



2006 HERL Summer Intern Program

This year we received our biggest and most diverse group of summer interns ever. Alicia Koontz, Ph.D. directs the HERL undergraduate intern program, a unique opportunity for students to learn about disabilities, assistive technology, and careers and advanced education opportunities in rehabilitation technology.

HERL has always provided internships to undergraduates, but it was not until Dr. Koontz formalized the program in 2001 that it really took off. Also, this year Dr. Koontz was awarded a grant from the National Science Foundation, "American Student Placements and Internships in Rehabilitation Engineering (ASPIRE)". The grant, along with supplementary funding, allowed a total of 17 summer internship opportunities, more than we have ever had. Additionally, the grant provided housing and travel expenses for non-local interns, which had never before been possible.

HERL seeks undergrads with a 3.0 or higher GPA, majoring in basic sciences, the rehab sciences, computer science, exercise physiology, and engineering. But the most important quality Dr. Koontz looks for in potential interns is a genuine interest in the rehab and assistive technology field.

"I think that one of the most unique aspects of our program is the hands-on opportunity that we offer, such as being able to take the designs we develop through research and turn them into real parts using our state-of-the-art rapid prototyping equipment," says Dr. Koontz. Interns also get to witness different phases of the research process, from the generation of new ideas, to grant proposal, to execution of the research and application of those results into clinical practice.

This year, interns were not working at just HERL; some worked with our affiliates, Carnegie Mellon University, the Rehabilitation Engineering Research Center on Telerehabilitation, and the Department of Rehabilitation Science and Technology at Pitt. With our newly-funded Engineering Research Center (see page 8), Dr. Koontz expects that in the future there will be even more opportunities for interns to work outside of HERL in

affiliated departments.

The summer intern program kicked off with a picnic and a "Wheelie Workshop" on June 12. Our graduate students lead the workshop, where interns got to learn and practice how to pop a wheelie in a wheelchair, as well as get acquainted with the HERL faculty, staff, and students.

Over the course of the summer, we conducted a Lecture Series for the interns, where various faculty, staff, and students presented on topics such as device design, scientific writing, and career options in the rehab engineering field. The interns then had an opportunity to present on the projects they worked on during our bi-weekly general lab meetings.

Dr. Koontz hopes that the interns she mentors will learn that a career in rehab engineering and assistive technology research or service not only helps others but is also incredibly rewarding. "I love when students come to me and say, 'I'd like to know more about what you do and how I can learn more about assistive technology' - then I know that this experience has enlightened them to this field and they are starting down the pathway to becoming our future AT providers and rehab scientists," says Dr. Koontz.

We have featured articles from some of our interns describing their experiences in this issue of the newsletter (see pages 2-4). Additionally, the 2006 Summer Intern webpage is now posted on our website. Go to www.herlpitt.org/education.htm to learn about this year's program and hear from other interns about their summer projects.



Some of our 2006 interns (from top, then L to R): Bailey Roche, Meghan Donahue, Mikhail Attaar, John Battles, Misty Woods, Jessica Poisel, Walter Sinegal, Andrew Cramer



The summer intern 'Wheelie Workshop'

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2006 Summer Internships

Meghan Donahue



I am beginning my senior year in biomedical engineering at Michigan Technological University. This summer the NSF REU American Student Placements and Internships in Rehabilitation Engineering grant funded me to come from Michigan to Pittsburgh and participate in this research experience.

My ten weeks at HERL have flown by faster than I could imagine. I learned about the existence of Rehabilitation engineering in January and since, have been interested in various careers in the related field. My experience at HERL has strengthened my interest significantly.

This summer I got the opportunity to develop the SMART^{HUB} for a manual wheelchair. The SMART^{HUB} utilizes strain gage technology to measure the ground reaction forces and moments transferred to the wheelchair. There were several bumps along the way, but it enriched my experience all the more. I took the existing SMART^{HUB} that I was intending on calibrating, and stripped off all of the strain gages that had gone bad over time. I then instrumented the hub with strain gages, which were then wired into a Wheatstone bridge, amplified, and recorded on a data logger.

The data logger required completion and programming so I spent time soldering proper components onto the data logger, I also completed and connected an amplifier board to it so that the changes in strain measured with the Wheatstone bridges could be detected. I also connected an accelerometer to the data logger so that accelerations along the Y and Z axis could also be measured.

The next step in my project was to calibrate the

accelerometer and the hub. I used a Material Testing System for the hub calibration as I applied known forces to the hub and measured the resulting strains. I could then create a calibration curve that would match the voltage outputs of the data logger to the measured forces and moments on the SMART^{HUB}.

Upon completion of the hub and calibration it can be used to quantify dynamic loads and accelerations experienced during manual wheelchair propulsion to determine vibration exposure and improve the durability and comfort of wheelchairs. I have also gotten the opportunity to learn and help with other projects while I was here at HERL, it made me feel like a part of the team! Although I was thoroughly interested in my project, I was still given the chance to dabble in other areas to see where my interests might lie.

G. Dewey Black



In the fall I will be a senior at Penn State's Erie campus. I am majoring in Computer Science and Mathematics. I worked at

Carnegie Mellon University's Robotics Institute with Dr. Huber and Dr. Steinfeld this summer. My project involved 2D/3D registration to produce a textured 3D model used to evaluate the ADA compliance of a building. It involved a lot of terminology and techniques from computer vision. I learned a great deal about computer vision, since I have never had a class on the subject. I also learned how to use a laser scanner and perform camera calibration, and I gained a deeper knowledge of the Linux operating system and its tools. It was a different environment and experience than working at HERL. It helped me determine what I would like to do and study in the future. Also, I was glad that the University of Pittsburgh could provide housing.

2006 Summer Internships

Erin Mishey



Erin with The GAME^{Cycle} Exercise System

HERL has presented me with an interactive opportunity to look into graduate research studies by placing me on the GAME^{Cycle} project with Ph.D. student Erica Authier.

For the last eight months I have been working with the study as a research associate. Currently, we are in the process of testing participants with the GAME^{Cycle} system in their home setting.

The GAME^{Cycle} is an exercise machine for people who use wheelchairs as an alternative to a standard arm ergometer. The device itself is basically an elaborate controller connected to a Nintendo Game Cube with a crank designed to exercise the upper body much like a standard ergometer. This allows the user to play racing video games while changing the resistance to participate in a simultaneously challenging and entertaining workout. Aside from facilitating in-home metabolic testing with the system, I also worked intensely with database design, as well as data collection, entry, and analysis.

Assisting with research at HERL has given me an intriguing and informative perspective on the policies, processes and dedication associated with research. The experience has also caused me to improve my computer and communication skills by functioning in a work environment and contacting participants for the study. Because of this opportunity, I am considering the field of research as a graduate possibility and plan to continue working with the study for another semester. Thanks to everyone here for helping me out and making the experience a fun and memorable one!

Elizabeth Copenhaver



This summer I was assigned to the Soft Tissue Biomechanics Laboratory, where one of the main focuses is pressure ulcers. At least half the people with spinal cord injuries will experience a pressure ulcer in their lifetime. Yet the best strategy against a pressure ulcer remains preventative measures. Several strategies include immersion, temperature control, or alternating pressure. My pilot study focused on the hyperemic response and sustained an increase in blood flow after applied pressure. To examine the data I collected using the Vasamedics Laser Flow Blood Perfusion Monitor, I first had to learn several analysis techniques.

Prior to this internship I had never been asked to analyze a signal and therefore everything was foreign. My first topic to tackle was filters. With this skill, I could remove the noise in the blood flow signal. Next, the signal had to be transferred to the frequency domain to determine what biological responses were increasing the blood flow. I converted the signal using three different techniques: the Fourier transfer, short term Fourier transfer, and wavelet analysis. Ultimately, the Butterworth filter and wavelet analysis were used to determine the experimental results. All analysis was completed using Lab View.

My data showed a beneficial increase of blood flow. Through manipulation of blood flow controls, pressure management may be used to induce blood flow for those that lack neurological control. During my summer I not only completed a pilot study for a project still in progress today, but I also gained valuable engineering skills. Thanks to all the guidance I received this summer, I now feel more competent to enter the work force as an engineer.

2006 Summer Internships

Tomás Maldonado



The project I worked on for the summer was called Balance Assessment for Everyday Life. Its intention was to provide a solution to performing balance analysis in any setting, by the examination of postural sway while standing in research laboratories and implementing

it in a clinical environment. For the first two weeks I visited many laboratories and clinics that performed different methods of balance analysis as well as met the people that managed the facilities. Laboratories like the Carnegie Mellon University (CMU) Motion Capture lab, the Eye and Ear Inst. (EEI) Center for Balance Disorders and the University of Pittsburgh (PITT) Human Movement and Balance Laboratory. I was treated the same way as a masters or PhD student; on my first day arriving to meet one of my advisors I was given a laptop with the latest software and hardware to perform experiments and told to begin my work.

The third week I finally understood what my goals were and how I was to implement a method to solve the problem. The purpose of the project is to examine a broader range of people taking part of posture trials in order to determine the elements involved with postural sway. In providing an easy to use, modular and robust solution to posture analysis, not only “super health” candidates will be considered, but everyone. The method selected for pilot tests involved placing an inertial sensor on the trunk of a person and recording movement while standing, acquiring and analyzing the sensor information using Labview programming, as well as combining sensor data with other more complex methods such as motion capture and force plate center of pressure (COP) analysis for comparison purposes.

During the summer I was assigned to Dr. Mark Redfern from PITT and Dr. Chris Atkenson from CMU. Since the professors are from two different universities and disciplines the proposed solution takes into consideration a greater number of variables and expertise. Consequently my time was spent alternating from the EEI to the CMU Robotics Inst. every two to three days; instead of sitting on a desk all day crunching numbers, I was required to set up daily and weekly meeting schedules with the advisors, the PhD students and the lab managers. The advisors gave me an overview of what were my tasks, ideas and resources. The PhD students sat down with me and explained in detail the concepts to perform a specific task, while the lab managers coordinated with me the correct way to implement the data collection and overall set up of the trail. Nothing could have been possible without having set my mind on taking complete advantage of all the resources at my disposal.



Tomás (L) records data from a sensor attached to the blue waist strap at the Human Movement and Balance Laboratory, while the cameras in the background record motion.

Work was not the only thing consuming my time at Pittsburgh. Whenever the group had free time, after hours or on the weekend, fun and games were always present. I am from Puerto Rico (PR), a 35 by 100 mile island in the Caribbean, and attend the University of Puerto Rico (UPR). The only Puerto Rico related object that greeted me in Pittsburgh was the statue of Roberto Clemente. Everything in Pittsburgh surprised me from the Mexican restaurant not served by Mexicans to the many hills you have to travel on just to go to

work. I slowly but surely got acquainted with local habits, customs, and forms of entertainment. For example, if you have nothing to do just knock on somebody's door and start talking. There was constant social interaction so I met someone new every day. Thanks to proper planning from PR I had already located the nearest latin club, salsa, bachata and merengue spots at Pittsburgh. I had a great time inviting interns from the dorms, HERL interns and employees of HERL to dance every week. Pittsburgh and HERL taught me that there is no such thing as a dull moment, there is always something to do if you have a positive attitude.

CURRENT RESEARCH ABSTRACTS

Use of the Independence 3000 IBOT™ Transporter at Home and in the Community: A Case Report

Rory A. Cooper, PhD, Michael L. Boninger, MD,

Rosemarie Cooper, MPT, ATP and Annmarie Kelleher, MS, OTR/L, ATP

Full article published in *Disability and Rehabilitation: Assistive Technology*, pp. 111-117, Vol. 1, No. 1-2, January-June 2006.

Purpose of the work. The INDEPENDENCE™ 3000 IBOT™ Transporter (IBOT) is an electronically stabilized wheeled mobility device for people with disabilities. The IBOT has four functions: Standard Function; 4-wheel Function; Balance Function; and Remote Function. The purpose of this study was to gain experience with the IBOT™ power wheelchair at home and in the community using an expert wheelchair user, who used the device as his primary means of mobility for one week.

Subjects/Procedures. This case report is based upon observations by trained clinicians and a diary recorded by the primary author, a male manual wheelchair user with traumatic spinal cord injury at the T7/8 level. The subject was 41 years of age and 21 years post SCI at the time of the study. The participant was employed and lived in a ranch style accessible home. The subject used the device to perform a variety of activities including holding eye-level discussions with colleagues and shopping by



The IBOT in balance function

balancing on two wheels, going up and down steep ramps, traversing outdoor surfaces (e.g., grass, dirt trails) and climbing curbs.

Results. The balance and four-wheel drive functions were helpful and worked well. The IBOT was somewhat difficult to control in standard function. The seat height was too high for most tables and desks encountered, and transfers were notably more difficult than with other wheelchairs. It was difficult to use the IBOT in the bathroom, and the subject preferred to use his personal wheelchairs for transfers into the shower. The IBOT

was a functional mobility device, its greatest strengths are outdoors and in circumstances where there is space to use balance function.

Relevance to Wheelchair Users. It is promising that a device like the IBOT is currently available and that people with disabilities, who have sufficient upper body strength and trunk stability, may have access to expanded environments.

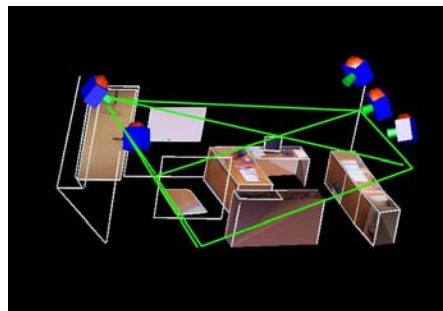
-Annmarie Kelleher, MS, OTR/L

Development of a Remote Accessibility Assessment System Through Three-Dimensional Reconstruction Technology

Jong Bae Kim, MS; David M. Brienza, PhD

Full article published in *Journal of Rehabilitation Research and Development*, pp. 257-272, Vol. 43, No. 2, March/April 2006.

We developed a Remote Accessibility Assessment System (RAAS) to analyze environments for wheelchair accessibility from a remote location. Our goals were to investigate the system's accuracy, compare different cameras, and demonstrate the feasibility of applying the system in an actual environment. We performed an accuracy analysis and a comparison of camera systems with the hardware and software components; therefore, we can specify a consumer-level digital camera and PhotoModeler



(EOS Systems, Inc, Vancouver, Canada) software for the system. Finally, we tested the system in an actual environment to evaluate its assessment of accessibility in a wheelchair user's environment, which resulted in accurate validation of our system.

The RAAS could improve rehabilitation outcomes by making accessibility assessments and modifications available to a larger proportion of the population of people with mobility limitations.

-Jong Bae Kim, PhD

CURRENT RESEARCH ABSTRACTS

Shoulder Joint Kinetics and Pathology in Manual Wheelchair Users

Jennifer L. Mercer BS, Michael Boninger MD, Alicia Koontz PhD,
Dianxu Ren PhD, Trevor Dyson-Hudson MD, Rory Cooper PhD

Full article appeared in *Clinical Biomechanics*, pp. 781-789, Vol. 21, No. 8, October 2006.



Purpose of the Work.

Manual wheelchair users rely heavily on their upper limbs for independent mobility which likely leads to a high prevalence of shoulder pain and injury. The goal of this study was to examine the relationship between shoulder forces and moments experienced during wheelchair propulsion and shoulder pathology.

Subjects/Procedures. Thirty-three subjects with paraplegia participated in this study. Pushrim forces and arm motion were recorded while the subjects propelled their wheelchair at two speeds (2 and 4 mph). This data was used to calculate shoulder joint forces and moments during propulsion. Shoulder pathology was evaluated using MRI and a physical examination.

Results. All subjects, except one, showed evidence of at least one abnormality on MRI. Thirty percent of the subjects experienced discomfort during part of the shoulder physical examination. Subjects with increased body weight experienced higher shoulder forces and moments during propulsion. Shoulder joint loading was significantly higher during the faster speed condition. Higher shoulder forces and moments in certain directions increased the odds of showing shoulder pathology (of the coracoacromial ligament) on MRI and during the physical examination.

Relevance to Wheelchair Users. Researchers, clinicians, and manual wheelchair users should work together to reduce the amount of force required to propel a wheelchair in order to reduce the risk of developing shoulder injury. This could be achieved by modifying wheelchair design or setup or through a training program to improve an individual's propulsion technique.

-Jen Mercer, BS

Advancements in Power Wheelchair Joystick Technology: Effects of Isometric Joysticks and Signal Conditioning on Driving Performance

Brad E. Dicianno, MD; Donald M. Spaeth, PhD; Rory A. Cooper, PhD;
Shirley G. Fitzgerald, PhD; and Michael L. Boninger, MD.

Full article published in *American Journal of Physical Medicine and Rehabilitation*, pp. 631-639, Vol. 85, No. 8, 2006.

Purpose of the Work: An estimated 125,000 Americans with movement disorders that preclude independent mobility in a power wheelchair could benefit from improved control devices. We developed software for our isometric (force-reflective) joystick (IJ) that allows it to emulate a commercially available motion sensing joystick (MSJ) in performance but retain the unique customizable features of an isometric control.

Subjects and Procedures: We compared driving performance to floor targets using our IJ with custom and basic software and an MSJ in 11 power wheelchair users with a variety of impairments. We measured reaction time (RT), trial time (TT), and driving accuracy (DA).

Results: The IJ with basic software had a significantly shorter RT than the MSJ and a significantly longer TT than the MSJ to far targets. No differences were found between the IJ with custom software and the MSJ with respect to RT or TT. No differences in DA were found among any of the joysticks.

Clinical Relevance to Wheelchair Users: We conclude that our custom software allowed the IJ to function similarly to the MSJ with respect to RT, TT, and DA which may make it useful as an alternative control interface.

-Brad Dicianno, MD

CURRENT RESEARCH ABSTRACTS

Development and Qualitative Assessment of the GAME^{Cycle} Exercise System

Songfeng Guo, PhD, Garrett Grindle, BS, Erica Authier, BS, Rory Cooper, PhD, Shirley Fitzgerald, PhD, Annmarie Kelleher, MS, OTR/L, Rosemarie Cooper, MPT

Full article published in *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, pp. 83-90, Vol. 14, No. 1, March 2006.

Purpose of the Work: The goal of this study was to explain and evaluate improvements made to the GAME^{Cycle}, an upper body exercise system that combines arm ergometry with video gaming. The system was evaluated by a focus group of wheelchair users and clinicians.

Subjects/Procedures: Several features were added or improved from the first generation of the GAME^{Cycle}, including a wheel on base, a steering return mechanism, and wireless fire buttons. A focus group made up of 8 clinicians, 8 wheelchair users, and 2 clinician wheelchair users was formed to evaluate the game cycle. The members of the group were allowed to try out the GAME^{Cycle}, make comments on its features, and filled out a survey regarding the system.



The GAME^{Cycle} exercise system

Results: Through the survey and comments the focus group suggested that further improvement be made the steering mechanism and to reduce the vibration that occurred during vigorous use. However, the group enjoyed the GAME^{Cycle} and felt that it would encourage exercise among persons with disabilities.

Relevance to Wheelchair Users: Inactivity is prevalent among people with disabilities. The GAME^{Cycle} offers a more enjoyable way to exercise, which may motivate its users to exercise more frequently, which in turn reduces the risk of cardiovascular disease.

The results of the focus group were used in subsequent development of the commercial version of the GAME^{Cycle}.

-Garrett Grindle, BS

HERL PUBLICATIONS

Dicianno BE, Spaeth DM, Cooper RA, Fitzgerald SG, Boninger ML, *Advancements in Power Wheelchair Joystick Technology: Effects of Isometric Joysticks and Signal Conditioning on Driving Performance*, **American Journal of Physical Medicine and Rehabilitation**, pp. 631-639, Vol. 85, No 8, 2006.

Kim JB, Brienza DM, [Development of a Remote Accessibility Assessment System Through Three-Dimensional Reconstruction Technology](#), **Journal of Rehabilitation Research and Development**, pp. 257-272, Vol. 43, No. 2, March/April 2006.

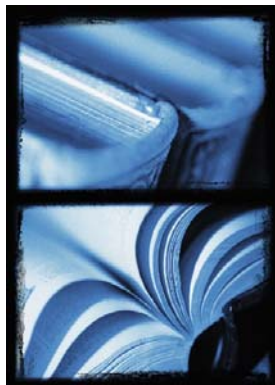
Mercer JL, Boninger ML, Koontz AM, Ren D, Dyson-Hudson T, Cooper RA, *Shoulder Joint Kinetics and Pathology in*

Manual Wheelchair Users, **Clinical Biomechanics**, pp. 781-789, Vol. 21, No. 8, October 2006.

Physical Medicine and Rehabilitation, 3rd Edition, Randall Braddom MD, MS, *Editor*, Elsevier Limited, UK, 2007. Prescription of Wheelchairs and Seating Systems (Chapter 18), A.M. Koontz, D. Ding, D.M. Spaeth, M.R. Schmeler, R.A. Cooper, pp. 381-411.

Karmarkar A, Pearlman J, Zipfel E, India: Making Mobility Real, **Paraplegia News**, pp. 12-16, Vol. 60, No. 8, August 2006.

Cooper RA, Cooper RM, Powering On, **Paraplegia News**, pp. 13-20, Vol. 60, No. 9, September 2006.



NSF Quality of Life Engineering Research Center Funded; NIDRR Model SCI Center Renewed

This summer brought some very exciting news: the University of Pittsburgh/Carnegie Mellon University Engineering Research Center (ERC) was awarded, and the University of Pittsburgh Model Center on Spinal Cord Injury was renewed for a second term.

The ERC's funding is a huge accomplishment, bringing in \$15 Million from the National Science Foundation to support projects over the next 5 years. Rory Cooper Ph.D. (University of Pittsburgh), and Takeo Kanade, PhD (Carnegie Mellon University) will co-direct the ERC.

The ERC focuses on Quality of Life Technology and on developing technology that will help the elderly and people with disabilities live more independently. Just some of the devices in the works include wearable health monitoring systems and robotic assistive devices.

The new center is also expected to involve companies and businesses to bring newly developed Quality of Life



Takeo Kanade (L) and Rory Cooper (R) will co-direct the new Quality of Life Engineering Research Center

technology devices to the market.

Our second big news was that our Model Center on Spinal Cord Injury (Model SCI) was renewed for another 5 years, with approx. \$2.3 Million of funding from the National Institute of Disability and Rehabilitation Research (NIDRR).

The Model SCI, directed by Michael Boninger, MD, will continue to focus on assistive technology (AT) for mobility. The new projects will examine the effectiveness of the Consortium of SCI's Guidelines for Prevention of Upper Limb Pain in SCI and the impact of the recent Centers for Medicare and

Medicaid Services changes for AT reimbursement.

Our first Model SCI center was funded in 2001.

For more information on the Model SCI, visit www.herlpitt.org and www.rehabmedicine.pitt.edu; for more information on the ERC, visit www.qolt.org.

-Christine Heiner

State of the Science Update

We are well into our second year of conducting our State of the Science Workshop series at Walter Reed Army Medical Center. These workshops were started last year to help translate research into clinical practice for wounded soldiers and start joint research ventures between the VA and the Department of Defense. In 2005 we held three workshops on wheelchairs, traumatic brain injury, and spinal cord injury. Early this year we were awarded a grant from the Department of Defense to continue these workshops, which are also sponsored by the University of Pittsburgh (Depts. Of Rehab Science and Technology/Physical Medicine and Rehabilitation, Center for Continuing Education in the Health Sciences), the VA, and Paralyzed Veterans of America).

We kicked off this year's round of workshops on April 21, when we organized a workshop on Assistive



CPT Dave Rozelle speaks about his recovery after an amputation at the workshop on Assistive Technology Devices in May

Technology Devices. Our fifth workshop was on May 26, focusing on Sensory Impairment. Our most recent workshop was held on Sept. 1 and focused on Polytrauma.

The State of the Science workshops unite experts in these rehab concentrations from Universities, VAs, and rehab centers all over the country.

Our next workshop is tentatively scheduled for Nov. 17 and will concentrate of the topic of spinal cord injury. Plans are also underway for a regenerative workshop in early 2007. Please check www.herlpitt.org for the latest information and to register to attend the State of the Science Workshops. Medical and rehab professionals can get continuing education credits for attending.

-Christine Heiner

Current Events/Announcements

The Steel City Starz Want You! Join one of only 14 all-women's competitive wheelchair basketball teams in the USA. Any female with a lower-extremity impairment is eligible to play. Participants must use a wheelchair to play, but do not need to be an everyday wheelchair user. The team is always looking for new members! For more information, please contact Leah Gray at 412-826-2703.

53rd Annual Governor's Conference on the Employment of Disabilities, October 4, 2006, Radisson Hotel Pittsburgh Greentree: Learn how employing people with disabilities enriches PA's workforce. The conference will include an address by keynote speaker and HERL director Dr. Rory Cooper, as well as interactive theatre, and awards ceremony, prizes, and a reception featuring the Carnegie Mellon Jazz Band Ensemble. SHRM, ACT 48, CEU and CRC credits available

through this one day conference. Registration cost: \$80 on or before Sept. 15, \$95 after Sept. 15. For more information, please call 412-918-4229 or visit <http://www.dli.state.pa.us/landi/cwp/view.asp?a=3&q=234482>

Perspectives on Employing Persons with Disabilities Conference, December 6-8, 2006, Hyatt Regency, Bethesda, MD: For 25 years, the Perspectives on Employment of Persons with Disabilities Conference has given federal managers an edge in recruiting, hiring and retaining qualified employees with disabilities. This 25th Annual Perspectives Conference offers you new and updated information on personnel policies and practices, developments in technology, legal updates, and resources that will assist your agency in finding its edge to achieve its goals. To register, visit <http://www.grad.usda.gov/perspectives>

Research at the National Veterans Wheelchair Games

This year's National Veterans Wheelchair Games was held in Anchorage, AK, from July 3-8. HERL sent a team of investigators to the games, where we conducted 5 research studies:

Examining Wheelchair Driving Characteristics During and After the Games: Using dataloggers, we collected speed, distance, vibration, and movement time from wheelchair users. The data will be used to improve wheelchair and wheelchair component design.

Comparison of Upper Limbs of Manual Wheelchair Users Before and After Intense Physical Activity: Manual wheelchair and crutch use can lead to arm pain and injuries; We used ultrasound technology to examine these injuries. This data can be used to develop safer propulsion techniques.

Mobility, Outcomes & Training in Veteran Adaptive Technology: This group of studies surveyed veterans who use wheelchairs in their daily activities about vari-



COL Raul Marin, MD from Walter Reed Army Medical Center, and Brad Impink from HERL, perform an ultrasound of veteran and games participant Johnny Lee Williams' wrist (photo used with permission from VA Office of Research and Development)

ous quality of life issues.

Evaluation of Computer Access Assessment Software: We measured computer access skills among veterans. These skills are critical part of the vocational rehab process for veterans with disabilities.

Wheelchair Users' Registry: We recruited veterans for our registry, which is an informational resource for participants which allows us to contact and inform people of research studies they may be able to participate in.

-Christine Heiner

RESNA 2006

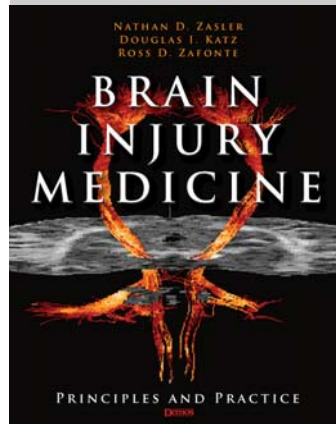
The 2006 Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) Conference was held in Atlanta, GA. HERL's 2 student award winners, Eliana Chaves and Michelle Tolerico, presented their research papers at the conference. The event also commenced our Director Rory Cooper's 2-year term as RESNA president.

News from the Department of Rehabilitation Science and Technology

The Department of RST conducted a world class symposium entitled, "Developing a Community Response: Welcoming Returning Operation Iraqi Freedom (OIF)/Operation Enduring Freedom (OEF) Service Members, on May 3, 2006. The symposium identified best practices for fulfilling the needs of returning service members. Experts from Walter Reed Army Medical Center, the VA, and Marines for Life spoke at the event, as well as Congressman John P. Murtha and PA Governor Ed Rendell.



News from the Department of Physical Medicine and Rehabilitation



Ross Zafonte, DO, Chair of the Department of PM&R, co-authored a new textbook that is scheduled for release in September, "Brain Injury Medicine: Principles and Practice." Amy Wagner, MD, Anthony Kline, PhD, and Joe Ricker, PhD, from the Department of Physical Medicine and Rehab also contributed to the textbook.

HERL IN THE MEDIA

United Press International, May 10, 2006: Study: Most Satisfied With Wheelchair
<http://www.upi.com/ConsumerHealthDaily/view.php?StoryID=20060510-015444-8196r>

VA Research Currents, June 1, 2006: VA Investigators at Walter Reed, p. 3
http://www.research.va.gov/resources/pubs/docs/va_research_currents_June_06.pdf

Press Release (UPMC), July 17, 2006: Carnegie Mellon, University of Pittsburgh Receive \$15 Million from NSF to Establish Center Focused on Improving Americans' Quality of Life, <http://newsbureau.upmc.com/Schools/QualityOfLife.htm>

VA Research Currents, May 1, 2006: Career Milestones: Rory Cooper, http://www.research.va.gov/resources/pubs/docs/va_research_currents_may_06.pdf

Pittsburgh Post Gazette, July 12, 2006: Local Vets Roll Through Wheelchair Sports in This Year's Games, <http://www.post-gazette.com/pg/06193/705053-114.stm>

University Times, July 20, 2006: Pitt-CMU Center to Develop Independent Living Technology, pp. 1-3, <http://mac10.umc.pitt.edu/u/FMPro?-db=ustory&-lay=a&-format=d.html&storyid=7132&-Find>

Pittsburgh Post Gazette, July 18, 2006: Pitt, CMU Get

\$15 Million Grant to Create Institute for Aged, Disabled, <http://www.post-gazette.com/pg/06199/706633-85.stm>

Pittsburgh Tribune Review, July 18, 2006: To Enable the Disabled, p. B-1, http://www.pittsburghlive.com/x/tribunereview/search/s_462283.html

New Pittsburgh Courier, July 19, 2006: Schools to Develop Technology for Elderly, p. A-4, <http://newpittsburghcourieronline.com/articlelive/articles/26/1/Metro-Beat/Lawrenceville-Technology-Center-funded.html>

Pittsburgh Business Times, July 17, 2006: CMU, Pitt Team on Tech Center to Help Elderly, <http://pittsburgh.bizjournals.com/pittsburgh/stories/2006/07/17/daily4.html>

Press Release - National Science Foundation, August 21, 2006: NSF Awards \$75.3 Million for Five Engineering Research Centers, http://www.nsf.gov/news/news_summ.jsp?cntn_id=107939&org=olpa&from=news

CAST Website, August 21, 2006: NSF Awards \$15 Million Grant to Establish Research Center, <http://www.agingtech.org/announcement.aspx?id=138>

Carnegie Mellon Today, July 17, 2006: Carnegie Mellon, University of Pittsburgh Receive \$15 Million from NSF to Establish Center Focused in Improving Americans' Quality of Life, http://www.cmu.edu/cmnews/tra/060717_qolt.html



ACCOMPLISHMENTS AND AWARDS



Michael Boninger, MD

Medical Director Michael L. Boninger M.D. was promoted to Associate Dean for Medical Student Research in the University of Pittsburgh School of Medicine.

Director Rory Cooper, Ph.D. won 4 gold medals in the 50-yard backstroke, the 50-yard breaststroke, the 50-yard butterfly, and 100-yard individual medley, as well as one silver medal in the slalom events at the 2006 National Veterans Wheelchair Games in Anchorage, AK.



Amol Karmarkar

Doctoral student Amol Karmarkar, MS, received the 2006 Patient Safety Fellowship from the Jewish Healthcare Foundation.

Investigator Diane Collins, Ph.D. received an Honorable Mention in Research by a Post-Doctoral Student for her paper, "Use of Higher Quality Wheelchairs by Race and Gender" for the Institute of Rehabilitation Research Day 2006. Dr. Collins was also elected to the Pitt School of Rehab Sciences Alumni Board to represent the Department of Rehabilitation Science and Technology.



Erica Authier

Doctoral student Erica Authier was the guest speaker on the Quality of Life Technology Engineering Research Center (see article, p. 8) on August 18 at the Working Order program's Disability Resource Breakfast.



Dr. Rory Cooper presented Emily Zipfel with the 2006 Rory Cooper-Dion Johnson Best Paper Award.

Doctoral Student Emily Zipfel received the Rory Cooper-Dion Johnson Best Paper Award for her paper "Testing and Evaluation of a Prototype Pediatric Wheelchair Design," which she presented at the 2006 Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) Conference.

Agency Spotlight: Pittsburgh Area Brain Injury Alliance (PABIA)

PABIA started in 1981 as a support group for parents of people who survived head trauma. In 1982, the organization became the Pittsburgh/Regional Chapter of the National Head Injury Foundation (NHIF). The head injury peer support movement grew as medical technology and treatment improved and more people survived Traumatic Brain Injury (TBI). Today PABIA is dedicated to the people recovering from TBI and who live with its consequences. They provide a forum for and assist in the development of peer-to-peer support groups in Western PA. PABIA works to educate the community on TBI, connect those with TBI to support and partner them with people working in professional disciplines, and help those with brain injuries overcome service barriers.

PABIA holds support group meetings on the first Tuesday of every month at Life's Work (formally VRC), 1323 Forbes Ave, Pittsburgh, PA. The organization also reaches out to the community through a free newsletter and their website, www.pabia.org. Their website is an inexhaustible resource of connections to other organizations, support groups, advocacy events, as well as many personal stories from brain injury survivors.

For more information on PABIA, visit www.pabia.org, or contact Ed Crinnion at 412-761-9870 or John Pistorius at 412-481-0443.

-Christine Heiner

HERL in the Community

Associate Director of Engineering Donald Spaeth, PhD, made several appearances at PABIA's support group meetings this summer to share the latest news on a new power wheelchair joystick we are developing for those with traumatic brain injury and limited dexterity.

Investigator Diane Collins, Ph.D. joined Katherine Seelman, Ph.D, and Dave Harding from the Department of Rehab Science and Technology in conducting "Disability Awareness Training" for regional managers of Sam's Club/Wal-Marts in the greater Pittsburgh area. The group's 3 hour in-service addressed accessibility barriers in the workplace as well as disability rights and etiquette.

HERL staff/students Annmarie Kelleher, Amie Struble, Amanda Reinsfelder, and Christine Heiner, formed a team to walk and raise funds for Easter Seals of Western PA in Easter Seals "Walk with Me" on July 16.

Interested in participating in a HERL Research Study?

If you are interested in participating in any of these studies, please contact the HERL Clinical Coordinators: Annmarie Kelleher, Emily Teodorski, or Michelle Tolerico at 412-365-4850

Longitudinal Collaborative Investigation of Arm Pain in Paraplegia



This research study will help to determine if there is a relationship between arm pain and injury and the type of wheelchair you use and if injury may result from how you push a wheelchair. This may help to

improve wheelchair fit and prescription and help prevent future injuries.

You may be eligible to participate if...

- You are between the ages of 18 and 65
- You have a spinal cord injury below T1
- You primarily use a manual wheelchair
- You do not have pain that limits your ability to propel a manual wheelchair

During participation in this study you will be asked to...

- Complete questionnaires
- Complete analysis of the force you use when push-

ing your wheelchair

- Have an MRI, x-ray, nerve conduction study and physical examination
- Complete brief telephone follow-up interviews
- Repeat initial testing after two years
- All testing will be completed at the VA Pittsburgh Healthcare System and the University of Pittsburgh Medical Center.

You will be compensated:

- \$100 for completing the initial testing
- an additional \$100 for completing the testing at 2 years.

Additional compensation for travel to Pittsburgh may be provided.

Principal Investigator: Michael Boninger, MD

JOYSTICK USE FOR VIRTUAL ELECTRIC POWER WHEELCHAIR DRIVING IN INDIVIDUALS WITH SPASTIC CEREBRAL PALSY

You may be eligible to participate if:

- You are between the ages of 18 and 80
- You have a diagnosis of cerebral palsy with increased muscle tone in upper extremities

We are evaluating the use of a new power wheelchair joystick. You will be asked to undergo a brief medical history and physical examination by a physician and complete a series of questionnaires.

Using a conventional joystick and the new joystick, you will be asked to complete virtual (computer based) driving tasks.

This study will involve a 2 ^{1/2} hour visit.

You will be compensated \$100 for completing the study.

Principal Investigator: Brad Dicianno, MD

These are just some of the studies we're presently recruiting for. For additional studies and updates on studies you may be able to participate in, visit www.herlpitt.org/research.htm, and click on **STUDIES WE'RE RECRUITING FOR**

NEW HERL GRANTS

“Customized Control to Enable Function in Dystonia and Chorea.” Principle Investigator: Rory Cooper, Ph.D. HERL Competitive Pilot Research Program, \$25,000, July 1, 2006-June 30, 2007.

“Use of Smart Wheelchairs to Provide Independent Mobility to Visual and Mobility Impairments.” Principle Investigator: Richard Simpson, Ph.D. Dept. of Veterans Affairs, Rehab Research & Development Service, \$249,600, June 1, 2006-May 31, 2008.

“Power Wheelchair Control Based on Joint Position.” Principle Investigator: Richard Simpson, Ph.D. HERL Competitive Pilot Research Program, \$6,000, May 1, 2006-April 30, 2007.

“Nutritional Needs and Weight Management after SCI: A Telehealth Approach.” Principle Investigator: B. Jenny Kiratli, VA Palo Alto Health Care System (HERL Co-Investigator: Shirley Fitzgerald, Ph.D). Depart. of Veterans Affairs, Rehab Research & Development Service, \$745,400.

“Quality of Life Technology Engineering Research Center.” Co-Directors: Rory Cooper, Ph.D. (University of Pittsburgh) and Takeo Kanade, Ph.D. (Carnegie Mellon Univ.). National Science Foundation, \$15,000,000, June 21, 2006-May 31, 2011 (estimated end date).

“University of Pittsburgh Model Center on Spinal Cord Injury.” Project Director: Michael Boninger, M.D. National Institute on Disability and Rehabilitation Research, \$ 449,417, October 1, 2006 - Sept. 30, 2011.

“Biomechanics of Manual Wheelchair Propulsion in the Frail and Non-Frail Elderly,” Principle Investigator: Rachel Cowan, MS. Pepper Center Pilot Program, \$14,667, September 1, 2006—August 30, 2007.

“Disparity in Wheelchair Quality of Veterans With Spinal Cord Injury.” Principle Investigator: Diane Collins, PhD. VA Stars and Stripes Network Competitive Pilot Project, \$49,800, August 1, 2006-July 31, 2008.

IMPACT OF PUSHRIM ACTIVATED POWER ASSIST WHEELCHAIRS ON MOBILITY AMONG PEOPLE WITH TETRAPLEGIA

Would you like to try using a power assist wheelchair as part of a research study?

If you:

- are a full-time manual wheelchair user
- are between the ages of 18 and 65 and have tetraplegia

we may be able to give you the opportunity to try one out.

We are conducting a research study comparing the use of regular manual wheelchairs to power assist wheelchairs among people with



tetraplegia. Your participation would last four weeks and require three visits to the lab. For two weeks, we would place a small device called a datalogger on your wheelchair to record the speed and distances you travel. For the other two weeks, we would send a power assist wheelchair home with you and ask you to use it for your daily activities. This would also be instrumented with a datalogger. We would ask you to fill out short surveys over this period of time.

Principle Investigator: Rory Cooper, Ph.D.

Human Engineering Research Laboratories

Mailing Address:
VA Pittsburgh Healthcare System
7180 Highland Drive
Building 4, 2nd Floor East Wing, 151R-1
Pittsburgh, Pa, 15206

Phone: 412-365-4850
Fax: 412-365-4858

E-mail any comments, corrections, or questions concerning
the newsletter to the editor, Christine Heiner at:
Email: heinercm@pitt.edu

VA Center Of Excellence For
Wheelchairs and Associated
Rehabilitation Engineering

University of Pittsburgh Model
Center on Spinal Cord Injury

Rory A. Cooper, Ph.D.
Director

Michael L. Boninger, M.D.
Medical Director

Shirley G. Fitzgerald, Ph.D.
Associate Director of Research,

Donald M. Spaeth, Ph.D., ATP, RET
Associate Director of Engineering



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available on our website, www.herlpitt.org.

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.

VA PGH Healthcare System 7180 Highland Drive Pittsburgh, PA 15206
412-365-4850 registry@herlpitt.org www.herlpitt.org