with the VA for the development of the Polytrauma Rehabilitation Center (PRC) Assistive Technology (AT) Lab programs initially in Richmond, Tampa, Palo Alto, Minneapolis, and more recently San Antonio as well as several other network sites nationwide.

The project is designed to support the VA and clinicians to ensure Veterans and active-duty military personnel with disabilities can achieve the highest level of function and participation in their communities through the appropriate application of assistive technology (AT) devices and services. The goal is to build on existing resources and ensure AT clinics are operational with qualified clinical personnel, necessary space and equipment resources, standards of practice, educational resources, and outcomes management to monitor the effectiveness of devices and service delivery processes.



Having personnel trained and certified in AT applications is one of many milestones of the collaboration. Given the geographic diversity of centers around the country, education and training resources have been systematically deployed using a combination of online/on-demand and in-person/hands-on learning methods. VA personnel interested in advancing their knowledge and skill in various areas of AT including but not limited to wheeled mobility & seating, adapted computer access, electronic aids for daily living, augmentative & alternative communication, electronic cognitive devices, adapted automotive equipment, and adapted sports & recreation equipment have access to these resources. One outcome is to increase the number of VA clinicians with the Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) Assistive Technology Professional (ATP) credential.

First, interested VA personnel are given access to an 8-hour online/on-demand course with lectures that provide a general overview of the various areas of AT. The course is designed to help the learner understand the various aspects AT and service delivery and how it fits into a context in order to not only prepare for the ATP exam but also advance

AT Education and Training Opportunities, cont.

their skills. Following this course that can be taken anytime from a computer with internet access, people can prepare a study plan and focus their attention in areas they identify that warrants more in-depth studying for the test. Second, Pitt has delivered over a dozen Virtual Grand Rounds lectures by presenters with more in-depth information on various topics related to AT. These were broadcast live however also archived for on-demand viewing over the internet. Topics cover the application of many types of devices and best-practice. These lectures have also served as resources for those preparing for the ATP.

Finally, Pitt has worked closely with the PRC sites to host in-person "Deep Dive in Assistive Technology Institutes". The purpose of the Deep Dives is to facilitate structured hands-on learning with devices. These were initially hosted twice at the University of Pittsburgh followed d by Richmond and Palo Alto and each attended by about 40 participants. These 2-3 day workshops included structured lab activities, live case studies, and group discussions that included strategies for the advancement of AT services at attendees' local VA facilities.

Since the launch of the educational resources in 2009, 9 PRC clinicians have prepared for and received the RESNA ATP credential and another 4-6 are ready to sit for the test. Many others are accessing the learning resources and plan to sit for the exam in the future.

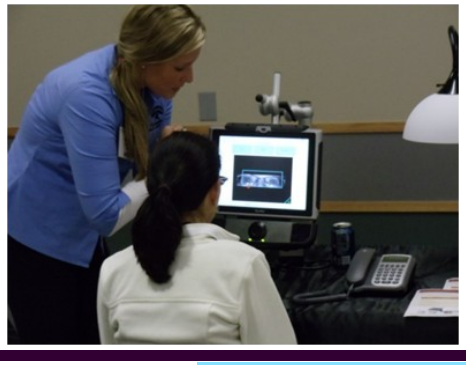
Pitt has developed and in the process of piloting a more structured training program based on many of the existing learning resources described above. Students in the pilot program known as RST Cert, complete an online learning module every month for 8 months. Class meets for a recitation once per month by conference call or internet meeting software. Students are also paired into virtual groups to prepare case studies. Upon completion of the online modules the group will meet in Pittsburgh for a hands-on Deep Dive.

The collaboration between Pitt and the VA has been renewed through 2016. Plans are in progress to continue to develop additional learning resources utilizing distance education technologies. Currently, most existing online learning resources especially the virtual grand rounds are open-source to the public. VA personnel can request a code to receive CEUs for viewing a course and completing a post-test at no cost. For more information go to www.rstce.pitt.edu.

For further details about the project, please contact the Project Director, Mark R. Schmeler (Schmeler@pitt.edu) or Project Manager, Richard M. Schein (rms35@pitt.edu).

Figure 1: Deep Dive

Attendees Interacting with Assistive Technology



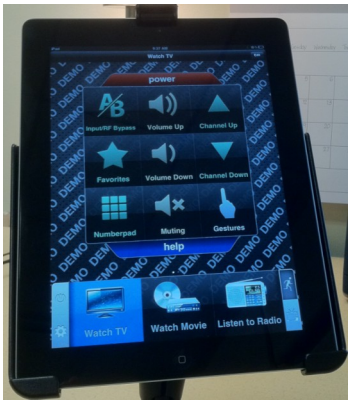
EADLS, cont.

Another common interface method uses universal infrared (IR) remotes which control televisions and home entertainment equipment. The growing ubiquity of home wireless networking, WiFi and Z-wave, makes this a viable interface option for device control and is quickly becoming normal in consumer electronics. It is common place to find WiFi connected thermostats and garage door openers in any home improvement store. This level of connectivity is slowly working its way into the EADL world and will likely eventually replace other antiquated systems.

The human technology interface in EADL systems consist of a control interface or access method, and some sort of user display or user feedback. Selection of the control interface should be based on user abilities, preferences, and actual device trials. User control can be accomplished directly or indirectly. Direct control is most efficient and involves the user making specific selections at will with a finger, hand, eye, or voice. Examples of direct selection include joystick mouse control or voice activation. Indirect control is less efficient, but allows a simple physical interface for individuals who have very limited functional mobility. While more simple physically indirect selection requires a more complex multi stage selection process. To better picture indirect selection imagine trying to turn on and off three separate lights in your home with only one light switch. Scanning is the indirect selection process that answers this conundrum. There are many types of scanning, but the most basic implementation requires one switch that upon the first activation initiates a prompt moving through available options and upon a second activation selects a specific option. In this description indirect selection requires two steps while direct selection would only require one step.

The EADL evaluation process at the Hunter Holmes McGuire VA Medical Center begins with a provider or Veteran identifying the need, desire for environmental control. A physician, physician assistant, or nurse practitioner can place a consult to the Assistive Technology (AT) Program. The evaluation process is typically a collaborative process involving the treating OT and AT Rehab Engineer working together. It is very helpful when a caregiver or significant other is present for the evaluation in addition to the Veteran. The initial evaluation is approximately one hour and is aimed at determining the Veteran's goals, cognitive and physical ability, appropriate access methods, environmental factors, and technology comfort level. Additional sessions of one to two hours are required to demonstrate trial multiple devices selected by the Veteran and AT team. If the Veteran is an inpatient then after the initial trialing process the devices can be narrowed to a few installed in the Veteran's hospital room for a trial period of one to two weeks. At this point the Veteran and At team can select the most appropriate EADL system. The AT Program or treating OT will then place a consult for the Prosthetics service solicit vendors to perform a home installation.

EADLs, following the consumer electronics trend, is constantly changing with the advancement of technology and in response to user requirements. With the growing variety of mobile, computationally powerful, and connected personnel computing devices, like the iPad or Samsung Galaxy tablet, options for EADL systems are growing rapidly. Many Apps and hardware accessories are available for these devices that allow access home automation systems, televisions, and any other remote controlled devices. Additionally, multiple assistive technology companies are producing accessories that allow scanning access to these mobile devices. Only time will determine which of these products are successful in the consumer market and result in viable EADL systems, but the future looks very bright.



Veteran's Story….Kenneth MacDonald

Hi, my name is Kenneth MacDonald, I'm 54 years old and was diagnosed with ALS in early 2007. My initial symptoms were slurred speech and trouble swallowing. Now I have very limited energy and strength, and I move very slow and stiff. I can walk with a walker but only for a short distance or I get real tired. I still have full cognitive functions and I work part time for an aerospace company as an electrical engineer. I used to be an avid road and mountain bike rider for a long time. I even rode a unicycle up to a couple years ago.

My goals were to get around my house and go out to movies, or join my wife when she took our dogs for a walk, and be able to communicate with folks.

I received help in a lot of areas (of assistive technology), but the main three were my power wheel chair, my adaptive speech technologies, and the most fun was my adaptive sporting equipment, or my trike.

For my power chair, I was able to try various configurations of front and center wheel drive chairs at the lab, which was very helpful since I'd never used a power chair before. A rep from the manufacturer also came out to my house with some models so I could maneuver them at home, which is where I would use it the most. At first I was leaning toward the front wheel drive since it was more stable to maneuver, but after the house visit and from using the more maneuverable center wheel drive in the confines of my house, I realized that the center drive would be the best for me. And, I wouldn't have picked one with the extreme tilt and recline features since I didn't think they were necessary, but after sitting in the chair for a few hours, I fully appreciate the pressure relief of reclining. Every day I am grateful for the independence that my power chair provides me. I don't have the upper body strength to use a manual chair so I simply can't imagine how my life would be without my power chair.

For the speech technology, I think the V-Max was ordered premature, or maybe it was too advanced for my current condition. I know that ALS can progress very quickly, and I really appreciated the fast results, but the V-Max is mainly for computer controlled optical eye-tracking for mouse control, and also for computer based artificial speech software. Back in 2009 I could still type pretty fast. Even now I can still type slowly but much faster than the eye-tracking mouse control. So for right now I use my iPad for speech, and my home computer also has lots of adaptive speech software which helps me do my telecommuting work and attend meetings over the phone. I also received a trackpad and an ergonomic keyboard for my desktop computer. The trackpad works great and I use it everyday.

The trike was probably the most complicated hardware ordered for me since it was definitely not "off the shelf" and needed much more alterations than I ever anticipated to work with my conditions. I'm tall and heavy and I used to ride a street bike all the time, 40 miles or more. The trike was as much for exercise as it was for creating happiness. The steering was an issue since having normal handlebars would have made getting on and off the trike more difficult or dangerous. I got custom trigger gear shifters since my grip is not strong enough to twist the normal twist-shift. The controls used most frequently, the rear derailleur, and the rear brake, were moved to the left handle since my left hand is stronger due to an old injury in my right wrist. The trike could hold up to 300 lbs, and I weigh 260. The seat was adjustable and could be moved back, since I have long legs. The frame was such that I could place my feet right beneath my butt, which was key for me, so I could easily and safely get on and off the trike. We also got special pedals that were so much better than I ever knew existed.

Assistive Technology Program Mission

To enhance the ability of Veterans and Active Duty Service Members with disabilities to fulfill life goals through the coordination and provision of appropriate interdisciplinary assistive technology services.

To serve as an expert resource to support the application of assistive technology within the VA health care system

ASSISTIVE TECHNOLOGY IS GROWING...

Assistive Technology Programs are expanding to other VA Sites including:

- Chicago (Hines)
- San Antonio
- Denver
- San Francisco
- Seattle
- Cincinnati
- Bronx