DEPARTMENT OF VETERANS AFFAIRS

PM&R Assistive Technology

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Assistive Technology Gets Hacking Again...McGuire and VCU Partner for VCU Health Hacks

On November 3-4, 2018, McGuire VA Medical Center partnered with Virginia Commonwealth University College of Engineering at their 3rd Annual HealthHacks focusing on Assistive Technology and Prosthetics.

Our Veterans presented their challenges in person sharing their story and engagement to the student Hackers. There were ten Veteran specific challenges ranging from adaptive fishing for individuals with spinal cord injury to communication app for individuals with aphasia to orthotic shoe insert for an partial amputation.

Over 150 students participated in the weekend event. Students represented engineering, occupational therapy, art and business from various universities. The AT team along with McGuire Physicians and Innovation Specialist were mentors to the student teams throughout the weekend.

At the end of the weekend, there were 34 summitted solutions for judging. Judging was completed by experts representing local businesses, VCU Health, VCU professors and McGuire VA Medical Center. Mr. Jim Dudley, acting Associate Director, Dr. Timothy Lavis, Chief of SCI&D and Dr. Lance Goetz, SCI&D physician represented McGuire VAMC as judges.

The AT Program plans to work with some of the teams to continue to develop their solutions that will assist our veterans and their life goals.

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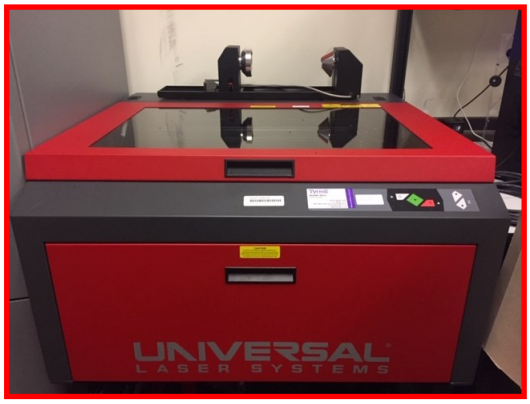
The Assistive Technology Program Expands Their Design Capabilities...*Brian Burkhardt, AT Rehab Engineer*

The Assistive Technology (AT) Program at McGuire VA Medical Center is constantly expanding its capabilities in order to efficiently meet the goals of our clinicians and Veterans. Over seven years ago the AT Program purchased a commercial grade 3D Printer. At the time there were very few 3D printers used for direct Patient care and this exciting technology was quickly put to use for our Veterans. The latest addition to the AT Program tool set is a commercial grade Laser cutter / engraver.

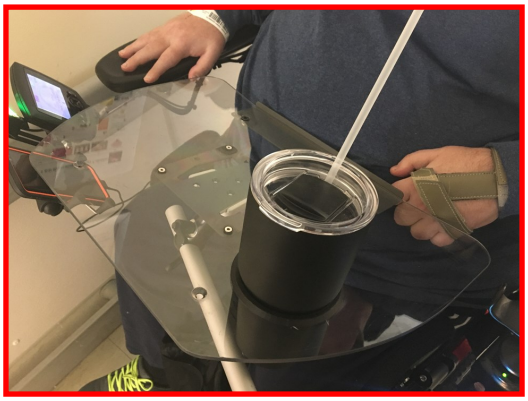
The Universal Laser Systems VLS 4.60 Laser Platform uses a 60 Watt CO_2 laser to cut or engrave an area of 24"x18"x9". This system can cut and engrave materials like, wood, plastic, fabric, leather, and paper. It can also engrave materials like glass, ceramics, and coated metal.



Laser cutting and engraving is a subtractive process, removing material, as compared to 3D printing, which is adds material. This means that certain items can be fabricated with much greater speed and with much greater accuracy then 3D printing. The nature of the two process lend themselves to different applications. For example, one of our first projects using the laser cutter involved a Patient desiring a cup holder built into his lap tray. Previously a cup holder was added separately from the lap tray, but it was knocked off in a doorway. With a few minutes work, using the laser cutter, a hole was cut into the Patients existing lap tray that fit his coffee mug perfectly. This would not have been possible with 3D printing. Other tools could have been used to achieve this goal, but not with the same results or repeatability.

Other intended applications for this system include:

- Enhancing off the shelf assistive switches with textures or labels for Patients with low vision
- Adding labeling to mounting products to aid in proper caregiver usage
- Creating custom mounting plates for AT devices
- Modifying the enclosures of custom AT devices with cutouts and labeling
- Creating custom or modifying existing lap trays
- Creating custom key-guards for Augmentative and Alternative Communication Devices
- Cut highly customized foam and strap material for orthotics and other adaptive devices.



This system was purchased for usage to fabricate and modify AT devices for Patients, but it has already found usage in other areas of the hospital. Medical Media was able to utilize the cutting ability to create custom military seals for the Prosthetics Service. The AT team has even produced some sample custom pylon engravings for lower extremity prosthetics in collaboration with the Prosthetics Service.

The AT program is always looking towards new solutions to improve Veterans quality of life. Please feel free to contact us regarding our new Laser Platform or any of our other fabrication abilities.

Veteran Story...Mr. Ryan Carter

Mr. Ryan Carter is 43 years old. He served in the Air Force for nine years. He is married and loves all Baltimore sports: Ravens and the Orioles. He has C4 AIS B SCI. His goals were to access his computer to complete his degree as well as use is smartphone independently.

Tell us about your experience with the Assistive Technology Program (Speech, driving rehab, OT/PT/RT).

I had a very positive experience. Working with the Assistive Technology Program showed me ways I could communicate with the outside world, and also to use my computer in a way I thought I wouldn't be able to.

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

My inability to use my phone, tablet, and a computer due to my spinal cord injury. I used those things on a daily basis before my injury, and it gave me back a part of my life.

Who did you see?

John, Melissa, and Heidi [VCU student working with AT program].

What device/program did you get?

I got Dragon software [for my computer], Sesame Enable for the phone, and several mounts for my devices.

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

They gave me hope that I could do the things I was previously doing on a laptop.

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

Typing on my laptop, looking at websites, utilizing my phone to listen to podcasts and audiobooks.

Would you say your quality of life has improved?

Yes, greatly!

Is there anything we have not covered that you would like to include?

The Assistive Technology group trained me really well on the Dragon software, even doing extra research on Apple products so I could use it on my Mac. I'm very thankful for them helping me.

CARF is coming...Tell Your AT Success Story

Storytelling is a great way to share your experiences in a concise but captivating way. This can be done through a drawing or 6-8 words. The legend goes, Ernest Hemingway was at a dinner party where no one believe he could tell a great story in six words. He wrote a story on a napkin and past it around and everyone was in tears. He wrote, "For sale, Baby shoes, Never worn."

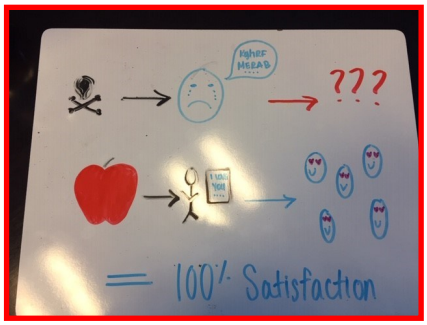
What is your Assistive Technology Success Story that had an impact on your Veteran?

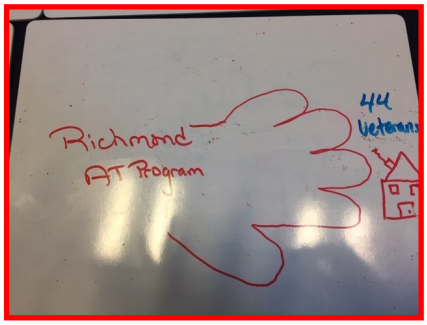
Tell your story in 3 parts

- Problem
- Solution
- Impact

All within 6-8 words or a simple drawing.

Here are some of our AT Success Story drawings!





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.

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Nuts and Bolts…Getting Around in Style: A Guide to Manual Wheelchair Assistive Propulsion Devices

John Miller, AT Rehab Engineering

There are many reasons to want a manual wheelchair over a power wheelchair. Manual wheelchairs are smaller/lighter and more easily transported, empower users to be more active daily, are less conspicuous in public settings, and can make a wheelchair user feel more independent and capable. However, propelling manual wheelchairs can be hard on the shoulders, and for some users fatigue is a big issue. Existing wheeled mobility AT devices on the market can alleviate those negative factors and enable more people to choose manual over power.

The SmartDrive is a great tool for providing assistive propulsion. It mounts onto the rear of the manual wheelchair (with hardware for rigid frames or folding frames) and provides forward propulsion when initiated by the user via a paired wristwatch with sensors. The user can use a "push" mode (called MX2) in which the watch senses a wheelrim push and fires up the SmartDrive's motor to match the push speed indefinitely until the user taps the watch to turn the motor off. Alternatively, the user can use a "tap" mode (MX2+) which gives the user the ability to start up the SmartDrive motor by double tapping the watch, then tapping again when the wheelchair reaches the speed the user wants. By keeping one's hands on the wheelrims, the user can steer and direct the SmartDrive.

Another device called the Firefly from Rio Mobility clamps onto the front of a manual wheelchair. It has handles for steering and essentially turns a manual wheelchair into a three-wheeled scooter. The Firefly is intuitive, using two handcontrols for forward and reverse propulsion and handbrakes to stop. The Firefly can also go faster than other devices, making it ideal for going long distances.

Alber and Quickie offers several different assistive propulsion products. From Alber, the e-fix, e-motion, and twion products rely on wheel hubs that fit onto the wheels of a manual wheelchair. The motors in the hubs provide additional propulsion based on the direction and magnitude of the user's input. The e-fix comes with a joystick, while the e-motion and twion have wheel rims with sensors which tell when the user pushes on them and activate the hubs. Quickie markets the Xtender, which function much like the e-motion and twion. All these products do add some weight to a manual wheelchair, but it is still far lighter and transportable than a standard power wheelchair.

These AT devices have many benefits: physical (reducing fatigue and joint wear), social (being more mobile), and psychological (having the option to use a manual wheelchair). It may be a helpful new intervention for a regular manual wheelchair user to combat the impacts of aging or increasing disability. Whatever the case may be, AT is once again improving the lives of people with disabilities and increasing independence.

The SmartDrive mounts on the rear of the manual wheelchair and provides a "cruise control" option.

The Firefly transforms a manual wheelchair into a three-wheeled scooter for rapid transport.

Alber offers wheel hubs that propel the wheelchair based on user input on the rims or via joystick

Quickie has the Xtender product, which also work to propel wheelchairs via wheel