

SAVE THE
DATES:

- **AT Educational Opportunities through EES/TMS**
 - June 6—Apps: Environmental Control
 - July 11—Apps: Low Vision
 - Aug 1—Adaptive Devices for Visually Impaired Veterans
- **AT Educational In-Services at McGuire**
 - May 21—Use of SmartPhones
 - June 18—Use of the “Cloud”
 - July 16—App Exchange

Contact Melissa Oliver x2134 for questions

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PM&R Assistive technology

VOLUME 3 ISSUE 3

SPRING 2014

Joysticks, Head Arrays, and Tablets Oh My!

...Brian Burkhardt

Proportional joysticks are the most commonly used input device for driving and seat position control in powered wheelchairs. This makes sense because proportional joysticks give the user variable speed and direction control. While proportional joysticks are typically accessed by hand, this is by far not the only way for someone to access a joystick. By utilizing various sizes, sensitivities, and mounting configurations joystick control can be accessed by a single finger, elbow, foot, head, or even the chin. As with a joystick, any control method relies heavily on proper mounting. There are many mounting products from each wheelchair manufacture as well as alternative control companies like Stealth products, Adaptive Switch Labs, HMC, and Switch-It.

Sometimes using a joystick is not appropriate for a given patient or is too fatiguing for continuous usage throughout the day. In these cases an alternative access method must be utilized. A patient with a high cervical spinal cord injury might have little to no movement below the neck or a patient with multiple sclerosis may have difficulty with severe tremors with purposeful upper extremity movements. Each person is different, and each wheelchair access method will also be different. Fortunately there are many alternatives to joystick control.

Consider a patient with a C2-3 complete spinal cord injury that has no extremity or neck function, and very little independent respiratory ability. How can this patient express his control desire to a wheelchair? Potential sites for volitional control output are facial, eye, and tongue movements, voice command, and inspiration / exhalation. There are many control options for this

example. A switch could be utilized to initiate the wheelchair control cycling (scanning) through all four directions. When the desired direction is selected the patient would activate the switch. This method is called scanning and the switch could be a bite switch, electromyographic (muscle electrical activity), eye blink, or pneumatic (for inspiration or exhalation). Another popular solution for this example is sip-and-puff drive control. This consists of a pneumatic sensor that detects negative (sip) and positive (puff) pressures to move the wheelchair forward or backward. A weaker sip and puff for left and right turns is also typically implemented. This system works extremely well with patients who have little to no movement ability as it requires only breath control.

There are many new more advanced drive control systems in development. The Tongue Drive System in development by Maysam Ghovanloo, a professor at Georgia Tech utilizes tongue movement to control a wheelchair. The patient must wear a special magnetic tongue stud and retainer containing a wireless sensor package. The retainer translates tongue movement into wheelchair control through a cell phone interface. This system can be used for computer or cell phone control also and provides an access method for even the most extreme

cases of functional movement limitation. Eye tracking technology has been used in the Augmentative Communication field for some time, but is currently making it into wheelchair control as well. Like the tongue drive system eye tracking could give patient's with no movement ability a reliable method for wheelchair mobility. There are even a number projects underway to utilize Google Glass and head or eye movement as a wheelchair input method. With wearable electronics becoming more prevalent the possibilities are limitless.



For a patient with a lower level spinal cord injury, multiple sclerosis, or any other patient with more head and neck movement ability another wheelchair drive control option is the head array. A typical head array system consists of 3-4 switches mounted in the wheelchair's headrest. A 3- switch system uses one switch for forward / reverse and two switches for left and right turning. Some newer devices, like Stealth Products i-Drive, combine the functionality of both a sip-and-puff and head array. Typically sip-and-puffs and head arrays are not proportional input devices; when activated they have either an on or off state. (cont. page 4)



Assistive Technology is EXPANDING!

The Assistive Technology (AT) Program is excited as it is expanding and growing into new areas of McGuire VAMC. Within the past 5 months, the AT Program has opened 2 new AT labs in order to meet the growing needs of our veterans.

An AT lab in the PM&R area of the main hospital opened in December 2013. This lab is dedicated to serving the inpatients as it allows for easier access for AT evaluations and training. In addition, the location (IT-123) is in close proximity to the SCI unit

allowing for increase utilization of the space and AT equipment by the SCI Rehabilitation therapists. The lab provides AT evaluations and training in the areas of the following:

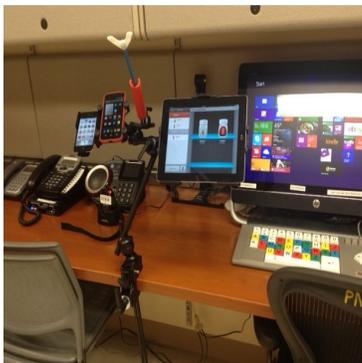
- ◆ EADLS (previously known as ECUs)
- ◆ Adaptive computer access
- ◆ Electronic cognitive devices
- ◆ Rehab engineering

In addition, this lab also is the location for the Adaptive Sports Equipment Clinic which is held every Thursday morning.

In February 2014, an AT

lab in mental health opened in the shared space with Occupational Therapy. This lab focuses on three specific areas of assistive technology:

- ◆ Adaptive computer access
- ◆ Learning technologies
- ◆ Electronic Cognitive Devices which include medication reminder systems.



Meet McGuire's AT Team ...Stacy Gross

Stacy Gross is a graduate of East Carolina University with a Master of Science in Speech Pathology. After graduating with her degree, she completed her Clinical Fellowship with Sheltering Arms Rehabilitation Facility.

Here is a little more information about Ms. Gross:

How long have you been at the VA?

I have been at the McGuire VAMC for have been working as a Speech Language Pathologist here at McGuire VA Medical Center for almost 10 years. I currently work as one of the acute care SLPs that services the intensive care units, medical floors, spinal cord injury units, community living center as well as outpatients. I enjoy the diversity that my job brings.

What do you like about working at the VA?

I have several members of my family that have served this country, including my grandfather, who was a decorated WWII veteran. I am extremely honored to help serve these active duty members as well as veterans who have so selflessly fought for our freedom. Here at McGuire VA Medical

center, I have the opportunity to collaborate with numerous disciplines to better serve our veterans and provide them with the best care.

What areas of AT are you interested in and like working with? And Why?

I am especially passionate about Augmentative and Alternative Communication (AAC) devices to assist patients with communicating their needs. Veterans with severe speech or language disorders can benefit from AAC devices to supplement existing speech or replace speech that is non functional. It's amazing to see how assistive technology allows these individuals to communicate anywhere from basic needs to complex thoughts with family and friends. These devices allow them to direct their care and become more independent within their environment.

Why are you passionate about AT?

Today's world is very technology oriented. Our veterans and staff are very fortunate to have access to the latest technology to better serve our patients. Although all of our

patient's aren't so comfortable with technology, we are able to provide education regarding AT, which can improve their independence and allow them to become more active. We are able to provide them with the best equipment that may not otherwise be available to them due to cost. The gratitude and appreciation expressed by our veterans makes this job worthwhile.

Tell us about other interests outside of the VA.

I enjoy spending quality time with my husband and two girls (4 yr and 2 yr), going to the beach, listening to music and staying active with volleyball and softball.



Stacy Gross, CCC, SLP

Veteran's Story...Phillip (P.J.) Reid

P.J. Reid is a 44 year old Veteran who was referred to outpatient occupational therapy for a wheeled mobility evaluation by his primary care physician in August of 2013. Mr. Reid had a large right basal ganglia hemorrhage in May of 2011 resulting in left sided hemiparesis with significant hypertonicity and arm and leg contractures and ROM limitations.

Mr. Reid arrived for his initial wheeled mobility evaluation on a stretcher from the skilled nursing facility where he resides. Mr. Reid and his mother expressed a strong desire to increase his mobility as he was limited to a borrowed tilt-in-space manual wheelchair at that time. Mr. Reid was dependent for every aspect of his mobility on initial evaluation. During subsequent follow up evaluation appointments, he demonstrated the ability to independently maneuver a power wheelchair using a right sided joystick. He was also able to operate the seating functions of the power wheelchair which allowed him the ability to independently perform pressure reliefs as well as to re-position in the chair for comfort. A mid-wheel drive power wheelchair (the Quickie QM710) with power tilt, manual reclining back with a J3 backrest, and manual elevating leg rests was prescribed for Mr. Reid.



Once the wheelchair was received, Mr. Reid participated in several outpatient OT sessions to adjust and adapt the wheelchair seating com-

ponents to his specialized seating needs. He now uses his power wheelchair as his primary means of mobility within the long term care facility where he resides.

Tell us about your experience with the Assistive Technology Program .

My experience has been great! They were the first that were willing to work with me (for a power wheelchair). Everyone else said I would never be able to get a power wheelchair. They did not think I would be safe to use one.

What challenges were you having that had you referred to the program?

My legs; I was not able to walk after my stroke and with all of my spasms.

Who did you see?

Sara Jackson (OTR/L—Wheeled Mobility Director)

What device/program did you get?

I got a power wheelchair.

How has the device changed your life or impacted your life?

I am more independent now. I feel alive. I can go around the facility with my mom with me, not pushing me. Mr. Reid's mother reports: "It made him feel more alive is right. He is now working with his computer. It has changed his disposition. He wants to get dressed and get up out of bed every day now. He did not want to do any of that before he got his power wheelchair."

What activities (things) are you doing now that you were not able to do before?

I can go outside without someone having to push me and I don't have to be dependent on my mom to go left or right. I can go where I want to go. (said with a big grin)

Would you say your quality of life has improved?

Yes; I feel like a person, not a thing now. I am not waiting to die anymore.

Is there anything we haven't covered that you would like to include?

When others said I couldn't, she (Sara Jackson) said I would.



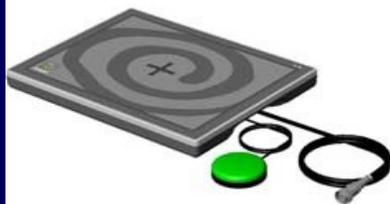
"I am more independent now. I feel alive!"

Joysticks, Head Arrays, and Tablets Oh My!, cont.



George Neagle using Head Array

"I am able to get out and around rather than in a manual wheelchair where I am sort of stuck in one place."



Alternative Drive: Track Pad Control

This means that when a switch is activated the wheelchair moves at a predefined speed. This is not as adaptable as proportional control and to combat this deficiency most power wheelchair manufacturers have implemented software that allow advanced users of these drive systems the ability to approximate proportional control.

Similar to a head array, the iZip from Magitek allows control of a wheelchair using head movement. A small sensor is worn on a head band that translates head movement proportionally into wheelchair drive controls. This sensor can also be placed on any body part that has reliable and controlled movement.



Alternative Drive: Head Array

If a patient has gross upper extremity control, but has trouble accessing a joystick a potential alternative is track pad control. This method provides control input by touching a large track pad. When an extremity, a hand for example, is placed on the surface of the track pad the initial contact point is calibrated as the center of control. When the contact point is moved forward the chair moves forward, if the contact point moves right the chair turns right. It is just like using a track pad on a computer and gives variable control in all directions. Someone who fatigues quickly using a standard joystick might be successful with track pad control because the hand can be rested fully on the track pad during operation as opposed to holding the hand above a joystick. A similar outcome could be accomplished

with mounting and hand support using a joystick. Ultimately the control method selected depends on the patient's success and comfort with either option. A simplified, version of track pad control can be accomplished by placing proximity or optical sensors in a lap tray. The wheelchair can be moved in forward, reverse, left, or right by moving an extremity onto, or near, each respective sensor.



Alternative Drive: 4 switch fiber optic array

If a patient can reliably make small finger movements the VIC CCD input device from HMC might be a good option. The VIC is an optical sensor that allows a single finger to operate a wheelchair. Control is achieved by placing a finger into the sensor area of the VIC and moving it in the direction of desired movement. No actual contact is required by the user, simply small movements. Both the track pad and VIC control allow a patient to stay in contact with the neutral or



Alternative Drive: VIC CCD

centered area of the control interface while in a resting position.

It is essential to trial the appropriate control methods as part of the wheeled mobility evaluation process. Additionally, some access methods, like sip-and-puff, take time for someone to learn, they may not be successful initially, but over time can become very proficient. The McGuire VA AT Program has assembled a wide selection of alternative drive systems for power wheelchairs. This library gives wheeled mobility specialists quick and easy access to the equipment they need in order to offer efficient and comprehensive evaluations and trials to our Veterans. If you would like to learn more about any of these systems or would like to reserve a device for an evaluation please contact the McGuire AT Program.

TECH IT OUT – ATIA ORLANDO 2014 HIGHLIGHTS

– BY TAMPA AT PROGRAM

App-y Hour:

Proloquo4Text AAC app: text/phrase based app, iOS only, 90 voices and 50 languages, share via social media, word and sentence prediction, no voice recording, \$129

RocketKeys AAC app: customizable keyboards, native accessibility features for vision and physical impairments, iOS only, webinar training available, \$159.99

Voice Dream Reader: text-to-speech app for multiple text formats, links with Bookshare and Gutenberg, good speech synthesis, half the price of Bookshare's Read2Go app, \$9.99

Any.do.to-dolist app: cloud-synced, voice recognition, shared lists, iOS and Android, free

Pomodoro: timer app for procrastination and time management incorporating timed breaks for specific tasks; free on Android and iOS

Products:

Tremor spoon: stabilizing spoon, <https://www.liftlabsdesign.com/>

Audio Notetaker: laptop based audio recording software with built-in organizational features

Jot Pro Pen Stylus: fine, sound dampening tip for precise writing on iPad, magnetically attaches

Compass Software– create charts to compare accuracy/speed of access across devices, provides suggested scanning rate, may be available on iPad in the future, can run on Surface tablet

Keyboard Wizard Software – establishes sticky keys and repeat settings and can change settings automatically

Pointing Wizard Software– adjusts user's pointer settings automatically

Single Switch Performance Test – software to facilitate measurement of the ability to activate a single switch. Measures the average time required to activate or release the switch and also can measure the speed of repetitive activations. Free download

Assignment Calculator – open source and customizable calculator which provides users with estimated completion time for step-by-step tasks including general deadline dates to keep you on track with assignments, provides resources, can copy and paste tasks into your digital calendar

Sqworl.com – web app that provides a clean and simple way to visually bookmark multiple URLs

Soundgecko.com – instant MP3

conversion of digital articles allows users (iOS, Android, Windows apps) to multi-task and clear their reading list while doing other things

Professional Development:

Padlet.com – mobile wall for posting discussions, brainstorming, taking notes or collecting feedback from presentations, add multimedia, instant collaboration and comments

Today'smeet.com – backchannel to connect with your audience in real time, live stream commenting

Nearpod.com – interactive presentations and lessons in mobile format, live Q/A, quizzes and free text formation, great for group treatments or lectures



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Assistive Technology Program Mission

- To enhance the ability of Veterans and Active Duty 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.

Nuts and Bolts of Rehab Engineering....

Siri and Google Now: What Can They Do for You?

...Ben Salatin, AT Rehab Engineering

If you are carrying around a smartphone then whether you know it or not, you have a powerful intelligent personal assistant at your beck and call. Apple has Siri and Google has Google Now, virtual assistants in the palm of our hand that we can talk too in natural sentences. Through your smartphone's internet connection, the Siri and Google Now software is able to understand what you said and access vast amounts of data to answer your questions, make recommendations and perform actions. (See Chart) The software adapts to the user's individual preferences over time and personalizes its responses.

Siri is built into your iPhone and is capable of using Apple's line-up of apps, which includes everything from stocks and iMessage, to the calendar and map apps. It uses Wolfram Alpha, a search technology that is capable of understanding questions, and it can pull in answers from Google, Bing, Yahoo, and Wikipedia.

Google Now is built into any new Android phone. It is easy to describe it as Google's version of Siri, but it is actually a lot more ambitious than that. The real attraction lies in its abilities to predict your desires and needs. If you let it learn about you and your habits, then it

can give you information that it thinks you might be interested in. News, sports scores, weather, and traffic information is displayed in real time without you asking for it, all based on your previous movements and searches.

The voice commands in both Siri and Google Now are quite powerful. You can dictate emails or text messages, make calls, open apps, play music, and search for information. Android and iPhone can even use many similar commands. Siri still has the lead in the variety of things it can understand. It also has a better sense of humor than Google Now. A few Android phones do offer completely hands free access to voice commands because the phone is always listening. No button press to put the phone in "listen mode" is needed. Wondering what you can say to your phone. Here is 2 good lists: Siri <http://goo.gl/TjFkSm> Google Now <http://goo.gl/X0SrXa>



	Siri	Google Now
Launch apps	Yes	Yes
Weather forecast	Yes	Yes
Calendar	Yes	Yes
Set alarms	Yes	Yes
Type queries	No	Yes
People reminders	No	No
Access functions within apps	No	No
Make calls	Yes	Yes
Send messages or emails	Yes	Yes
Play music	Yes	Yes
Recognize music	No	Yes
Web search powered by	Bing, Wolfram Alpha	Google
Sense of humor	Yes	No