



Research at the 2008 NVWG

For the eighth year, investigators brought HERL research to the athletes at the annual National Veterans Wheelchair Games (NVWG). This year's games was held in Omaha, Nebraska, from July 25-29, 2008.

The NVWG is a sports and rehabilitation program for military service veterans who use wheelchairs for sports competition. Participants have spinal cord injuries, amputations, and other physical disabilities. Attracting more than 500 athletes each year, the NVWG is the largest annual wheelchair sports event in the world. The NVWGs are presented by the U.S. Department of Veterans Affairs and Paralyzed Veterans of America, with financial assistance from corporate, civic, and veterans service organizations.

Researchers from Walter Reed Army Medical Center joined HERL to test 142 participants in five different research studies conducted at the 2008 NVWGs:

A Comparison of the Upper Limb of Manual Wheelchair Users and Crutch Users Before & After an Intense Physical Activity. Principle Investigator: Michael Boninger, M.D. Researchers analyzed the effects of intense wheelchair propulsion and crutch walking using ultrasound technology.

Quantification of Activity During Wheelchair Sports at the National Veterans Wheelchair Games. Principle Investigator: Rory Cooper, Ph.D. Researchers used dataloggers to collect information on speed, distance, and activity time of up to 100 athletes while participating in wheelchair basketball, rugby, or power soccer .

Joystick Use for Virtual Electric Power Wheelchair Driving in

Individuals with a Movement Disorder, Principle Investigator: Brad Dicianno, MD. Researchers collected data while power wheelchair users with upper limb spasticity used the HERL isometric joystick



The 2008 NVWG research team: (Back): MinHo Chang , Amol Karmarkar, Brad Impink, Jen Collinger, Michelle Sporer, Rosi Cooper, Harshal Mahajan, Brad Dicianno. (Front): HongWu Wang:, Emily Teodorski, Rory Cooper, Anmarie Kelleher, Don Spaeth , Brad Fullerton

(IJ). The data can be used to customize the IJ for people who have difficulty using a traditional power wheelchair joystick, such as people with upper limb spasticity and motor control impairments.

Wheelchair Driving Characteristics During and Post National Veterans Wheelchair Games, Principle Investigator: Rory Cooper, Ph.D. Researchers used wheelchair dataloggers to collect information on the speed, distance, movement, time, and vibration exposure from power and



A NVWG basketball player's chair with a HERL datalogger attached to collect research data

manual wheelchair users. Data collected at the NVWG verses in their home environment will be compared. Usage patterns could tell researchers the activity level of wheelchair users, which may be an indicator of secondary disability due to repetitive strain injuries or insufficient physical activity. Activity level could be used to develop new directions for rehabilitation and community integration.

Enhanced Controls for Assessing Assistive Technology, Principle Investigator: Don Spaeth, Ph.D. Researchers tested people with upper extremity movement disorders while they used the Graphical User Interface Dexterity Enhancer (GUIDE). GUIDE is a software program that overrides the standard Windows mouse driver. Using standard Graphical User Interfaces (GUIs) such as Microsoft Windows requires fine motor dexterity. This study will determine whether personalized algorithms can assist individuals with impaired hand control to better use a GUI.

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Summer Interns shine at Research Symposium

The ASPIRE (American Student Placements in Rehabilitation Engineering) and QoLT (Quality of Life Technology) Research Experience for Undergraduates Internship Programs are sponsored by the National Science Foundation and are a joint collaboration between the University of Pittsburgh, Carnegie Mellon, and industry. The program engages undergraduate students majoring in diversified areas of engineering, computer science, rehabilitation science, or related fields to understand the real issues faced by persons with disabilities and apply engineering principles to improve their level of functionality, quality of life, and society participation. Students complete a 10-week summer internship program at various laboratories including HERL, the Rehabilitation Engineering Research Centers (RERCs) at Pitt, the Robotics and Human Computer Interaction Institutes at Carnegie Mellon, and companies such as AT Sciences and Bosch.

During the orientation week, interns attended several lectures by Pitt and CMU faculty. They also attended an “ethics forum”, organized by Pitt’s Office of Experiential Learning later in the summer. Students explored various research laboratories and the city of Pittsburgh through field trips and a city-wide social internship program, “Interns 2008.” Pirates’ baseball games, service projects, karaoke nights, and picnics provided for social interaction among multiple research experience programs. Other field trips included a city wide tour of the “Robot 250” exhibits and Blueroot Technologies.

The 2008 internship program culminated July 31 at the annual Students’ Research Symposium. Eleven selected interns presented their summer research projects. All 26 interns presented posters at the symposium. A “Best Presentation” and “Best Paper” were awarded to students in each program. Mario Bermudez, University of Miami (LoPresti/Sharma), was awarded the ASPIRE Best



The 2008 summer interns at the career workshop



Mario Bermudez presents at the Students’ Research Symposium

Presentation for his talk on “Design, Development, and Evaluation of a Drop-Off Detection System for Robotic Wheelchairs” and Betsy Timcho, Allegheny College/University of Pittsburgh (Koontz/Collinger), was awarded the ASPIRE Best Paper award for “Effects of Surface and Speed on Biomechanics Variables During Steady-State Wheelchair Propulsion.” The QoLT Best Presentation and Best

Paper were both awarded to Linford Leitch, Binghamton University (Wang/Sudre), for his work entitled “Simulating Human Brain activity for Brain-Computer Interface Study.” The RERC Presentation and Paper winners were Varun Viswanathan, University of Pittsburgh

(VanRoosmalen/Turkovich), for “Improving Consumer Awareness of Wheelchair Transportation Safety Issues” and Sean Evans, University of Pittsburgh (Brienza/Tzen), for “Configuring a System to Study Local Cooling and Shear Forces on Skin Blood Flow Response to Pressure,” respectively.

All students submitted posters and Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) formatted conference papers at the end of the internship. All HERL and RERC in-

terns gave formal presentations at their respective labs and other students were asked to present to their mentors. Students also shadowed therapists one day in the Center for Assistive Technology clinic and wrote reflection papers on their experiences.

When surveyed about their experience this summer, 95% of the students stated that “the internship met their expectations.” Additionally, over 90% of the interns said they would recommend this internship to other students.

You can learn more about the internship programs, read research project descriptions, and apply for internships at <http://www.herlpitt.org/education.htm>

-Mary Hershberger

HERL in the Community

Annmarie Kelleher and Sara Sibenaller from HERL joined United Cerebral Palsy (UCP) of Pittsburgh to participate in the **2008 Walk for A Healthy Community**, presented by Highmark Blue Cross Blue Shield on May 3, 2008 at Heinz Field in Pittsburgh. The Walk brings together 37 local nonprofit organizations that deliver vital health and human services programs to the community.

Easter Seals Walk with Me was held on July 19, 2008 at the Pittsburgh Zoo and PPG aquarium. HERL teammates Rory and Rosemarie Cooper, Annmarie Kelleher, Mark McCartney, Christine Heiner, Alicia Koontz, Bambi Brewer, Harshal

Mahajan, and Shiv Hiramath and their friends and families walked and raised close to \$500 for Easter Seals of Western PA.

Three Rivers Adaptive Sports held their **18th Annual Adaptive Water Ski Clinic** at Conneaut Lake, Pennsylvania from July 21- 24, 2008. The yearly event is an instructional clinic for children and adults with physical challenges at a beginner or intermediate level. HERL machinist Mark McCartney joined Three Rivers Adaptive Sports' group of professional, experienced volunteers to provide instruction to participants and to train new volunteers.

CURRENT RESEARCH ABSTRACTS

Evaluation of Pushrim-Activated, Power-Assisted Wheelchairs (PAPAW) Using ANSI/RESNA Standards

Amol Karmarkar, MS, Rory A. Cooper, Ph.D, Hsin-yi Liu, B.S,
Sam Connor, B.S, and Jeremy Puhlman, B.S

Full article published in *Archives of Physical Medicine and Rehabilitation*, pp. 1191-1198, Vol. 89, No. 6, June 2008.

Purpose of the Work:

Pushrim-Activated Power Assisted Wheelchairs (PAPAW) have become a viable option for wheelchair users, to prevent overexertion and deconditioning. However, there is no study to date, that has compared different PAPAW systems for making comparisons using ANSI/ RESNA standards testing approach. The objectives of this study were, a) to test three popular PAPAW system namely the Iglide, Xtender and e-motion using ANSI/RESNA standards testing and b) to compare three systems in terms of durability, safety and effectiveness using standards testing. Three models from three different manufacturers of PAPAW systems were tested using ANSI/RESNA standard testing guidelines: Static, dynamic stability, brake effectiveness, maximum speed, acceleration, retardation, energy consumption, static, impact and fatigue



The Yamaha JWII PAPAW

strength.

Results: There was no significant difference among the three models in forward stability. Iglide was the most stable while e-motion was the least stable model in the rearward stability tests. All PAPAWs performed equally on the slopes of 3° and 6° degree in the forward and rearward directions. Braking distance was the highest for e-motion and the lowest for Iglide in forward direction. Except for e-motion all other PAPAWs completed the static impact and fatigue strength test,

without significant failures.

Relevance to wheelchair users: PAPAW users, clinicians and manufactures of this technology. Results could serve as a prescription guideline for PAPAW and a manufacturing guideline for improving quality of products.

-Amol Karmarkar, MS

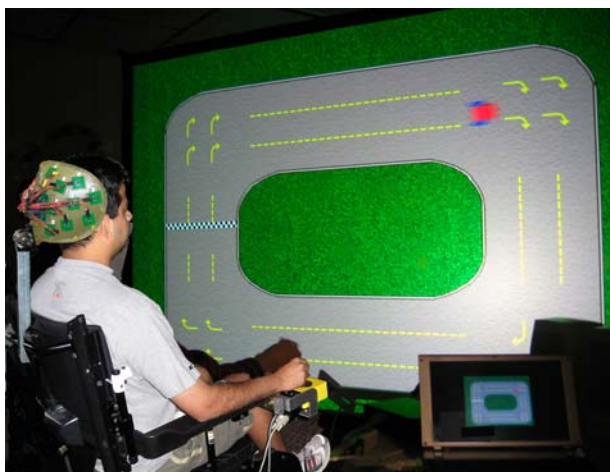
CURRENT RESEARCH ABSTRACTS

Can Survivors of Traumatic Brain Injury Learn to Drive Electric Powered Wheelchairs with Simulator Training?

Donald M. Spaeth, PhD, Harshal Mahajan, MS, Amol Karmarkar, MS
Diane Collins, PhD, Rory A. Cooper, PhD, Michael L. Boninger, MD

Full article published in *Archives of Physical Medicine and Rehabilitation*, pp. 1191-1198, Vol. 89, No. 6, June 2008.

Purpose of Work: Not all persons who desire a power wheelchair can obtain it. Clinicians hesitate to recommend a power wheelchair unless adequate driving skills can be demonstrated during the clinical evaluation. Computer simulation offers a less expensive and safer alternative to real-world training for consumers who need help learning to drive. This research is testing an improved force-sensing joystick for individuals unable to use the regular movement sensing joystick. A computer-based wheelchair driving simulator was created to run the comparison trials.



HERL doctoral student Amol Karmarkar demonstrates the power wheelchair joystick controlled wheelchair driving simulator used in this study.

Subjects/Procedures: Eight individuals with traumatic brain injury at least one year post injury; 18 to 80 years of age. During the first visit each subject was fitted with a force sensing joystick with personalized control settings. During the second visit the subjects used both the experimental and the standard joystick to drive the onscreen wheelchair through four driving tasks (Left turn, Right turn, Track narrowing and Docking). Each

driving task was performed five times with each joystick in both forward and reverse directions.

Results: All but one of the subjects was able to use the force sensing joystick. Between the joysticks, task completion times and average deviation from the track centers were almost the same. When comparing the driving tasks, the force sensing joystick

appears better for the Narrowing and Docking tasks which have the tightest clearances.

Relevance to people with disabilities: Personal powered mobility contributes greatly to successful rehabilitation following severe physical disability. Driving an electric powered wheelchair (EPW) unsupervised in a variety of environments is key ingredient for employment, socializing and self-esteem.
-Don Spaeth, Ph.D.

Acute Mountain Sickness in Disability and Adaptive Sports: Preliminary Data

Brad Dicianno, MD, Eric Aguila, MD, Rory Cooper, Ph.D., Paul Pasquina, MD, Mary Clark, DO, Diane Collins, PhD, Shirley Fitzgerald, PhD, Todd Wichman, MD

Full article published in *Journal of Rehabilitation Research and Development*, pp. 479-488, Vol. 45, No. 4, 2008.

Purpose of the Work: Symptoms of Acute Mountain Sickness (AMS) may be due to abnormal regulation of the volume of brain and spinal fluid. There has been no relevant research on individuals with traumatic brain or spinal cord injuries (TBI or SCI).

Methods: We studied symptoms of 64 subjects with TBI, SCI, Multiple Sclerosis, and no impairments at the 2007 National Veterans Winter Sports Clinic in Snowmass, Colorado.

Results: We found a higher than expected occurrence of AMS overall (51.6%) but no differences among groups in occurrence or severity. Fatigue and weakness were the most common symptoms. More research is needed on medications to prevent and treat AMS.

Relevance to people with Disabilities: Acute mountain sickness (AMS) is a frequent complication for military personnel, veterans, athletes, and travelers at high altitudes.

-Brad Dicianno, MD

Wheelchair Securement System Testing in a Pittsburgh Port Authority Transit Bus

Linda van Roosmalen, Mike Turkovich, Douglas Hobson, Erik Porach, Patricia Karg, Ana Allegretti

Rehabilitation Engineering Research Center on

Department of Rehabilitation Science
and Technology, University of
Pittsburgh



Wheelchair Transportation Safety

The RERC on Wheelchair Transportation Safety recently performed a study evaluating three wheelchair securement systems on a large transit bus. These systems included a state-of-the-art 4-point tie down system (Q'Straint), a prototype rear-facing wheelchair passenger station (Pitt & Q'Straint) and a prototype automated docking system (Pitt & Kinedyne) (Figure 1). A 44-passenger Pittsburgh Port Authority Transit bus was overhauled and the securement systems were installed.

First, emergency bus maneuvers consisting of a hard brake from 20-0 mph and sharp left and right turns were performed. Each securement system was also evaluated for compliance with federal requirements for wheelchair securement using 50th percentile ISO test dummies placed in three different mobility aids: an Amigo scooter, a Quickie 2 manual wheelchair, and an Invacare TDX-SP power wheelchair. Maximum acceleration of the vehicle and excursion of the wheelchair in each securement system were recorded during turning, braking and normal driving. All systems passed the driving tests with flying colors; wheelchair movement was less than 2" during all test scenarios. To create some excitement among the investigators, the wheeled mobility devices were then subjected to emergency bus maneuvers without any securement systems in place. The results clearly showed the need for the securement systems, as wheelchairs slid across the bus and crashed into the sides of the bus (Figure 2).

In addition to compliance testing of the securement systems, seven bus drivers and twenty manual/ power wheelchair- and scooter-seated individuals



Figure 1 (left): Power wheelchair in the Rear-Facing wheelchair passenger station and Scooter in the Automated Docking System

Figure 2 (right): An unsecured manual wheelchair swinging into the aisle during a quick turn of the vehicle

gave their user feedback on each securement system. Our group of 6 investigators was stationed at the United Cerebral Palsy building in Oakland where different PAT bus drivers picked up study participants. Each study participant was safely transferred by Dr. Allegretti, an occupational therapist, into a matching test wheelchair/scooter and instructed to use the wheelchair-mounted safety belt (prototype provided by

BodyPoint). Then participants were asked to use and evaluate each securement station on the bus during a test route (Figure 3).

The bus test route was selected to incorporate steep uphill and downhill sections (cardiac hill!), as



Figure 3: Study participant is evaluating the rear-facing wheelchair passenger station

well as numerous left and right turns and stops. After each ride, study participants were asked to answer questions on the safety, usability and comfort of the securement system. A summary questionnaire was conducted among wheelchair users and bus drivers and went in-depth on the preferred securement system and what could be changed to make the system even better.

In the next few months the investigators will be designing an improved securement system, or optimizing existing securement systems to maximize safety, comfort and usability for both wheelchair users and bus drivers. For additional information, please contact the PI. Linda van Roosmalen, at Lvanroos@pitt.edu or at (412) 586-6911.

The Rehabilitation Engineering Research Center on Wheelchair Transportation Safety is funded by the Dept. of Education, National Institutes on Disability and Rehabilitation Research.

Rehabilitation Research and Development: Collaboration with India

There is a tremendous world-wide need for assistive technology for people with disabilities. India has one of the largest populations of people with disabilities in the world. HERL exposes student to rehabilitation engineering research, provided education, and creates novel training activities through direct mentorship from successful faculty partners in India and the United States. Through our growing international collaboration with the Indian Spinal Injury Center (ISIC) in India, faculty and student research projects have been supported to gain perspective by working in a dynamic academic, clinical, and cultural environment. India has a rapidly growing economy and a progressive position in the worlds of technology and programs for persons with disabilities. The ISIC is one of the finest academic medical rehabilitation centers in the region with broad outreach.

The focal points of our work in India has been on teaching rehabilitation engineering design and assistive technology clinical outcomes research, while fostering and nurturing future India and US cooperation in rehabilitation engineering research. In developing regions, the mobility devices distributed to clients are rarely designed for the cultural, social, and economic circumstances of the region. As a consequence, these devices often fail prematurely. Additionally, in these countries it is still unknown whether and to what degree different mobility technology and services to provide those technologies impact the quality of life of the mobility device user.



*HERL and ISIC Collaborators in India, 2008
(Back): Jon Pearlman, PhD, Nahom Beyene, Jyoti Vidhani,
Neckram Upadhyay. (Front): Friends from ISIC*

India provides an excellent platform for both students and faculty to learn.

Our recent experience allowed the completion of the final stage of a user-centered design project to develop an electric powered wheelchair (EPW) for the Indian subcontinent. The ideation phase and first generation prototyping were completed, and focus groups were held in India during a brief trip in 2006. An ethnographic 'camera study' was also performed in India and the photographic results were inte-

grated into a web-based survey where experts worldwide provided design advice for the EPW. The focus groups and web-based survey results were used to develop a second generation prototype, named the Single Motor Propelled Electric Powered Wheelchair (SIMPL-EPW) which incorporates a single fork-mounted hub-motor as the propulsion, braking, and turning source for the device, significantly reducing the costs of the device compared to conventional EPW designs. Field-trials of the device were performed with a joint India-US team at ISIC, in New Delhi. The research involved non-invasive monitoring (speed, distance) of twenty-five wheelchair users during typical daily activities and while completing an obstacle course in their own wheelchairs. Subsequently, the SIMPL-EPW was used by the subjects for the same activities. The results of the study strongly suggested the SIMPL-EPW improved the mobility of the subjects, who all had spinal cord injuries—subjects

traveled significantly further during typical daily activities when using the SIMPL-EPW, and reported that the indoor and/or the outdoor portion of the obstacle course was easier to complete with the SIMPL-EPW. Exit interviews of subjects also provided valuable design ideas for the next generation prototype, which is currently being developed.



Wheelchair Dancing in India

traveled significantly further during typical daily activities when using the SIMPL-EPW, and reported that the indoor and/or the outdoor portion of the obstacle course was easier to complete with the SIMPL-EPW. Exit interviews of subjects also provided valuable design ideas for the next generation prototype, which is currently being developed.

Currently we are collaborating with ISIC to address the second focus of our international research—establishing outcome measurement tools to evaluate how different mobility technology and provision methods impact the mobility performance and quality of life of people with disabilities. All of the participants complete the program with a more holistic awareness of the universal impact assistive technology has on one's life despite cultural differences. Relationships between US and India researchers have been established and are blossoming by way of joint research publications as well as with establishing future cooperative research projects.

A primary objective of the program has been to entice students' interest in the study of assistive technology as well as to foster and nurture future Indian and US cooperation in and sharing of innovative rehabilitation engineering research. In order to facilitate these objectives, our collaboration exposes undergraduates, graduate students, and faculty to India's programs for clinical services, advocacy, research, and technology development for people with disabilities. Participants receive academic instruction and/or guidance from mentors and people with disabilities in India, and other low-income countries.

Moreover, and often with the greatest impact, participants are exposed to the unique culture and economy of India.

This work is transformative, multidisciplinary, and unique. There are several important aspects to this project. The Indian economy is rapidly evolving which is bringing about tremendous social, technical, and social change that brings with it numerous opportunities for students, faculties, and staff. Our collaboration brings together engineers, physicians, therapists, policy-makers, and end-users as members of an integrated team. The core principle that brings the team together is participatory action design, which promotes the end-user (typically a person with a disability) as the center of the research, design, development, and deployment process. Communication technology; as well as emersion into the Indian environment helps to create cultural competency: a tool that can help students and faculty for a life-time. Participants also learn a humanitarian approach to research and development by working with real people with disabilities with real and pressing needs.

-Rory Cooper, PhD, Jon Pearlman, PhD



News from The University of Pittsburgh Department of Physical Medicine and Rehabilitation

UPMC Rehabilitation Care

PM&R was ranked 14th in the nation for rehabilitation by *US News & World Report*. This new ranking is up from 18th in 2007.

New Online CME Course Rehab Grand Rounds

First edition: Clinical Management of Upper Limb Spasticity

A new course is available through the Center for Continuing Education in the Health Sciences on the new web site [Internet-based Studies in Education and Research \(ISER\)](http://www.physiatry.org/Education_RREMS.cfm)

CME credit is offered at no charge to physicians and allied healthcare professionals nationwide. First time users must register before using this

site. After signing in proceed to this department's Grand Rounds folder and follow the instructions.

Medical Student Research Opportunities

Rehabilitation Research Experience for Medical Students (RREMS) at http://www.physiatry.org/Education_RREMS.cfm.

PMR departments across the country with the Association of Academic Physiatrists are working together to mitigate the shortage of rehabilitation physician researchers. The University of Pittsburgh RREMS director is Brad Dicianno, MD, assistant professor in the Department of Physical Medicine and Rehabilitation.

News contributed by Mary Synnott, Dept. of PM&R

HERL PUBLICATIONS

Spaeth DM, Mahajan H, Karmarkar A, Collins DM, Cooper RA, Boninger ML, Development of a Wheelchair Virtual Driving Environment: Trials with Subjects with Traumatic Brain Injury, **Archives of Physical Medicine and Rehabilitation**, pp. 996-1003, Vol. 89, No. 5, May 2008.

Karmarkar A, Cooper RA, Liu HY, Connor S, Puhlman J, Evaluation of Pushrim-Activated Power Assisted Wheelchairs (PAPAW) Using ANSI/RESNA Standards, **Archives of Physical Medicine and Rehabilitation**, pp. 1191-1198, Vol. 89, No. 6, June 2008.

Cooper RA, Cooper R, Boninger ML, Trends and Issues in Wheelchair Technologies, pp. 61-72, **Assistive Technology**, Vol. 20, No. 2, 2008.

Dicianno BE, Aguila E, Cooper RA, Pasquina P, Clark M, Collins DM, Fitzgerald SG, Wichman T, Acute Mountain Sickness in Disability and Adaptive Sports: Preliminary Data, **Journal of Rehabilitation Research and Development**, pp. 479-488, Vol. 45, No. 4, 2008.

LoPresti EF, Simpson RC, Kirsch N, Schreckenghost D, Hayashi S, Distributed Cognitive Aid With Scheduling and Interactive Task Guidance, **Journal of Rehabilitation Research and Development**, pp. 505-522, Vol. 45, No. 4, 2008.

Sibenaller S, Spornier M, Bright Ideas for Better Living, **Paraplegia News**, pp. 32-34, Vol. 62, No. 4, 2008.

Cooper RA, Cooper RM, Wheeling Through the World, **Sports 'N Spokes**, pp. 41-42, Vol. 34, No. 2, 2008.

McClure L, Kankipati P, State-of-the-Science Workshop on Spinal Cord Injury, **Paraplegia News**, pp. 68-69, Vol. 62, No. 7, July 2008.

Cooper RA, Schmeler M, Cooper RM, Perplexing Power Chair Policies, **Paraplegia News**, pp. 42-46, Vol. 62, No. 8, August 2008.



HERL IN THE NEWS

2007 PVA Annual Report, p. 22-24, 2008: Let Wheelchairs Roll

University of Pittsburgh - CIDDE, 2008: [University of Pittsburgh Clinical Research: Advancing Science and Changing Lives](#)

The Journal, p. 81, Summer, 2008: [PerMMA - A Robotic Aid for Aging in Place](#)

The Parascope, p. 17, May/June, 2008: Scenes from the Third Annual Open House

The Tartan, p. A12, March 3, 2008: Athlete Profile: Brian Harvey

AAP News, p. 12, Spring, 2008: The Electrode Store Best Paper Awards

National Disabled Veterans Winter Sports Clinic Press Release, April 2, 2008: [Gibsonia Veteran Hits the Slopes](#)

National Veterans Wheelchair Games Press Release, July 27, 2008: [Local Veteran Competes in National Veterans Wheelchair Games](#)

Pittsburgh Tribune-Review, August 12, 2008: [Newsmaker: Rory A. Cooper](#)

HERL VIDEO COMING SOON!

We are completing post-production on a new HERL video highlighting our research projects and laboratories. The video will make its debut on our web site, www.herlpitt.org, in the near future. Look for an announcement in the next newsletter!

ACCOMPLISHMENTS AND AWARDS

Eight HERL students won awards for their student scientific papers at the 2008 Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) Conference on June 26-30 in Washington, DC.

The following Student Scientific Paper award winners received \$1000 and free conference registration:

Dany Gagnon, Ph.D. for his paper "Do Stroke Characteristics Change During a High-Intensity 12-minute Corridor Wheelchair Propulsion Test in Experienced Manual Wheelchair Users?"

Hongwu Wang, M.S. for his paper "Influence of Gripping Moments during Wheelchair Propulsion on Natural Surfaces"

Padmaja Kankipati, M.S. for her paper "Shoulder Joint Loading for Three Types of Lateral Wheelchair Transfers"

Amol Karmarkar, M.S. for his paper "Monitoring Wheelchair-Related Physical Activities in Older

Adults in Nursing Care Facilities"

Ana Souza, M.S. for her paper "Impact and Usage of Pushrim Activated Power Assist Wheelchair Among Individuals with Tetraplegia"

The following students received Honorable mentions:

Shivayogi Hiremath, B.S. for his paper "Estimating Temporal Parameters of Wheelchair Propulsion based on Hand Acceleration"

Michael Turkovich, M.S. for his paper "The Effect of Shoulder Position on Pushrim Forces during Overground Manual Wheelchair Propulsion"

Vishnu Ambur, B.S. for his paper "Accelerometry-Based Classification of Wheelchair Propulsion Patterns Using Machine Learning Techniques"

Sara Sibenaller, B.S. received the Rory Cooper-Dion Johnson award from the University of Pittsburgh Department of Rehabilitation Science and Technology for her 2008 RESNA paper "Kinematic Characteristics of Athetoid Movement During Target Acquisition."



Web Watch: The Ohio Wheelchair Network

The Ohio Wheelchair Network, <http://www.ohiowheelchair.com/>, is a communication and networking resource for people using adaptive technologies. The site promotes events sponsored by various adaptive support groups throughout Ohio. They also publish a newsletter and post links to many Ohio wheelchair sports groups for activities such as tennis, water skiing, hand cycling, kayaking, and rugby.

The Ohio Wheelchair Network invites people to join their communication network to keep their list current and stay connected with wheelchair friendly activities for Ohio Residents. Please e-mail them at OhioWheelchair@gmail.com

Here are just some of the upcoming events publicized on the Ohio Wheelchair Network:

Hand Cycle Clinic: September 2, 2008, 2pm-4pm
People with or without disabilities are welcome to

come out and try this upper body workout. These clinics are designed to help facilitate proper training and outfitting of IGO hand cycles that are available during our cycling rides. Riding distances will vary between 2-4 miles over mostly flat terrain. Instructor: Rosenthal Fern Hill Picnic Area, Big Creek Reservation Institute of the Great Outdoors (IGO) April Rosenthal, CTRS
Work 216-341-1704

amr@clevelandmetroparks.com

<http://www.clemetparks.com/education/igo/index.asp>

Akron Marathon Handcycle group
September 27, 2008, 7am, Akron, Ohio
<http://www.akronmarathon.org/home.aspx>

Columbus Marathon Handcycle group:
October 19, 2008, Columbus, Ohio
<http://www.columbusmarathon.com/>

-Christine Heiner

State of the Science Workshop on Spinal Cord Injury

Walter Reed Army Medical Center (WRAMC) joined the Human Engineering Research Laboratories (HERL) of the VA Pittsburgh Healthcare System and the University of Pittsburgh to host their eleventh state-of-the science workshop on April 11, 2008. Approximately 150 physicians, therapists, counselors, social workers and rehabilitation engineers attended the event to learn about the current clinical practices and research studies associated with spinal cord injury. The workshop speakers covered topics ranging from current clinical practices being used in the VA health care system and the private sector to new assistive technology devices that have only begun the early phases of research.

Dr. Margaret Hammond, chief consultant of the Spinal Cord Injury and Disorders program, kick started the workshop with an overview of the VA's SCI &D programs. She spoke about the mission of the program, which is to promote health, independence, quality of life, and productivity throughout the lives of people with SCI. Dr. Hammond explained the structural organization of the program as a Hub and Spokes System; where the hub represents full service providers who handle primary and specialty care, while the spokes represented primary care teams comprised of physician, nurses and social workers. There are 23 SCI centers and 135 SCI Primary Care Teams across USA. She discussed the services provided by the SCI&D program, which range from acute care, rehabilitation, preventive care, sustaining care, extended care, and end of life care. Dr. Hammond also discussed the research being conducted and current technology being used by the program.

The second session was conducted by Dr. Michael Boninger (Associate Dean of Medical Student Research in the School of Medicine, University of

Pittsburgh) and Miss Laura McClure (PhD student at the University of Pittsburgh). Dr. Boninger and Miss McClure discussed a research study where wheelchair users learn how to implement the Clinical Practice Guideline for Prevention of Upper Limb Pain. Dr. Boninger and Ms. McClure explained the experiences and issues faced with carrying out a randomized control trial in an acute rehabilitation patient care setting. The purpose of their research study was to determine

the effect of educating clinicians on clinical practice guidelines during the first year after discharge from acute rehabilitation. Preliminary data was presented.

The director of ICORD (International Collaboration on Repair and Discoveries), Dr. John Steeves, talked about designing valid SCI clinical trials. He discussed the necessity and objectives of SCI clinical trial guidelines. Other aspects of clinical trials that were discussed were confounders, outcome measures

and outcome assessment tools.

The afternoon session began with a talk by Dr. Rory Cooper, PhD, HERL director and FISA/PVA Chair and Distinguished Professor in the Department of Rehabilitation Science and Technology at the University of Pittsburgh, on the current state-of-the-art Assistive Technology. The presentation highlighted a range of assistive technology devices that are currently on the market and those in their early stages of development. Following Dr. Cooper's presentation, Dr. Gale Whiteneck, PhD from Craig Hospital spoke on outcome measures used in research and the importance of practice based evidence. Dr. Whiteneck also spoke about a current study being conducted: SCIREHB. This study is being performed to document all of the essential elements of SCI rehabilitation in an attempt to provide a



Top: Laura McClure and Dr. Boninger discuss the Clinical Practice Guidelines for Prevention of Upper Limb Pain.

Bottom: Audience listens attentively and asks questions during the lectures.

solid basis for rehabilitation clinicians.

After a short break, a panel discussion was held that consisted of individuals with spinal cord injury and family members. The audience was able to ask candid questions to these individuals about their experiences in rehab, wheelchair section and the difficulties they faced in their lifetime. This was the first panel discussion of its kind to be held at the state-of-the-science workshops. The feedback from the audience was overwhelmingly positive and will be incorporated into future state of the science workshops.

The last session of the day was presented by Dr. Stanley Ducharme, PhD of Boston University on Sexuality and Reproductive Health. Dr. Ducharme focused on the importance of sexuality in an individual's life and how this is an area that is often overlooked. The conference was concluded with remarks by LTC Paul Pasquina, MD, Chief of Physical Medicine and Rehab Service at Walter Reed.

The next State of the Science Workshop will be held on September 25, 2008 with a focus on Ultrasound technology. Please check www.herlpitt.org for updates.
-Laura McClure, Padmaja Kankipati

Upcoming Events

The Opening Ceremonies for the **2008 Paralympic Games** will take place on **September 6th in Beijing, China**, kicking-off 11 days of competition. The 2008 U.S. Paralympic Team roster features more than 200 athletes that will compete in 18 sports. Athletes range in age from 14 to 56 years old and come from 37 states. The roster includes 13 veterans of the United States Military.

Official 2008 Paralympics website:

<http://en.paralympic.beijing2008.cn>



The Department of Veterans Affairs (VA) has announced a new national rehab special event— **The National Veterans Summer Sports Clinic**, to be held from **September 28-October 3 in San Diego, CA**.

The Summer Sports Clinic introduces recently injured veterans to adventure sports and recreational activities, such as sailing, surfing, kayaking, cycling, and track and field events. Participation is open to U.S. military service veterans with orthopedic amputations, traumatic brain

injuries, burn injuries, psychological trauma, certain neurological conditions, visual impairment, spinal cord injuries and other recently incurred disabilities.

Information: Sandy Trombetta, 2008 NVSSC Operations Coordinator (970) 244-7726 Teresa Parks, 2008 NVSSC Administrative Coordinator (970) 263-5040

www.summersportsclinic.va.gov

Former HERL visiting faculty member Lucas van der Woude, Ph.D. kindly invites you to participate in the 4th 3-day **International Congress from April 7-9, 2009 on “Rehabilitation: Mobility, Exercise & Sports”**. The Congress will be held in the main building of the VU University Amsterdam, The Netherlands. The congress stresses the strong and natural link between the fields of rehabilitation and human movement sciences, both in theory and practice. Internationally renowned experts in the field of rehabilitation, mobility, exercise and sports will present their views on the current state-of-the-art on different topics in rehabilitation and human movement sciences.

Clinicians and other professionals from rehabilitation, human movement and exercise sciences, as well as researchers in wheeled mobility, exercise and adaptive sports are invited to submit abstracts and present their work and/or participate in the congress. Abstract submissions for both oral and poster presentations are subject to review by the scientific committee. For further information and submission guidelines, please see:

www.move.vu.nl/links/rehabmove2009

Important Dates:

- December 1st, 2008: Deadline for abstract submission
- January 23rd, 2009: Notification of acceptance

Preliminary list of topics:

- Mobility • Wheeled mobility • Hand cycling
- Prosthetics & orthotic gait • Aging & chronic disease Sports • Performance • Running
- Wheeled sports • Disability & classification
- Exercise • Exercise capacity • Physical activity
- Training FES & hybrid exercise



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VA Center Of Excellence
For Wheelchairs and
Associated Rehabilitation
Engineering



University of Pittsburgh
NIDRR Model Center on
Spinal Cord Injury



Part of
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ARE YOU INTERESTED IN WHEELCHAIR RESEARCH?

The Human Engineering Research Laboratories is recruiting individuals interested in participating in research studies for the **WHEELCHAIR USERS REGISTRY**. If you would like to be notified of Wheelchair related Research Studies for which you may be eligible to participate, contact The Human Engineering Research Laboratories and join the Wheelchair Users 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 a wheelchair or scooter, please contact **Emily, Annmarie, or Michelle** for more information.

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