



## Introducing the ISWP *Group to promote mobility worldwide*

The University of Pittsburgh's Department of Rehabilitation Science and Technology has been awarded a grant from the US Agency for International Development (USAID) to develop the International Society of Wheelchair Professionals (ISWP). ISWP will be built around a federation of regional and international Affiliate Members and Partners which will help ensure ISWP activities are culturally relevant, timely, and focused on the most important wheelchair-related issues.

ISWP will initially be led by a group of wheelchair experts at University of Pittsburgh, with strategic partnerships that have already been established with USAID and the World Health Organization (WHO). ISWP's mission will be that wheelchair users are provided the best technology with the best service worldwide. This will be accomplished by promoting the WHO Guidelines on the provision of manual wheelchairs in less resourced settings, promoting training and research activities and improving wheelchair design, manufacturing and coordinating services. To that end, ISWP Affiliates will be representative of all of the stakeholders with the addition of research institutions dedicated to improving wheelchair services through evidence-based practice.

The ISWP Advisory Board, comprised of a cross-section of worldwide wheelchair industry professionals, provides oversight during the two-year USAID grant period. The Advisory Board also will set ISWP's long-term direction.

Three Working Groups have been established to help implement USAID grant objectives: Standards, Advocacy, and Training.

Interested parties should visit the ISWP website at <http://wheelchairnet.org/> for more information. Website visitors can also find ISWP contacts for member countries, the ISWP event calendar, the ISWP Advisory Board Member List, ISWP Working Group minutes, ISWP news, a wheelchair catalog for less-resourced settings, a wheelchair standards testing and outcome measures literature search, the ISWP intermediate knowledge test, and WHO wheelchair service training documents.

All wheelchair professionals are encouraged to become members of the ISWP! Joining is free; please visit <http://wheelchairnet.org/ISWP/ISWPcontact.html>. Questions or comments can be directed to [karl161@pitt.edu](mailto:karl161@pitt.edu).



## Did You Know About ... The State of the Science Symposium Series?

More than ten years ago, HERL Director Dr. Rory Cooper and Walter Reed PM&R Surgeon COL Paul Pasquina saw a need to disseminate up-to-date health information concerning the care, rehabilitation, and reintegration of Veterans and Service Members across all military branches. Their efforts culminated in 2004 with the creation of the State of the Science Symposium series.

**What is it?** The State of the Science Symposia are a series of quarterly, one-day workshops concerning rotating topics on the latest information pertaining to physical rehabilitation and/or assistive technology.

**Where is it?** The Symposia have been held in many different locations in and around Washington, DC in the past, but are currently held at the Uniformed Services University of the Health Sciences on the campus of the Walter Reed National Military Medical Center in Bethesda, Maryland.



**Who sponsors it?** The Symposium Series is sponsored by the Center for Rehabilitation Science Research, Department of Physical Medicine and Rehabilitation at the Uniformed

Services University of the Health Sciences; the Department of Rehabilitation, Walter Reed National Military Medical Center; the Department of Rehabilitation Science and Technology in the School of Health and Rehabilitation Sciences, University of Pittsburgh; the Human Engineering Research Laboratories, VA Pittsburgh Healthcare System; and the University of Pittsburgh School of Medicine Center for Continuing Education in the Health Sciences. Lunch during the Symposia is provided via a grant from the Paralyzed Veterans of America.

**What topics are covered?** Each symposium focuses on a topic in rehabilitation, military medicine, or assistive technology. During each symposium, top experts in the field give presentations on specific subjects within the topic. Past symposia have focused on topics such as vision and hearing impairment, regenerative medicine, virtual reality, education and training programs, the role of not-for-profit agencies, advanced technology, and more.

**Who can attend?** Anyone with an interest in current topics in military medicine, assistive technology, or rehabilitation is welcome to attend; however, priority is given to Department of Defense personnel. Continuing Education Credits are available to qualified attendees. Please note that attendance at the Symposia requires the completion of a security (*Cont. on p. 3*)

## Current Research Abstracts

Ding D, Rodriguez SP, Cooper RA, Riviere CN, Improving Target Acquisition for Computer Users with Athetosis, Assistive Technology, pp. 52-28, Vol. 27, No. 1, 2015.

**SUMMARY: An algorithm was developed to improve target acquisition for people with athetosis.**

Prior work has highlighted the challenges faced by people with athetosis when trying to acquire on-screen targets using a mouse or trackball. The difficulty of positioning the mouse cursor within a confined area has been identified as a challenging task. We have developed a target acquisition assistance algorithm that features transition assistance via directional gain variation based on target prediction, settling assistance via gain reduction in the vicinity of a predicted target, and expansion of the predicted target as the cursor approaches it. We evaluated the algorithm on improving target acquisition efficiency among seven participants with athetoid cerebral palsy. Our results showed that the algorithm significantly reduced the overall movement time by about 20%. Considering the target acquisition occurs countless times in the course of regular computer use, the accumulative effect of such improvements can be significant for improving the efficiency of computer interaction among people with athetosis.

Crytzer TM, Dicianno BE, Robertson RJ, Cheng YT, Validity of a Wheelchair Perceived Exertion Scale (Wheel Scale) for Arm Ergometry Exercise in People with Spina Bifida, Perceptual and Motor Skills, pp. 304-322, Vol. 120, No. 1, February 2015.

**SUMMARY: This study assessed the validity of the Borg 6-20 and WHEEL scales.**

This study assessed the concurrent and construct validity of the Borg 6–20 Scale and WHEEL Scale during arm ergometry exercise stress testing in ( $n = 24$ ) adolescents and adults with spina bifida. Significant, moderate, positive correlations were observed between power output and relative heart rate and power output to relative  $VO_{2peak}$ . Further, a moderate, significant correlation between physiologic criterion variables and the rating of perceived exertion derived from the Borg Scale and the WHEEL Scale was found. Concurrent validity was supported by the following findings: (1) relative heart rate was significantly correlated with the Borg (Kendall's  $\tau = .41$ ) and WHEEL Scales ( $\tau = .44$ ), and relative  $VO_2$  was significantly correlated with the Borg ( $\tau = .46$ ) and WHEEL Scales ( $\tau = .47$ ); (2) content validity was supported by the finding that the Borg and WHEEL Scales shared significant variance ( $\tau = .70$ ), demonstrating internal consistency. The WHEEL Scale shows strong potential for use in this cohort subsequent to further testing and validation.

Sindall P, Lenton J, Cooper RA, Tolfrey K, Goosey-Tolfrey V, Data logger device applicability for wheelchair tennis court movement, Journal of Sports Sciences, pp. 527-533, Vol. 33, No. 5, 2015.

**SUMMARY: Dataloggers are suitable for tracking on-court movement for wheelchair tennis.**

Assessment of movement logging devices is required to ensure suitability for the determination of court-movement variables during competitive sports performance and allow for practical recommendations to be made. Hence, the purpose was to examine wheelchair tennis speed profiles to assess data logger device applicability for court-movement quantification, with match play stratified by rank (HIGH, LOW), sex (male, female) and format (singles, doubles). Thirty-one wheelchair tennis players were monitored during competitive match play. Mixed sampling was employed (male = 23, female = 8). Friedman's test with Wilcoxon signed-rank post hoc testing revealed a higher percentage of time below  $2.5 \text{ m} \cdot \text{s}^{-1}$  [ $<2.5$  vs.  $\geq 2.5 \text{ m} \cdot \text{s}^{-1}$ : 89.4 (5.0) vs. 1.2 (3.5)%,  $Z = -4.860$ ,  $P < 0.0005$ ,  $r = 0.87$ ] with the remaining time [9.0 (4.9%)] spent stationary. LOW-ranked players were stationary for longer than HIGH-ranked counterparts [12.6 (8.7) vs. 8.2 (5.1)%,  $U = 30.000$ ,  $P = 0.011$ ,  $r = 0.46$ ] with more time at low propulsion speeds ( $<1.0 \text{ m} \cdot \text{s}^{-1}$ ). HIGH-ranked and doubles players spent more time in higher speed zones than respective counterparts. Females spent more time in the  $1.0\text{--}1.49 \text{ m} \cdot \text{s}^{-1}$  zone ( $U = 48.000$ ,  $P = 0.047$ ,  $r = 0.36$ ). Regardless of rank, sex or format, propulsion speeds during wheelchair tennis match play are consistent with data logger accuracy. Hence, data logging is appropriate for court-movement quantification.

## NIDRR is now NIDILRR!

On July 22, 2014, President Obama signed the Workforce Innovation Opportunity Act (WIOA). WIOA was effective immediately. One provision of WIOA transferred the National Institute on Disability and Rehabilitation Research (NIDRR) from the Department of Education to the Administration for Community Living in the Department of Health and Human Services. In addition, NIDRR's name was changed to the Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR). NIDRR funded, and NIDILRR continues to fund, several of HERL's research projects such as the Spinal Cord Injury Model Systems Collaboration on Mobility Training, Virtual Coaches for Wheelchair Users, the University of Pittsburgh Medical Center Model Center For Spinal Cord Injury, and Rehabilitation Long Term Training. For more information on our funding, see <http://herl.pitt.edu/research/grants>.

## Current Research Abstracts

Hausmann LRM, Myaskovsky L, Niyonkuru C, Oyster ML, Switzer GE, Burkitt KH, Fine MJ, Gao S, Boninger ML, Examining implicit bias of physicians who care for individuals with spinal cord injury: a pilot study and future directions, *Journal of Spinal Cord Medicine*, pp. 102-110, Vol. 38, No. 1, January 2015.

**SUMMARY:** This study showed a strong pro-white/anti-black racial bias among SCI care physicians.

**Context:** Despite evidence that healthcare providers have implicit biases that can impact clinical interactions and decisions, implicit bias among physicians caring for individuals with spinal cord injury (SCI) has not been examined.

**Objective:** Conduct a pilot study to examine implicit racial bias of SCI physicians and its association with functioning and wellbeing for individuals with SCI.

**Design:** Combined data from cross-sectional surveys of individuals with SCI and their SCI physicians.

**Setting:** Four national SCI Model Systems sites.

**Participants** Individuals with SCI (N = 162) and their SCI physicians (N = 14).

**Outcome measures:** SCI physicians completed online surveys measuring implicit racial (pro-white/anti-black) bias. Individuals with SCI completed questionnaires assessing mobility, physical independence, occupational functioning, social integration, self-reported health, depression, and life satisfaction. We used multilevel regression analyses to examine the associations of physician bias and outcomes of individuals with SCI.

**Results:** Physicians had a mean bias score of 0.62 (SD = 0.35), indicating a strong pro-white/anti-black bias. Greater physician bias was associated with disability among individuals with SCI in the domain of social integration (odds ratio = 4.80, 95% confidence interval (CI) = 1.44, 16.04), as well as higher depression (B = 3.24, 95% CI = 1.06, 5.41) and lower life satisfaction (B = -4.54, 95% CI = -8.79, -0.28).

**Conclusion:** This pilot study indicates that SCI providers are susceptible to implicit racial bias and provides preliminary evidence that greater implicit racial bias of physicians is associated with poorer psychosocial health outcomes for individuals with SCI. It demonstrates the feasibility of studying implicit bias among SCI providers and provides guidance for future research on physician bias and patient outcomes.

Wodlinger B, Downey J, Tyler-Kabara E, Schwartz A, Boninger ML, Collinger JL, Ten-Dimensional Anthropomorphic Arm Control in a Human Brain-Machine Interface: Difficulties, Solutions, and Limitations, *Journal of Neural Engineering*, 14 pages, Article ID 016011, Vol. 12, No. 1, 2015.

**SUMMARY:** A subject successfully controlled a 10-DOF robotic arm using a Brain-Machine Interface.

**Objective:** In a previous study we demonstrated continuous translation, orientation and one-dimensional grasping control of a prosthetic limb (seven degrees of freedom) by a human subject with tetraplegia using a brain-machine interface (BMI). The current study, in the same subject, immediately followed the previous work and expanded the scope of the control signal by also extracting hand-shape commands from the two 96-channel intracortical electrode arrays implanted in the subject's left motor cortex.

**Approach:** Four new control signals, dictating prosthetic hand shape, replaced the one-dimensional grasping in the previous study, allowing the subject to control the prosthetic limb with ten degrees of freedom (three-dimensional (3D) translation, 3D orientation, four-dimensional hand shaping) simultaneously.

**Main results:** Robust neural tuning to hand shaping was found, leading to ten-dimensional (10D) performance well above chance levels in all tests. Neural unit preferred directions were broadly distributed through the 10D space, with the majority of units significantly tuned to all ten dimensions, instead of being restricted to isolated domains (e.g. translation, orientation or hand shape). The addition of hand shaping emphasized object-interaction behavior. A fundamental component of BMIs is the calibration used to associate neural activity to intended movement. We found that the presence of an object during calibration enhanced successful shaping of the prosthetic hand as it closed around the object during grasping.

**Significance:** Our results show that individual motor cortical neurons encode many parameters of movement, that object interaction is an important factor when extracting these signals, and that high-dimensional operation of prosthetic devices can be achieved with simple decoding algorithms.

## State of the Science (cont.)

access form for those without a current Common Access Card. Parking is very limited, so the use of public transportation is highly recommended.

**Who benefits?** The Symposium Series benefits Veterans, military Service Members and their families, caregivers, clinicians, students, medical residents, community-based organizations,

government agency personnel, and healthcare providers.

**Where can I find more information?** Upcoming and past symposia are listed at <http://herl.pitt.edu/education-outreach/symposia/>, where you can find videos, photos, and presentation slides for symposia going back to 2011. You may also contact the course coordinator at [herl@shrs.pitt.edu](mailto:herl@shrs.pitt.edu).



## State of the Science Symposium: Adaptive Reconditioning

The State of the Science Symposium on Adaptive Reconditioning for Wounded, Injured, and Ill Veterans was held in Sanford Auditorium at the Uniformed Services University of the Health Sciences in Bethesda, Maryland on June 5, 2015.



During the opening remarks at 0800, symposium directors **Dr. Paul Pasquina** and **Dr. Rory Cooper** surprised symposium coordinator Shelly Brown with the U.S.

Army's Civilian Patriotic Award for her ongoing work in organizing the State of the Science Symposium series. It was a truly well-deserved honor.

The first speakers at the symposium were **LTC(P) Matthew St. Laurent, MS OT** and **Rick Yount, MS LSW**, discussing the Therapeutic Service Dog Training Program at Walter Reed National Military Medical Center. LTC St. Laurent and Mr. Yount first took part in the State of the Science Symposium series in 2012, when they gave a presentation about service dogs for the symposium on complementary healing programs.

The second presentation, concerning Walter Reed's Adaptive Sports and Recreational Therapy Program, was given jointly by **Karen R. Noel, CTRS**; **Harvey Naranjo, COTA/L**; and **Cara A. Navarro, CTRS**.

Showing a number of YouTube videos to accompany his formal presentation, **Michael Baria, MD MBA** of the Mayo Clinic discussed wrestlers with limb deficiencies, who in general are able to compensate and beat wrestlers without limb deficiencies.



Following this, course director Dr. Rory Cooper took his turn at presenting with a discussion entitled "Adaptive Sports as a Tool for Reintegration."

After lunch – generously provided by a grant from the Paralyzed Veterans of America – an overview of the Consortium for Healthy and Military Performance (CHAMP), a Department of Defense Center of Excellence for human performance, was provided by the Uniformed Services University's **Patricia Deuster, PhD MPH FACS**.

**Katherine Bentley, DPT**, physical therapist for the Warrior Transition Brigade at Walter Reed National Military Medical Center, discussed the Warrior Transition Command Adaptive Reconditioning Program.



The final formal presentation of the day was entitled "Spirituality: A Pathway to Reconditioning, Reintegration, and Resilience," by **CH (LTC-P) Douglas A. Etter, BA MDIV MSS EMT-P**, Division Chaplain for the 28th Infantry Division.

Finally, the course directors made closing remarks. The Symposium was dismissed at 1600.

Videos, presentations, and photos from this symposium are available, along with biographies of all speakers, on the HERL website at <http://herl.pitt.edu/adaptive-reconditioning>. You can also browse symposia dating back to 2011 at <http://herl.pitt.edu/education-outreach/symposia>.

## Previous State of the Science Symposium: Vision and Hearing Impairment

The State of the Science Symposium on Caring for Wounded Warriors with Vision and Hearing Impairment: Impact on Rehabilitation was held in Sanford Auditorium at the Uniformed Services University of the Health Sciences in Bethesda, Maryland on April 17, 2015.

Among the speakers at the symposium were **MG (Ret.) Gale S. Pollock, CRNA FACHE FAAN** with opening remarks; **CAPT Penny E. Walter, OD**; **William Boules, MS**; **Sally H. Dang, OD**; **Suzanne Wickum, OD**; and **Marcus H. Colyer,**

**MD MAJ MC USA** discussing topics in eye and vision impairment; and **Lynn W. Henselman, PhD**; **Douglas S. Brungart, PhD**; **Kenneth W. Grant, PhD**; **Joshua G.W. Bernstein, PhD**; and **Robin L. Pinto, AuD** discussing topics in audiology and hearing impairment. Additionally, **Robert C. Read, MBA** introduced the US Army Medical Research and Materiel Command Vision Research Portfolio, and **Shannon E. Auxier, MS CCC-SLP** and **Judy M. Mikola, PhD CCC-SLP** discussed cognitive assessment in mild traumatic brain injury.

## Papers from the 2015 International Seating Symposium

### Preparation skills impact upper limb joint loading during toilet transfers

*Chung-Ying Tsai, PhD; Michael Boninger, MD; Jennifer Hastings, PhD; Rory Cooper, PhD; Laura Rice, PhD; Alicia Koontz, PhD*

Using good transfer skills has significant effects on reducing the loading on upper limbs during toilet transfers with both side and front set-ups. Close positioning of the wheelchair before toilet transfers could significantly reduce loading on the upper arms in both wheelchair-toilet setups. The scoot forward movement before toilet transfers can also reduce the resultant moment on the trailing elbow in a side setup. Clinical transfer training is important for wheelchair users to reduce loading on the upper limbs during transfers.

### Wheelchair transfers affect changes in ultrasonographic markers for biceps tendon degeneration

*Nathan S. Hogaboom, BS; Michelle L. Oyster, MS; Alicia M. Koontz, PhD; Michael L. Boninger, MD*

Transfers caused measurable changes in ultrasonographic markers for biceps tendon degeneration. Changes in tendons were associated with greater body-weight and not scooting to the front of the wheelchair. Wheelchair users with SCI should consider reducing body-weight to limit negative effects of transfers. The TAI can be used to guide transfer training that will potentially reduce risk of developing shoulder pain and injury.

### Transfer skill deficits among veterans who use wheelchairs

*Alicia M. Koontz, PhD; Chung-Ying Tsai, PhD; Nathan Hogaboom, MS*

The results of the current study imply that there is much room for improvement in transfer skills in a veteran population. Healthcare professionals who work with veterans and veterans themselves need to be vigilant about seeking education and training on best transfer practices. Improving access to the TAI and training materials is an important step to this process. Development of web-based transfer training and development of a smartphone application for the TAI are areas of ongoing work.

### Gender effects on independent wheelchair transfers

*Sarah Bass; Alicia Koontz, Ph.D, RET*

A recent study has shown on that men perform better on the wheelchair skills test than women. Additionally, a wheelchair propulsion study showed an association between gender and worsening MRI findings that could have been attributed to increased radial force exerted by women during wheelchair propulsion. The purpose of this study was to investigate the differences in transfer ability and technique between men and women: specifically how high and how low men and women could transfer and how well they scored on the transfer assessment instrument.

### The current state of wheelchair testing, repairs, consequences, and maintenance

*Lynn A. Worobey, PhD; Maria Luisa Toro, MS; Michelle L. Oyster, MS; Jon Pearlman, PhD; Michael L. Boninger, MD*

This study presents preliminary results examining the types of repairs wheelchairs users are experiencing and corresponding consequences. Incidence is reported in the following categories of wheelchair repairs: wheels and casters, wheelchair frame, user interfaces, seating system, peripheral items, electrical system, and power/control system. Additionally, user demographics, wheelchair specifications, and corresponding consequences are discussed.

### Basic wheelchair maintenance training for manual and power wheelchair users

*Maria Toro, MS; Jonathan Pearlman, PhD; Jessica Pedersen; Mary Shea*

The wheelchair maintenance training program was launched in the summer of 2014. As of November 2014, 15 clinicians have been trained by two investigators from the University of Pittsburgh. Clinicians provided feedback and content has been modified to reflect current best practice. Overall the training was found to be useful, relevant, understandable, easy to tolerate, and enjoyable.

### Validity of a wheelchair perceived exertion scale in people with spina bifida

*Theresa M Crytzer, PhD; Brad E. Dicianno, MD; R.J. Robertson; Yu-Ting Cheng, PhD*

The WHEEL RPE Scale is a newly developed scale that was adapted for wheelchair users from the OMNI RPE Scale (Robertson et al., 2006). The WHEEL Scale portrays color photos of a person in a wheelchair paired with the verbal descriptors and associated numeric values that were previously validated for children and adolescents without disabilities (Robertson et al., 2002). The goal of this study was to investigate the concurrent validity of the Borg 6-20 RPE and WHEEL Scales and the construct validity of the WHEEL Scale during a one-time arm ergometry exercise stress test in adolescents and adults with spina bifida.

### Strategies for effective online training and learning in assistive technology

*Mary R. Goldberg, PhD, MEd*

A novel hybrid continuing education certificate program was developed at the University of Pittsburgh to prepare practitioners for the ATP exam through a focus on interprofessional learning and reflective practice based on evidence-based practice in CE. In addition to an expected increase in content knowledge, it was hypothesized that both interprofessional learning, defined as interactive and group-based education aimed at improving collaborative practice (Parsell & Bligh, 1999), and reflective practice (Schon, 1983), or the capacity to reflect on action so as to engage in a process of continuous learning, would increase after trainees' participation in the hybrid program as a result of the program's design. A mixed methods assessment was conducted on the certificate program, consisting of validated questionnaires and a unique qualitative coding scheme.

### Development of a terrain dependent power wheelchair driver assistance system

*Hongwu Wang, PhD; Eric Coyle; Jorge Candiotti, MS; Chengshiu Chung, MS; Dan Ding, PhD; Emmanuel Collins; Rory A. Cooper, PhD*

The purpose of this study was to develop an electrical powered wheelchair (EPW) driver assistance system to improve the performance of EPWs when driving on different terrains, to decrease the chances of falls and tip over, and to increase the community participation and quality of life of users. An add-on package to commercial EPWs has been designed and developed where the sensing components can detect different terrains as well as EPW driving parameters (i.e., drive wheel speed, caster wheel speed, EPW accelerations and angular velocities along the longitudinal, lateral and vertical axes), and a tablet computer can record performance variables and adjust the driving parameters based on terrains EPW is driving on.

## Meet a Researcher: Deepan C. Kamaraj

Dr. Deepan C Kamaraj, MD is currently a graduate student researcher with the Department of Rehabilitation Science and Technology (RST), School of Health and Rehabilitation Sciences at the University of Pittsburgh, Pittsburgh. He received his M.B.B.S. (equivalent to MD in United States) from Jawaharlal Nehru Medical College, India in 2006 and worked as a physician in India for several years before joining us at HERL.

In India, he served as Medical Director of an 80-bed inpatient nursing facility working closely with internists, emergency physicians and surgeons taking care of the residents, and overseeing management of the facility. He came to United States in pursuit of a career in Robotic Surgery in 2009, and spent time rotating within the Departments of Surgery in multiple university hospitals. However, his interest in the design and development of new technology and robotics was what drew him to start with us at HERL as a research volunteer in 2010. He began his graduate studies while working at HERL in 2011.

During his Master's studies, he helped develop and conduct usability studies of the Virtual Reality based driving SIMulator, VRSIM along with Dr. Mahajan, PhD. The VRSIM is a power wheelchair-driving simulator intended to help assess driving performance of newer power wheelchair users in resource limited clinical settings. He was awarded the Virginia Kaufman award for his work, an honorary award for excellence in Rehabilitation Science and Technology by the Department of Rehabilitation Science and Technology, University of Pittsburgh.

He began his doctoral studies in 2012 with the School of Health and Rehabilitation Sciences at the University of Pittsburgh under the mentorship of Dr. Brad Dicianno and Dr. Rory Cooper. His doctoral work began as lead student responsible for the coordination of the design and installation of the Computer Assisted Rehabilitation Environment (CAREN) at HERL. CAREN is a simulation system that allows us to simulate different terrains and environments where wheelchairs could be used in the real-world. The system has been used for various research purposes; such as studying the balance strategies among prosthetic limb users with unilateral below knee amputations and examining the effects of wheelchair seat position and footprint length on ramp propulsion biomechanics. Under the mentorship of Dr. Jen Collinger, using CAREN system, he is working on studying the effects of distractions due to external stimuli, while using Brain Computer Interface (BCI) based devices. This work is intended to help develop better algorithms for everyday use of BCI based devices.

As a part of his doctoral dissertation work, Deepan developed the Power Mobility Screening Tool (PMST) and the Power Mobility Clinical Driving Assessment (PMCD). These assessment tools act as a screening and driving performance assessment measure for new electric power wheelchair users respectively. His dissertation will assess the psychometric properties of these tools in the real and virtual world.

When not working or studying, Deepan enjoys playing volleyball, and is a runner as well. After he graduates from the doctoral program, he wishes to continue his work in this field as a Psychiatrist.



## HERL Reaps Awards at RESNA Conference

Congratulations to the authors of these award-winning papers submitted to this year's RESNA Conference:

- Hailee Kulich, Sarah Bass, Alicia Koontz: *Accessibility barriers affecting independent wheelchair transfers in the home and community* - **Honorable Mention**
- Yu Kuang Wu, Hsinyi Liu, Annmarie Kelleher, Rory Cooper: *A usability study for a website based dashboard for reviewing powered seat functions usage of powered wheelchair user* - **Honorable Mention**
- Maria Toro, Jonathan Pearlman: *Development of a manual wheelchair and power wheelchair maintenance program* - **Winner**

## HERL Hosts National Council on Disability

On May 5, HERL was honored to host a tour of our facilities and research for members of the National Council on Disability (NCD).

The 15-member NCD is an independent federal agency that advises the President, Congress and other federal agencies regarding policies, programs, practices and procedures that affect people with disabilities. Each year, the NCD holds two of its quarterly meetings in locations other than Washington, DC. For the members of the NCD, the overarching goal of these meetings is to understand how opportunities for people with disabilities can be strengthened in the states and regions where the meetings are held. The Pittsburgh meeting on May 4 and 5 represents the first time the current members of the NCD have held a quarterly meeting in Pennsylvania.

Katherine D. Seelman, Ph.D., associate dean of disability programs and professor of rehabilitation science and technology at the School of Health and Rehabilitation Sciences, University of Pittsburgh, is a NCD member.





*Fulbright Scholars visit HERL, May 20, 2015.*

## *HERL articles in Press*

Hong E, Cooper RA, Pearlman J, Hargroder T, Design, Testing and Evaluation of Angle-Adjustable Backrest Hardware, Disability and Rehabilitation: Assistive Technology, Epub ahead of print, 2014.

Hong E, Pearlman J, Dicianno BE, Cooper RM, Cooper RA, Comfort and Stability of Wheelchair Backrests According to the TAWC (Tool for Assessing Wheelchair discomfort), Disability and Rehabilitation: Assistive Technology, Epub ahead of print, 2014.

Lin Y, Boninger ML, Day KA, Koontz AM, Ultrasonographic Measurement of the Acromiohumeral Distance in Spinal Cord Injury: Reliability and Effects of Shoulder Positioning, Journal of Spinal Cord Medicine, Epub ahead of print, 2014.

Dicianno BE, Parmento B, Fairman AD, Crytzer T, Yu DX, Pramana IW, Coughenour D, Petrazzi A, Perspectives on the Evolution of Mobile (mHealth) Technologies and Application to Rehabilitation, Physical Therapy Journal, Epub ahead of print, 2014.

Darrah SD, Dicianno BE, Berthold J, McCoy A, Haas M, Cooper RA, Measuring Static Seated Pressure Distributions and Risk for Skin Pressure Ulceration in Ice Sledge Hockey Players, Disability and Rehabilitation: Assistive Technology, Epub ahead of print, 2014.

Goldberg M, Karimi H, Pearlman JL, Interactive, mobile, AGile and novel education (IMAGINE): a conceptual framework to support students with mobility challenges in higher education, Disability and Rehabilitation: Assistive Technology, Epub ahead of print, 2014.

Popchak A, Burnett T, Weber N, Boninger ML, Factors Related to Injury in Youth and Adolescent Baseball Pitching, with an eye Toward Prevention, American Journal of Physical Medicine and Rehabilitation, Epub ahead of print, 2014.

Dicianno BE, Mahajan H, Cooper RA, Advanced Joystick Algorithms for Computer Access Tasks, Physical Medicine and Rehabilitation, Epub ahead of print, 2015.

Toosi KK, Hogaboom NS, Oyster ML, Computer keyboarding biomechanics and acute changes in median nerve indicative of Carpal Tunnel Syndrome, Clinical Biomechanics, Epub ahead of print, 2015.

Crytzer TM, Cooper RA, Jerome GM, Koontz AM, Identifying Research Needs for Wheelchair Transfers in the Built Environment, Disability and Rehabilitation: Assistive Technology, Epub ahead of print, 2015.

Goldberg M, Cooper RA, Milleville M, Barry A, Sporer ML, Ensuring Success for Veterans with Disabilities in STEM Degree Programs: Recommendations from a Workshop and Case Study of an Evidence-Based Transition Program, Journal of STEM Education, In press, 2015.

Hiremath SV, Chen W, Wang W, Foldes S, Yang Y, Tyler-Kabara EC, Collinger JL, Boninger ML, Brain Computer Interface Learning for Systems Based on Electroencephalography and Intracortical Microelectrode Arrays, Frontiers in Integrative Neuroscience, In press, 2015.

Daveler B, Salatin B, Grindle GG, Candiotti J, Wang H, Cooper RA, Design of a Mobility Enhancement Wheelchair, Journal of Rehabilitation Research and Development, In press, 2015.



## Human Engineering Research Laboratories



VA Center of Excellence for  
Wheelchairs and Associated  
Rehabilitation Engineering



University of Pittsburgh  
School of Health & Rehabilitation Sciences  
School of Medicine



University of Pittsburgh  
NIDRR Model Center on  
Spinal Cord Injury



National Science Foundation  
Advanced Technology  
Education Center

Rory A. Cooper, PhD  
*Director*

Brad Dicianno, MD  
*Medical Director*

Jonathan Pearlman, PhD  
*Associate Director of Engineering*

Alicia Koontz, PhD, RET  
*Associate Director for  
Research Capacity Building*

Michael L. Boninger, MD  
*Associate Medical Director Emeritus*

Mailing Address:  
6425 Penn Avenue, Suite 400  
Pittsburgh, PA 15206

Phone: 412-822-3700  
Fax: 412-822-3699

<http://herl.pitt.edu/>  
[herl@shrs.pitt.edu](mailto:herl@shrs.pitt.edu)

**Editor: Michael Lain**

The HERL Newsletter and all photos and text within are copyright  
© 2015 Human Engineering Research Laboratories. All rights  
reserved. Not to be duplicated or reprinted without permission.

## HERL Research Report & 20th Anniversary Brochure

### Human Engineering Research Laboratories



Have you received a copy of the HERL Research Report? Includes information on HERL's current projects, initiatives, and facilities. Full color with many photos. 12 pages. Printed with HERL's 20th Anniversary Commemorative Brochure (4 pages; full color).

To receive a FREE copy, please call (412) 822-3663 or email [mil72@pitt.edu](mailto:mil72@pitt.edu).

## ARE YOU INTERESTED IN ASSISTIVE TECHNOLOGY RESEARCH?

The Human Engineering Research Laboratories (HERL) is recruiting individuals interested in participating in research studies for the ASSISTIVE 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](mailto:herlregistry@shrs.pitt.edu).

Human Engineering Research Laboratories  
VA Center of Excellence  
Bakery Square, Suite 400  
6425 Penn Avenue, Pittsburgh, PA 15206

*Pittsburgh-area volunteers are needed for research studies!*  
Check <http://herl.pitt.edu/volunteer> for current studies.

### Contact us!

Email [mil72@pitt.edu](mailto:mil72@pitt.edu) or call **412-822-3663**

To subscribe to the electronic mailing list: <http://herl.pitt.edu/subscribe>  
Check us out on Facebook at <http://www.facebook.com/herlpitt>