



HERL Newsletter

News from the Human Engineering Research Laboratories VOL. 12, NO. 1 • MARCH 2013

Advising the Nation on Health

Institute of Medicine Leads in Research



The Institute of Medicine (IOM) is a non-governmental organization, based in Washington D.C., tasked with medical policy research. It provides advice on health and medical matters to the government of the United States and the public. The IOM is the health-related arm of the National Academies, which were chartered as the National Academy of Sciences under President Abraham Lincoln in 1863. The Academy's mission was, and remains, to "investigate, examine, experiment, and report upon any subject of science or art" whenever called upon to do so by any federal department or agency. Currently, the National Academies are comprised of four branches: The National Academy of Sciences, the National Academy of Engineering, the National Research Council, and the Institute of Medicine.

The IOM consists of more than 1900 members and foreign associates, and is an honorific organization as membership may only be gained by election of the full Institute. Only 70 or fewer new members are elect-

ed each year. On October 15, 2012, the IOM announced that Human Engineering Research Laboratories Medical Director Dr. Michael Boninger had been elected as a new member. Dr. Boninger was elected on the strength of his groundbreaking medical research at both HERL and the Department of Physical Medicine and Rehabilitation (PM&R) at the University of Pittsburgh, which he chairs. As the IOM itself states: "For those at the top of their field, membership in the IOM reflects the height of professional achievement and commitment to service." Dr. Boninger has been nationally recognized for his work with wheelchairs, and a research team he led was credited with establishing the link between manual wheelchair propulsion and certain injuries such as rotator cuff tears. He was also instrumental in developing standard of care guidelines currently used worldwide in clinical practice. He is currently working on a brain-computer interface that has been recognized by Popular Mechanics magazine with a 2012 Breakthrough Award.



Washington's Marine Barracks Has a Rich Past, Colorful Present

Evening Parade: Summer Celebrations of Heritage, History

"Music" might not be the first word you think of when you think of the Marine Corps. On the other hand, "precision" might be. But

both are on full display during the Marine Barracks Washington's Evening Parades, held every Friday night during summertime at the Barracks.

The Barracks, located at the corner of 8th and I Streets in Washington, D.C., is home to the Marine Corps' oldest active post, co-founded by President Thomas Jefferson in 1801. It also houses "The President's Own" United States Marine Band, "The Commandant's Own" The United States Marine Drum and Bugle Corps, the Marine Corps Color Guard, the Marine Corps Silent Drill Platoon, and the Ceremonial Marchers – all units which take part in the Evening Parade performance of music and display of precision marching.

The Evening Parades came into being in the early 1900s, when presidential inaugurations and other special occasions provided the Marine Corps with an opportunity to perform. The initial parades were held infrequently until Major General John H. Russell, Jr., the 16th Commandant of the Marine Corps, initiated the first season of regularly scheduled parades in 1934.

An accumulation of former military rituals such as retreat, tattoo, and the lowering of the colors ceremonies, the Evening Parade was conceived as a unique

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WE'D LIKE TO GET TO KNOW YOU BETTER!

please fill out our survey at

<http://is.gd/herlnl>

The HERL newsletter audience consists of clinicians, researchers, research study participants, and students interested in rehabilitation science and technology. With that in mind, we want to ensure we're providing content that is pertinent and of interest to all of you. Please take a few moments to fill out a brief survey, and let us know what type of information you're looking for in the HERL newsletter. You can expect to see some changes in future editions as we learn more about you.

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Current Research Abstracts and Book Chapters

Dicianno BE, Mahajan H, Guirand AS, Cooper RA, "Joystick Use for Virtual Electric Power Wheelchair Driving in Individuals with Spastic Cerebral Palsy," *American Journal of Physical Medicine & Rehabilitation*, pp. 823-830, Vol. 91, No. 10, Oct 2012.

SUMMARY: Joysticks that don't move were preferred more often by individuals with cerebral palsy.

Objective: Upper limb spasticity may impair the use of control interfaces such as joysticks for many individuals with disabilities such as cerebral palsy (CP). The aims of this study were to compare the driving performance of those with CP to that of control participants, to identify the impact of lead time on performance, and to compare two joystick designs, a standard movement sensing joystick and a novel isometric joystick.

Design: This study used a repeated-measures design to compare the performance of a group of participants with CP to that of participants without disabilities in a two-dimensional simulated driving task on a computer screen using the two control interfaces. The driving trials used varying "lead times," or the amount of warning time available to make movement decisions and turns. A total of 34 participants with CP and without disability were matched by age and sex into two groups.

Results: Participants with CP had lower driving performance in most variables of interest compared with controls. However, surprisingly, reducing lead time also reduced some performance errors, possibly because of more deliberate driving. The isometric joystick outperformed the movement sensing joystick in terms of performance errors but contributed to a prolonged reaction time.

Conclusions: The isometric joystick was preferred by participants over the movement sensing joystick in this study and may be a future alternative for individuals with CP for both power mobility and computer access tasks.

Karmarkar A, Dicianno BE, Graham JE, Cooper RM, Kelleher AR, Cooper RA, "Factors Associated with Provision of Wheelchairs in Older Adults," *Assistive Technology*, pp. 155-167, Vol. 24, No. 3, 2012.

SUMMARY: Which kind of wheelchair a person is prescribed is often related to his or her cognitive functions.

The objectives of this study were: (a) to identify the factors that impact prescription of wheeled mobility devices for older adults, and (b) to determine the effects that living settings have on the types of devices that older adults receive. Data were gathered from medical charts on 337 older individuals. These individuals were aged >60 years, and each of them received a new wheeled mobility device from the Center for Assistive Technology during the years 2007 and 2008. Data were analyzed in three tiers: tier 1 (manual versus powered mobility devices); tier 2 (motorized scooters versus power wheelchairs); and tier 3 (customized versus standard power wheelchairs). For tier 1, the factor associated with higher odds for receipt of manual wheelchairs versus powered were: cognitive limitations. For tier 2, diagnosis of cardio-vascular and pulmonary conditions were associated with prescription of motorized scooters. For tier 3, neurological conditions, male gender, institutional living, and lower age were associated with receipt of customized power wheelchairs.

This study objectively describes the clinical decision making process used for prescription of wheeled mobility for older adults. This information can aid in development of guidelines and improving standards of practice for prescription of wheelchairs for older adults.

Liu H, Grindle GG, Chuang FC, Kelleher AR, Cooper RM, Sieworek D, Smailagic A, Cooper RA, "A Survey of Feedback Modalities for Wheelchair Power Seat Functions," *IEEE Pervasive Computing*, pp. 54-62, Vol. 11, No. 3, July-Sept 2012.

SUMMARY: Wheelchair users had concerns with power seat function reminder feedback controls.

Purpose. This study was to investigate users' preferences for interface modalities and reminder functions to develop a seating virtual coach (SVC).

Methods. The subjects reviewed modalities with various properties using a computer demonstration program with supplemental devices. Their preferences and suggestions were collected via a questionnaire and interviews.

Results. An animation of power seat function usage tasks was preferred because it conveyed essential information. If human face images and speaking are needed, female images and voices were preferred more frequently than male. The subjects who were power seat function users preferred joysticks as pointing devices because they were accustomed to manipulating them. Most of the subjects would like to keep control over their wheelchairs and SVC in terms of being able to shut the machines and operate their wheelchairs and power seat functions independently.

Relevance. The information obtained from this study will be used to design human-machine interface and reminder functions for people using power wheelchairs.

Brain Injury Medicine, 2nd Edition, Nathan D. Zasler, MD, Douglas I. Katz, MD, Ross Z. Zafonte, DO, Editors, Demos Medical Publishing, New York.

Assistive Technology for People with Traumatic Brain Injuries (Chapter 71),

R.A. Cooper, M. McCue, R.M. Schein, R.M. Cooper, M.L. Sporer, M.B. Dodson, A.M. Reinsfelder, A.F. Yeager, A. Jinks, E. LoPresti, L. McClure, H. Wang, J.L. Collinger, S. Hiremath, A.N. Lewis.

SUMMARY: Technology can be of tremendous benefit to people with brain injuries and facilitate greater independence and community participation.

Mobility, communication, computer usage, and assistance with cognitive functioning can all be supported with the appropriate usage of technology. The delivery of assistive technologies for people with brain injuries mandates a team approach involving therapists, counselors, physicians, engineers, and most importantly the person with a brain injury (and the person's family). Brain injury can affect many aspects of functioning, and therefore, a thorough assessment of the individual's abilities, his or her understanding of technology, and his or her interaction with other people and various environments is needed. Unfortunately, there is a shortage of health care professionals with the expertise to provide and train individuals with brain injuries in the application and usage of assistive technology (AT). This need is in part beginning to be addressed using telerehabilitation, which is expected to grow as remotely programmable devices become ubiquitous.

Transfer Studies at HERL

Studies indicate that wheelchair users transfer 15 to 18 times a day, on average, and some people transfer as many as 40 times a day. Whether to a car, a commode, an easy chair, or a bed, transfers are a necessary part of everyday life – but they can cause major problems such as shoulder and wrist pain, rotator cuff tears, and tendonitis.

The culprit? Overuse of the upper extremities. But researchers have discovered that transfer technique can make a huge difference as well. Proper transfer techniques can save a lot of wear and tear on the joints and muscles. The question is, though, what does good transfer technique look like?

Researchers from the Human Engineering Research Laboratories (HERL) in Pittsburgh are currently working on exactly this question. Three separate studies are underway to measure and define transfer techniques.

The first transfer study at HERL is funded by the VA and looks at the biomechanics of transfers. To measure various techniques, HERL researchers have built a custom transfer station with state-of-the-art instrumentation to measure human movement and forces. Participants' are fitted with special infrared markers, and the station is surrounded with cameras that can pick up and record the movement of the markers. The object to be transferred onto is placed on the station – for example, a commode – and the research subject transfers from their wheelchair to the object using force-sensing grab bars and plates that record the loading on their upper limbs and legs. Simultaneously, the infrared cameras measure the movement of the subject during the transfer. All of the data is combined together to get a complete picture of a single transfer and determine which techniques best minimize force and injury risk.

Since the project was started, thousands of transfers have been recorded. Researchers and clinicians have analyzed the data and in combination with a previous study funded by National Institute on Disability and Rehabilitation Research (NIDRR) put together a “scoresheet” of transfer quality – the Transfer Assessment Instrument (TAI). While the TAI is still being refined, it is hoped that in the future it can become a clinical standard for grading transfer technique. Currently, a few clinics outside of Pittsburgh are using the TAI and preliminary results are encouraging.

The second HERL transfer study, funded by NIDRR, uses ultrasound of the participants' upper extremities before and after they perform a number of transfers in a short period of time. The two ultrasounds are compared to measure changes. We hypothesize that good transfer techniques will cause less changes in ultrasound and eventually less damage to the joints. Enrollment in this study is ongoing.

SUMMARY: *Three separate studies are underway at HERL that aim to find out what good transfer techniques look like.*

HERL's third active transfer study is funded by the United States Access Board and NIDRR and concerns the impact of environment on transfers. The project hopes to determine acceptable ranges for setting U.S. standards for non-level transfers (e.g. vertical height differences), gaps between the target and wheelchair, and the clear space (length/width) needed to position wheelchairs in proximity to the targets. For this study, researchers from HERL designed and built a modular transfer station that consisted of a height adjustable platform, a fixed area for feet placement and adjustable lateral and front mounted grab bars. A fixed arm rest was inserted next to the platform to test its impact on the transfer process. Results are available from the first phase of this study at <http://www.herl.pitt.edu/ab/>. Phase 2 of this study will incorporate a workshop comprised of people who have expertise and experience with wheelchair transfers to discuss areas in which additional research is needed. This will include a discussion about which existing accessibility standards may need modification or further investigation.

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Maria Toro and Elaine Houston perform a transfer experiment.

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Article Warns of Increasing Wheelchair Breakdowns

Graduate student Lynn Worobey and other investigators at the Human Engineering Research Laboratories in Pittsburgh, Pennsylvania – as well MetroHealth in Cleveland – have published an original research article entitled “Increases in Wheelchair Breakdowns, Repairs, and Adverse Consequences for People with Traumatic Spinal Cord Injury” in the June issue of the research journal *American Journal of Physical Medicine and Rehabilitation*. This is an important article that has received both local and national media attention on a critical issue – and the people this issue affects most should also be informed.

After surveying 723 people with a spinal cord injury – all of who use a wheelchair more than 40 hours a week – Worobey et al found that wheelchair users with spinal cord injuries have very high rates of wheelchair breakdowns, which can result in being stranded, being injured, or missing appointments. Power wheelchair users reported having significantly more problems than manual wheelchair users, and those who use power wheelchairs with added seating functionality such as tilt-in-space, recline and seat elevation appeared to have the most breakdowns of all.

And the problem, unfortunately, is only getting worse. More than half (53%) of all the wheelchair users who participated in the study reported having a wheelchair breakdown that required a repair in the previous six months. A similar study took place in 2006, which found a breakdown rate of 45%. Injury rates from wheelchair breakdowns are also rising.

The article also reported that users who had their wheelchairs funded by Medicare and Medicaid had more problems with their wheelchairs than individuals funded by other sources. Race also seems to be a factor: wheelchair users from a racial/ethnic minority background were more likely overall to have problems with their wheelchairs.

As one might expect, breakdowns have an adverse effect on a wheelchair user's ability to work. Injuries suffered by users during wheelchair breakdowns can also make working problematic. Since wheelchair users already face a much higher unemployment rate than the population at large, breakdowns present a large barrier to successful employment.

While more research is needed, the article speculates that there has been a drop in wheelchair quality due to two factors: insurance reimbursement changes and a lack of

SUMMARY: Wheelchair quality is declining and the number of wheelchair breakdowns are rising. Here's what can be done.

quality standards enforcement. Medicare and Medicaid pay for wheelchairs using a consistent fee schedule that doesn't take wheelchair quality into account; additionally, competitive bidding policies can mean that users end up with cheaper, lower-quality equipment. Also, the Food and Drug Administration does not currently require wheelchairs to undergo quality testing, which means that many wheelchairs don't meet the standards developed by the American National Standards Institute and Rehabilitation Engineering and Assistive Technology Society of North America.

Maintaining a wheelchair can present another issue when it comes to breakdowns: power wheelchairs are simply more difficult to maintain, which may account for the greater number of problems reported for power wheelchairs over manual wheelchairs. System complexity is also a factor, because the more specialized functions wheelchairs have, the more a technician may be required to fix them – in-home repairs may not be possible.

The problems of wheelchair breakdown are exacerbated when users have no backup chairs available, effectively stranding and/or immobilizing them. This study found that individuals with Medicaid were less likely to have a backup wheelchair, as were individuals from a racial/ethnic minority background. This article also reported that compared with historical data, the percentage of individuals with backup wheelchairs has dropped by 50%.

So, what can be done? The authors of this study provide three suggestions on how to limit future wheelchair breakdowns. First, further investigation is needed by looking at the manufacturers and models of wheelchairs to identify manufacturing differences that make breakdowns either more or less likely. Second, wheelchair users should be given more education on routine wheelchair maintenance such as the replacement of cushions, caster wheels, and batteries. Finally, policymakers must review and revise current prescription and testing policies to improve wheelchair quality and requisitions.

Full citation: Worobey L, Oyster M, Nemunaitis G, Cooper RA, Boninger ML, “Increases in Wheelchair Repairs, Breakdown, and Adverse Consequences for People with Traumatic Spinal Cord Injury,” *American Journal of Physical Medicine and Rehabilitation*, pp. 463-469, Vol. 91, No. 6, June 2012.

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Latest State of the Science symposia at Walter Reed educate hundreds

Assistive Technology, September 2012

The State of the Science Symposium on Assistive Technology was held in the Memorial Auditorium at the Walter Reed National Military Medical Center in Bethesda, Maryland on September 21, 2012.

Casey Nolan of Clark Realty Capital and **Mark A. Sullivan** of Michael Graves & Associates led off the symposium with their presentation about the latest in adaptive housing. Their firms – development and architecture, respectively – have collaborated to build new, state-of-the-art military housing for Soldiers with disabilities. **Mark Schmeler, PhD** of the University of Pittsburgh's Department of Rehabilitation Science and Technology (RST) spoke about the Veterans Health Administration Polytrauma Assistive Technology Program. He was followed by **Allen N. Lewis Jr., PhD**, also of RST, who discussed methods of using assistive technology to promote employment among Veterans. Afterwards, Walter Reed's own Assistive Technology Specialist, **Amanda**



The iArm

Reinsfelder, MS ATP, presented a discussion about current methods of delivering cognitive assistive technology services. Following this, RST graduate

student **Nahom Beyene, MS**, described his research on adaptive driving for people with brain injuries and other disabilities.

Lunch was provided thanks to the generous support of the Paralyzed Veterans of America. During lunch, symposium attendees were treated to a lecture by special guest **Maryann McFadden**, author of the bestseller *The Book Lover*, copies of which were available in the auditorium lobby. *The Book Lover's* main male character was inspired by Symposium Director **Dr. Rory Cooper**.

Following lunch, **Rosemarie Cooper, MPT ATP** of the Center for Assistive Technology at UPMC Pittsburgh, discussed the improvement of assistive technology service delivery outcomes in the face of constant clinical challenges. Continuing on the same theme, HERL Associate Medical Director **Brad E. Dicianno, MD** discussed best practices for wheelchair selection and fitting. Afterwards, **Kendra Betz, MSPT ATP**, Prosthetics Clinical

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Virtual Reality, November 2012

The State of the Science Symposium on Assistive Technology on the subject of Virtual Reality (VR) was held in the Memorial Auditorium at the Walter Reed National Military Medical Center in Bethesda, Maryland on November 30, 2012. Over 180 people registered for this event, making it one of the best-attended symposia in the history of the series.

The symposium began with a presentation by **Erik Wolf, PhD**, Director of the Center for Performance and Clinical Research at Walter Reed, who provided an overview of research using the Computer Assisted Rehabilitation Environment (CAREN) system. CAREN combines a motion base, treadmill, projection system with integrated software to provide an immersive virtual reality environment. This simulates a realistic environment which facilitates testing and research for individuals with disabilities.

Professor and Chair of the Department of Physical Therapy at Temple University **Emily A. Keshner, PhD**, was next with a presentation entitled "Virtual Reality and Physical Rehabilitation: A New Toy or a New Research and Rehabilitation Tool?" Not only did Dr. Keshner prove that VR is indeed a valuable new tool, but she also presented evidence that it can sometimes be better for rehabilitation than rehabilitation in real life.

The next speaker was **Edmund LoPresti, PhD** of the Department of Rehabilitation Science and Technology at the University of Pittsburgh, who described his work using the video game *The Sims™* for people with cognitive impairments. Similarly, research discussed by the following speaker, **Albert "Skip" Rizzo, PhD**, Associate Director of the University of Southern California Institute for Creative Technologies, uses a video game engine and VR scenarios to help treat combat related post traumatic stress disorder (PTSD) via exposure therapy. Following this, the lunchtime speaker, Professor **Audrey Schoomaker, BSN CPT RYT**, of the School of Recreation, Health, and Tourism at George Mason University, changed things up with a presentation on yoga therapy in rehabilitation.

After lunch – graciously provided by the Paralyzed Veterans of



Video still from Dr. Rizzo's VR therapy

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Proceedings of the IEEE, impact factor, and PerMMA

The journal article “Personal Mobility and Manipulation Appliance - Design, Development and Initial Testing” by Dr. Rory Cooper and many researchers from HERL was published in the August 2012 issue of *Proceedings of the IEEE*. This is very important news for HERL in general and the PerMMA project in particular – but to understand exactly why, we need to answer several other questions first.

What is the IEEE?

The Institute of Electrical and Electronics Engineers, or “I-triple-E,” is an international, nonprofit organization comprised of engineers, scientists, technicians, and allied professionals. Founded in New York in 1884 as a professional organization for electrical engineers, the legal name of the organization is technically the Institute of Electrical and Electronics Engineers. However, anyone with an interest in advancing technology and innovation may join, so the full name is rarely used.

The IEEE currently has more than 400,000 members worldwide. Members with an “extraordinary record of accomplishment” are selected for IEEE Fellowship by the IEEE Board of Directors; fewer than 400 people a year are chosen for this honor. HERL Director Dr. Rory Cooper is an IEEE Fellow.

What is the *Proceedings of the IEEE*?

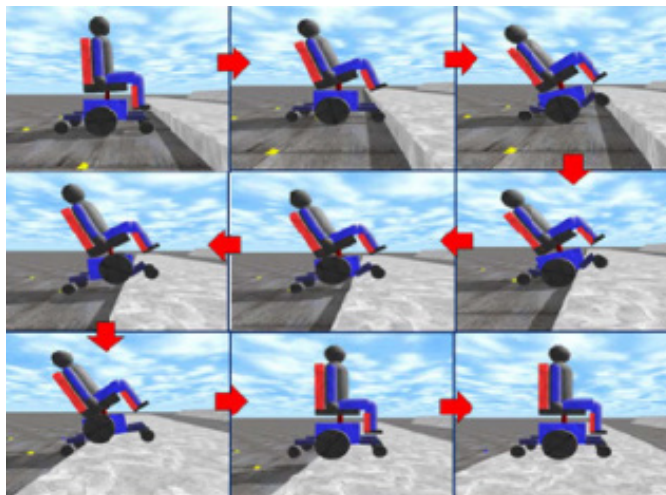
The IEEE publishes almost 150 separate journals, magazines, and other scholarly publications, including nearly a third of the world’s technical literature in electrical engineering, computer science, and electronics. The flagship publication of the IEEE is *Proceedings of the IEEE*, a monthly journal covering all topics in technology. *Proceedings of the IEEE*, first published in 1913, is currently celebrating its 100th year.

Proceedings of the IEEE is ranked #2 on the *Journal of Citation Reports* (JCR) 2012 Impact Factor list for Electrical and Electronic Engineering publications, and is ranked #1 on the JCR 2012 Article Influence list for Electrical and Electronic Engineering publications.

What is “impact factor”?

“Impact factor,” generically, is a measure of a journal’s reach and influence based on circulation, readership, citations, and electronic downloads, as well as relative measurements such as reputation and prestige. The higher a journal’s rankings, the greater the influence it will have on research and the scientific community as a whole, and the more selective it can be in choosing which articles to accept.

SUMMARY: *The history of the IEEE and the Proceedings journal, and what it means to HERL.*

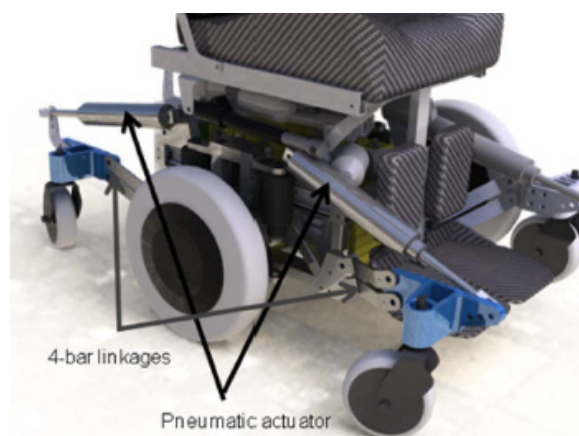


Why is the article important for HERL and PerMMA?

Not only is the *Proceedings of the IEEE* one of the most influential electrical and electronic engineering journals, the IEEE itself has a huge footprint in the scientific community – which means wide exposure for articles published by the *Proceedings*. For an ongoing project like PerMMA, exposure is necessary in order to secure continued interest (and continued funding). Moreover, the selectivity of the top journals means that acceptance of an article is no sure thing and is reserved for the very best, timeliest, and most interesting subjects.

Full citation: Cooper RA, Grindle GG, Vazquez JJ, Xu J, Wang H, Candiotti J, Salatin B, Houston E, Kelleher AR, Cooper RM, Teodorski E, Beach S, “Personal Mobility and Manipulation Appliance - Design, Development and Initial Testing,” *Proceedings of the IEEE*, pp. 2505-2511, Vol. 100, No. 8, August 2012.

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Illustrated with figures from the *Proceedings* article.
Top: ODE software simulation of GEN2-PerMMA climbing an 8-in-high curb.
Above: Image of the GEN2-PerMMA base showing the four-bar linkages and pneumatic actuators.

Assistive Technology, September 2012

Continued from page 5

Coordinator for the Prosthetics and Sensory Aids Service at the Department of Veterans Affairs, spoke on adaptive sports and current recreation technology, using examples such as sled hockey, cycling, wheelchair racing, and skiing. Finally, the last presentation of the day was given by HERL postdoctoral researcher **Hongwu Wang, PhD**, who discussed quality of life technology robots, or QoLTBots - in other words, robots that provide manipulation and mobility assistance to support independent living. As an example, Dr. Wang brought the **iArm**, a robotic arm that helps with grasping and maneuvering tasks.

View videos, presentations, photos, and more from this symposium online at the HERL website: <http://herl.pitt.edu/assistive-technology>



Researchers visited HERL on November 20 to begin work on a major grant. From left to right: Emily Krobot, MSW-HERL; Trevor Dyson-Hudson, MD - Kessler Foundation; Mary Shea, MA, OTR - Kessler Foundation; R. Lee Kirby, MD - Dalhousie University; Luisa Betancourt, MD - University of Miami; Rachel Cowan, PhD - University of Miami; Allen Heine-mann, PhD - Rehabilitation Institute of Chicago; Maria Toro, MS - HERL; Kevin Dalal, MD - University of Miami; Rory Cooper, PhD - HERL; Jonathan Pearlman, PhD - HERL; Jessica Pedersen, MBA, OTR/L - Rehabilitation Institute of Chicago; Michael Boninger, MD - HERL; Michelle Oyster, MS-HERL



At the Evening Parade, Washington DC, August 3, 2012. From left to right: William Cole, Rosemarie Cooper, Sergeant Major of the Marine Corps Micheal Barrett, Dr. Rory Cooper, Matt Hannan.

Virtual Reality, November 2012

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America – **Nancy Chiaravalloti, PhD**, Director of Neuropsychology/Neuroscience and Traumatic Brain Injury Research at the Kessler Foundation, spoke about using virtual reality in neuropsychology. Dr. Chiaravalloti conducts randomized clinical trials examining rehabilitation using VR for the improvement of learning and memory in persons with multiple sclerosis and traumatic brain injury (TBI).

The next presenter was HERL's own **Deepan Kamaraj, MD** who described the state of current VR work at HERL. He was followed by **Harshal Mahajan, PhD**, also of HERL, who described HERL's specific VR work with power wheelchair driving assessment and training. (For more on this work, see pages 44-45 of the January 2013 issue of *PN*.) The final speakers of the day, **Maria T. Schultheis, PhD** and **Elizabeth Whipple** of the Applied Neurotechnologies Lab at Drexel University spoke about their work on simulated driving using VR in populations with PTSD and TBI.

View videos, presentations, photos, and more from this symposium online at the HERL website: <http://www.herl.pitt.edu/virtual-reality>

Evening Parades

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mode of patriotism designed to showcase the music-ality of the U.S. Marine Band, which gained international acclaim under the leadership of "The American March King" John Philip Sousa. The parade continues to be a revered tradition of the Oldest Post of the Corps.

Each year, only eight people are invited to serve as guests of honor at the Evening Parades. HERL Director Dr. Rory Cooper was one of those elite few when he was invited to attend as Evening Parade Guest of Honor by Micheal P. Barrett, the Sergeant Major of the Marine Corps, on August 3, 2012. Dr. Cooper was also allowed to invite his own guests, one of which was current Pitt Student and Marine Corps veteran, Matt Hannan. Matt said of the event:

"Attending the United States Marine Corps Evening Parade was the opportunity of a lifetime. As a Marine for over fifteen years, I was not afforded the chance to attend while I was on active duty, so being a guest of Dr. Rory Cooper was amazing. I had the opportunity to meet and show support for my fellow Marines with disabilities."

-Kelechi Urama



Human Engineering Research Laboratories



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Wheelchairs and Associated
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University of Pittsburgh
NIDRR Model Center on
Spinal Cord Injury



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HERL Director Dr. Rory Cooper with Al-
legheny County Executive Rich Fitzgerald.

ARE YOU INTERESTED IN ASSISTIVE TECHNOLOGY RESEARCH?

The Human Engineering Research Laboratories (HERL) is recruiting individuals interested in participating in research studies for the AS-SISTIVE TECHNOLOGY REGISTRY.

If you would like to be notified of research studies related to assistive technology for which you may be eligible to participate, contact The Human Engineering Research Laboratories and join the Assistive Technology Registry.

This is an informational resource and notification of a study does not obligate you to participate. You do not need to be located in, nor are you required to travel to, Pittsburgh in order to participate in research studies.

If you are at least 18 years of age, and use assistive technology (e.g. wheelchair, scooter, prosthesis, etc) please contact a Clinical Coordinator at (412) 822-3700 or herlregistry@shrs.pitt.edu.

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