



HERL Quarterly Newsletter

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SUMMER EDITION
JULY/AUGUST 2004

LETTER FROM THE EDITOR

We held our 10th anniversary celebration on March 29, 2004 at the VA Pittsburgh Healthcare System, Highland Drive division. About 100 guests attended the event, including friends, supporters and collaborators from the University of Pittsburgh, UPMC, the Department of Veterans Affairs, and



Dean Clifford Brubaker, Ph.D. of the University of Pittsburgh School of Health and Rehabilitation Sciences, was a speaker at the HERL 10th anniversary celebration.

Paralyzed Veterans of America, as well as from many disability organizations and research facilities and companies we have worked with over the years. R. Lee Kirby, M.D., from the Nova Scotia Rehab Centre in Canada, was the keynote speaker at the celebration. Mr. Michael Moreland, Director of the VA Pittsburgh Healthcare System, and Dean Clifford Brubaker, PhD, Dean of the University of Pittsburgh's School of Health and Rehabilitation Sciences, also spoke.

In April, our director Rory Cooper was appointed by Chancellor Mark Nordenberg as a Distinguished Professor of the University of Pittsburgh in the School of Health and Rehabilitation Sciences. This is the first such appointment of a faculty member in the history of our school. As noted by Chancellor Nordenberg in his letter announcing Dr. Cooper's appointment "... The appointment of a faculty member to a Distinguished Professorship is the highest honor that the University of Pittsburgh can accord a member of its professoriate." Dr. Cooper was also selected by the American Paraplegia Society (APS) as the recipient of their 2004 Excellence Award. He was chosen for his many years of dedication in the field of research mobility, assistive technology, and for improving the quality of life of persons with spinal cord injury. The APS will present Dr. Cooper with the award at their annual meeting in September.

Our staff was involved in several community activities this spring. On April 22, we provided a tour of our wheelchair testing facility for "take your kids to work day." In May, we participated in the first UPMC Rehabilitation Hospital Wheelchair Slalom. Pittsburgh wheelchair users navigated ramps and obstacle courses designed by HERL volunteers during the athletic event.

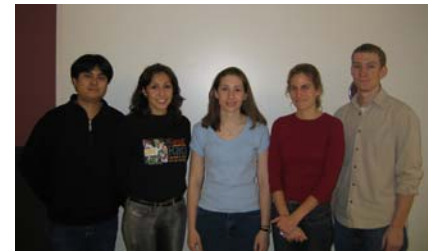


HERL staff and students participated in the UPMC Wheelchair Slalom on May

June marked the two most important yearly activities for HERL: the National Veterans Wheelchair Games (NVWG) and the Rehabilitation Engineering Society of North America (RESNA) Conference. HERL sent a team of faculty and students to conduct research at the 2004 NVWG, held in St. Louis, MO. We successfully recruited over 100 new wheelchair users for our registry and for the studies conducted at the games. This year's RESNA conference was held in Orlando, FL. HERL had 5 student award winners at the conference. Yusheng Yang, Faby Ambrosio, Emily Zipfel, and David Algood were 2004 student scientific competition winners and Beth Ann Kaminski was a student design competition winner. The students received a framed certificate and \$1,000 honorarium.

This edition of the newsletter has been a little late due to the many summer activities going on at HERL. We continue to encourage readers to elect to receive the newsletter by e-mail, which is our fastest method of distribution. If you would like to switch to electronic distribution, please e-mail me at heinercm@pitt.edu.

Look for our next newsletter this fall! We are grateful for your continued support and readership!



HERL's 2004 RESNA student winners (L to R): Yusheng Yang, Fabrisia Ambrosio, Beth Ann Kaminski, Emily Zipfel, David Algood

INSIDE THIS ISSUE:

Current Research Abstracts	2-3
Publications/Media	4
Current Events	4
Featured Staff	5
Featured HERL Student	5
Visiting Faculty Profile	7

-Christine Heiner, HERL newsletter editor

CURRENT RESEARCH ABSTRACTS

Tips and Falls During Electric Powered Wheelchair Driving: Effects of Seatbelt Use, Legrests, and Driving Speed

Thomas A Corfman, M.S., Rory A Cooper, Ph.D., Shirley G Fitzgerald, Ph.D. and Rosemarie Cooper, M.P.T., A.T.P.

Full article published in the **Archives of Physical Medicine and Rehabilitation**,

Vol. 84, No. 12, pp. 1797-1802, December 2003.

Purpose of the work: Users of electric powered wheelchairs (EPW) often have difficulty maintaining a supported seated posture when encountering ordinary obstacles thus exposing them to the risk of falling from an EPW or completely tipping an EPW. Further increasing the risk to EPW users is the lack of seatbelt use and/or the use of improperly adjusted legrests. How legrests will affect the frequency or severity of EPW driving accidents is not known at this time, however, legrests may contribute to both support and balance of the EPW occupant reducing instability and falls from the EPW.

The purpose of this research study was to measure the response of a test dummy while traversing common obstacles encountered by EPW users to determine if optimal wheelchair fit, the use of seatbelts, and driving speed affect the frequency and severity of EPW tips and falls.

Subjects/Procedures: A 50th percentile anthropometric Hybrid II test dummy (ATD) was used to simulate a person driving an EPW. The ATD was driven in four different EPWs over commonly encountered obstacles at speeds of 1m/s and 2m/s, with and without the use of a seatbelt, and



This test dummy was driven in a power wheelchair by remote control over various obstacles in order to observe tips and falls (also pictured: HERL doctoral student Mike Dvorznak)

varying legrest height. The response/motion of the ATD was observed and recorded as: no fall, loss of control (the ATD falls forward or sideways but remains in the EPW), fall of the ATD out of the EPW, or a complete tip of the EPW.

Results: A total of 97 adverse events were recorded out of 1700 trials: 88 loss of control (instability) and nine falls of the ATD. No complete tips of any EPW occurred. Univariate statistical analysis indicates a significant relationship between the adverse events and the use of seatbelts, legrest condition, and test obstacles ($p < 0.05$). A mixed model analysis confirmed the significant relationships between the adverse events and the use of seatbelts, legrest condition, and test obstacles ($p < 0.05$). However, the mixed model indicated no significant relationship between the adverse events and driving speed and indicated that no one obstacle was designated to be the most problematic.

Relevance to Wheelchair Users: EPW users should use seatbelts and legrests while driving their EPWs and clinicians should include common driving tasks when assessing the proper set-up of EPWs.

-Rosemarie Cooper, MPT, ATP

Shoulder Magnetic Resonance Imaging Abnormalities, Wheelchair Propulsion, and Gender

Michael Boninger, M.D., Brad Dicianno, M.D., Rory Cooper, Ph.D., Jeff Towers, M.D.,

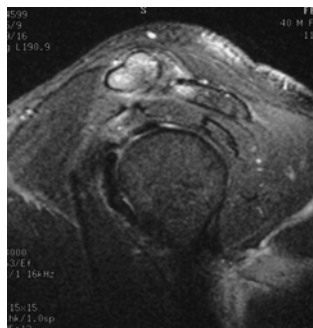
Alicia Koontz, Ph.D., Aaron Souza, M.S.

Full article published in **Archives of Physical Medicine and Rehabilitation**, Vol. 84, No. 11, pp. 1615-1620, November 2003.

Purpose of Work. The purpose of this study was to determine if there are changes in MRI studies of the shoulder over time and if there are any characteristics of subjects that predict these changes.

Subjects/Procedure. Fourteen wheelchair user with paraplegia had two MRI studies separated by at least two years. The MRI studies were graded by a radiologist for the amount of injury and inflammation in the shoulder.

Results. The subjects in the study were separated into two groups: 1) those whose MRIs were worse over time and those whose MRI were unchanged or better. Of the seven subjects who has



MRIs can provide evidence of shoulder injury in manual wheelchair users

worsening of the MRI over time, six were women. There were no women in the unchanged or better group.

Relevance to Wheelchair Users. Women appear to be at greater risk of progressive shoulder injuries over time. This is in line with previous studies that have shown women to have a significant amount of shoulder pain. Women wheelchair users should be aware of this risk and not ignore pain if it should develop. In addition, women and men should consider exercises that may help prevent the development of pain.

-Michael Boninger, MD

CURRENT RESEARCH ABSTRACTS

Summary: Integrated Control and Related Technology of Assistive Devices

Dan Ding, Ph.D., Rory Cooper, Ph.D., Beth Kaminski, B.S.E., John Kanaly, B.S., Ana Allegretti, M.S., Eliana Chaves, B.S., Sandra Hubbard, M.A.

Full Article Published in *Assistive Technology*, Vol. 15.2, pp. 89-97, Winter 2003.

Purpose of the Work: Assistive devices are now available that allow persons with severe physical disabilities to complete tasks independently. When the user has severe physical limitations, it may be advantageous to have an *integrated control system*, where a single control interface (e.g. joystick, head switches, voice recognition system, keypad) is used to operate two or more assistive devices (e.g. power wheelchairs, augmentative communication devices, computers, environmental control units, and other devices that are controlled electronically). Integrated control allows persons with limited motor control to access several devices with one access site without assistance and users do not need to learn different operating mechanism for each device. The purpose of this review is to convey the depth and breadth of the research that has been conducted on integrated control systems, as well as to pro-



Three examples of HERL integrated control systems: the wheelchair mounted robotic arm (top), the robotic walker (left), and isometric joystick (right)

vide some insights into future directions. We reviewed research works pertaining to communication and environmental control, computer access, and wheelchair guidance systems. Integrated communication and environment control units enable people to actively interact with their surroundings. Integrated computer access provides greater convenience for people with disabilities and increases their quality of life. Integrated wheelchair guidance systems enhance the mobility as well as safety.

Information gathered in this study will help people to become fully aware of the status of contemporary integrated control technology to increase the quality of life of people who use electronic assistive devices.

-Dan Ding, Ph.D.

Influence of Wheelchair Front Caster Wheel on the Reverse Directional Stability

Sonfeng Guo, PhD, Rory A. Cooper, PhD, Tom Corfman, MS, Dan Ding, PhD, Garrett Grindle

Full article published in *Assistive Technology*, Vol. 15.2, pp. 98-104, Winter 2003.

Purpose of the Work: The purpose of this research was to study directional stability during reversing of rear-wheel drive electric powered wheelchairs (EPW) under different initial front caster orientations. Specifically, the weight distribution differences caused by certain initial caster orientations were examined as a possible mechanism for causing directional instability that could lead to accidents.

Methods: An EPW and a test dummy were positioned on a force collection platform with the front caster wheels in a particular orientation. The EPW was then driven directly backward across the platform. Six different orientations were tested. A camera motion tracking system (Optotrack) was used to determine drive direction error. The ground reaction forces were collected to determine the load on the front casters along with back-emf data to



The experimental set-up for this study

attain the speed of the motors.

Results: The drive direction error was found to be different for various initial caster orientations. Drive direction error was greatest when both casters are oriented 90° to the left or right, and least when both casters were oriented forward. The results show that drive direction error corresponds to the loading difference on the casters. The data indicates that loading differences may cause asymmetric drag on the casters, which in turn

causes unbalanced torque load on the motors. This leads to a difference in motor speed and drive direction error.

Relevance to Wheelchair Users: The findings identified situations in which an EPW may not respond as the user intended while driving backward. This knowledge may be applied by EPW manufacturers to minimize these effects in new designs, leading to better directional stability, and less potential for accidents. -Garrett Grindle

RECENT HERL PUBLICATIONS

Book Chapter: Strength and Disability, Koontz AM, Ambrosio F, Souza AL, Buning ME, Arva J, Cooper RA, Ch. 21 in **Muscle Strength**, Shrawan Kumar Ph.D., D.Sc., F. Erg.S., *Editor*, pp. 485-518, CRC Press, 2004.

Fass MV, Cooper RA, Fitzgerald SG, Schmeler M, Boninger ML, Algood SD, Ammer WA, Rentschler AJ, Duncan J, Durability, Value, and Reliability of Selected Electric Powered Wheelchairs, **Archives of Physical Medicine and Rehabilitation**, Vol. 85, No. 5, pp. 805-814, May 2004.

Rentschler AJ, Cooper RA, Fitzgerald SG, Boninger ML, Guo S, Ammer WA, Vitek M, Algood SD, Evaluation of Selected Electric Powered Wheelchairs Using the ANSI/RESNA Standards, **Archives of Physical Medicine and Rehabilitation**, Vol. 85, No. 4, pp. 611-619, April 2004.

DiGiovine CP, Cooper RA, Wolf E, Fitzgerald SG, Boninger ML, Analysis of Whole-Body Vibration During Manual Wheelchair Propulsion: A Comparison of Seat Cushions and Back Supports for Individuals Without a Disability, **Assistive Technology**, Vol. 15.2, pp. 129-144, Winter 2003.

Guo S, Cooper RA, Corfman TA, Ding D, Grindle GG, Influence of Wheelchair Front Caster Wheel on Reverse Directional Stability, **Assistive Technology**, Vol. 15.2, pp. 98-104, Winter 2003.

Fitzgerald SG, Arva J, Cooper RA, Dvorznak MJ, Spaeth DM, Boninger ML, A Pilot Study on Community Usage of a Pushrim Activated Power Assist Wheelchair, **Assistive Technology Journal**, Vol. 15.2, pp. 113-119, Winter 2003.

Ding D, Cooper RA, Kaminski BA, Kanaly JR, Allegretti A, Chaves E, Hubbard S, Integrated Control and Related Technology of Assistive Devices, **Assistive Technology**, Vol. 15.2, pp. 89-97, Winter 2003.

CURRENT EVENTS

A new MS support group is forming in the Pittsburgh area. The group will meet twice monthly at Pitt's School of Health and Rehabilitation Sciences, 5073 Forbes Tower, in Oakland. Please contact Joe Ruffing, (412) 383-6599, ruffing@pitt.edu, with questions or for more information.

Easter Seals of Western Pennsylvania's website, www.westernpa.easterseals.com, has just gone live. Check out the site for updates on current local Easter Seals events and information.

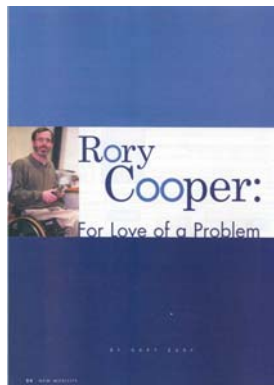
HERL IN THE MEDIA

Paralyzed Veterans of America Research, Education, & Practice Guidelines Program, 2003 Annual Report:
Page 19: Preserving Upper Limb Function

ORD Research Honors, April 2004:
Page 2: Rory Cooper appointed to Distinguished Professor of Rehabilitation Science and Technology

Pitt Chronicle, April 12, 2004:
Page 4: Awards & More, Rory Cooper

Pitt Chronicle, April 25, 2004:
Page 9: Rehab Science Chair Names Distinguished Professor



University Times, April 29, 2004:
Page 13: Faculty, Alums Collect Major Honors, Rory Cooper

New Mobility, May 2004:
Pp 24-26: Rory Cooper: For Love of a Problem

Pittsburgh Post-Gazette, May 2, 2004:
Page C-2: Course in Confidence (UPMC Wheelchair Slalom) <http://www.post-gazette.com/pg/04123/309884.stm>

Pittsburgh Tribune-Review, May 2, 2004:
Page E6: Wheelchair Users get to Strut Their Stuff http://pittsburghlive.com/x/search/s_192117.html

Pittsburgh Tribune-Review, May 16, 2004:
Page G-2: Rory Cooper appointed to Distinguished Professor of Rehabilitation Science and Technology

If you know of a current event or have an ad that you would like to post in the HERL Quarterly Newsletter, please contact Christine Heiner at (412) 365-4854 or by e-mail at heiner@pitt.edu

FEATURED STAFF MEMBER: Jeremy Puhlman

Jeremy Puhlman is a Technical Assistant at HERL. When he is not helping the graduate students with the technical aspects of their projects, you will find him designing and building prototypes for projects of his own. Mr. Puhlman completed an internship with HERL as an undergrad at the University of Pittsburgh, and was later hired part time while he finished his studies. During his internship he designed, manufactured, and tested the first Pneumatic Suspension Wheelchair Caster Fork. In April 2003 he graduated with a BS in Biomedical Engineering and was granted a full time position at HERL.

Mr. Puhlman has participated in numerous lab projects including the creation of an adjustable backrest wheelchair mechanism and a forward folding wheelchair that is able to fit in an airplane's overhead compartment. He has donated



HERL Technical Assistant
Jeremy Puhlman

his time to building obstacles for UPMC's Wheelchair Slalom and helping with the Three Rivers Adaptive Sports (TRAS) clinic, which gives people with disabilities an opportunity to participate in water sports at Conneaut Lake Park, PA. He has also served as technical support in two focus groups involving the testing of Game^{Wheel} and Game^{Cycle}, programs that allow wheelchair users to get exercise while playing a video game.

In addition to his aspirations of becoming a member of the Wheelchair Standards Committee and working with the Center for Assistive Technologies (CAT), he hopes to one day get his master's degree in Mechanical Engineering or Rehabilitation Science Technology. When not working, Mr. Puhlman enjoys ice hockey, skiing, snowboarding, and hiking.

-Samantha Goldstein

FEATURED HERL STUDENT: Yusheng Yang



Yusheng Yang, three time RESNA winner & 2004
ASB Grant-in Aid recipient

HERL doctoral student Yusheng Yang received his B.S. in Occupational Therapy from Chun-San Medical and Dental College in Taiwan in 1995 and his M.A. in Biomechanics and Ergonomics

from New York University in 2000. He began his doctoral work in Pitt's Rehabilitation Science and Technology program at HERL in 2001.

Yusheng works with HERL principle investigator Dr. Alicia Koontz on the project, "Effects of Trunk Stimulation on Seated Wheelchair Function after Spinal Cord Injury," a collaborative grant between the Pittsburgh and Cleveland VA Medical Centers. Researchers in this study

investigate the effects of electrical stimulation of the hip and trunk muscles on seated function in a wheelchair.

Yusheng has won the Rehabilitation Engineering Society of North America (RESNA) -Whitaker Student Paper Competition award for three consecutive years. This year, he was honored for his paper entitled, "Influence of Gripping Moments on Mechanical Efficiency of Wheelchair Propulsion." Yusheng and the 4 other HERL RESNA student winners were each presented with a framed certificate and \$1,000 honorarium at the RESNA Conference this past June in Orlando.

Yusheng also received an American Society of Biomechanics (ASB) Grant-In-Aid award. This award will provide Yusheng with \$2095 in research funding for the project, "Development of the SMART^{Platform} and SMART^{Wheelchair}: Measurement System for Evaluating Transfer Biomechanics." In this project, Yusheng will expand upon his advisor Dr. Alicia Koontz's work to develop a measurement system for investigating transfer biomechanics.

-Christine Heiner

A Newsletter Reader Shares her Personal Story

In the last issue of the newsletter, we invited our readers to share their personal stories. We received our first real-life story from Rosemarie Benecke in Wildwood, Montana. Anyone interested in writing a personal story should contact the newsletter editor, Christine Heiner, at heinercm@pitt.edu

When I graduated from Webster College, St. Louis, MO in 1962 with a BA in Home Economics Education I was ready to teach “high schoolers” how to sew and cook! Since I contracted Polio in 1951, I used a wheelchair as a means of mobility. I had done my state re-

quired practice teaching at the high school I had attended so I knew I was certified to do the job.

When I hit the real world, I could not find a position as a Home Ec teacher at an accessible school that had an opening in my field. September came and went and I did not have a job! In early October I was offered a half time position teaching 5th grade at a St. Louis County Catholic school. Even though the school had two steps to get into, the principal, who was the other half teacher, assured me two of the 5th grade boys would help me in and out each day, which they faithfully did. I enjoyed the post so much that I began taking graduate classes to become certified in elementary education. The next year I was hired full time to teach seventh grade. The students were quite welcoming and accepting of my physical challenges. At that time I was driving my Dad’s 4-door car and needed help to get the wheelchair out of the trunk. Two boys met me in the parking lot each morning in all kinds of weather and assisted me with the wheelchair. The same procedure took place in the afternoon. Often several students stayed after school with me to help grade papers, etc. When going over to Church they fought over who was going to push me. This necessitated taking turns.

After teaching several more years at Catholic schools, including one in Champaign, IL, I found myself teaching and living in New Jersey where my husband had taken a job. With certification in Elementary Education I decided I wanted to procure a teaching position in a public school to increase my earning capacity. I sent out many resumes and applications and received a few interviews. This being the late 60’s there was no ADA for assistance from discrimination. The results of the interviews were negative with comments like, “You can’t do playground duty” or “You can’t actively teach games on the playground” and even, “You’d be an embarrassment to the

parents!” After several of these interviews, I was devastated, thinking I would never teach in the public school system.

Around that time I got a call from Parsippany-Troy Hills School District Assistant Superintendent, Joe Huber, asking to come observe me where I was teaching at St. Joseph School in West Orange, New Jersey. After his hour visit, he offered me a contract for the coming school year. This contract doubled my salary. Upon being hired at Troy Hills Elementary School to teach 6th grade I was told I would be required to teach PE four days a week as the PE teacher was only available to our school one day per week. At first I didn’t know how I would do this but I figured I’d find a way. The kids were old enough that they could learn through verbal instruction so we played a lot of different “ball” games.

The second year at Troy Hills while teaching 3rd grade (my favorite) we had a fire drill in which the Parsippany Fire Department came for inspection. During fire drills two of my boys always helped me out the doors and down the small ramp that the school had installed for accessibility. After the “all clear” we returned to the classroom where the Fire Chief applauded my two helpers. Their

buttons almost popped off their shirts, they were so proud. Several years before while living in Skokie, IL, I was turned down for a teaching position with their district because I would be a “fire hazard” in the classroom. During my six and a half years of teaching elementary school I never had a problem due to my being in a wheelchair. Once the students understood why I used a wheelchair and were given the opportunity to ask questions they accepted me as their “teacher”.

After obtaining a Master’s Degree in Special Education in 1983 I obtained a full time teacher position with Special School District of St. Louis County.

Two years ago I retired from nineteen memorable years of teaching. During those years I taught mainly at a vocational/technical high school working with students who are learning disabled, behavior disordered or mildly mentally retarded.

Before I contracted Polio at age 11, I had always thought I would be a dancer. I never thought I would find my life work as a teacher, but after dancing around several pre ADA obstacles I feel I’ve been blessed to have touched so many lives. I know they have touched mine.

-Rosemarie Benecke



Rosemarie Benecke and husband Ernest

VISITING FACULTY PROFILE: Hisaichi Ohnabe, Ph.D.

Dr. Hisaichi Ohnabe joined HERL in April as our third "visiting professor". Dr. Ohnabe recently retired from Niigata University in Japan, where he was a professor in many departments, ranging from the Department of Biocybernetics to the Graduate School of Science and Technology. He will spend the next year at HERL, where he will continue to develop the book he is writing with Dr. Rory Cooper, Dr. Douglas A. Hobson, and the faculty in the Dept. of Rehabilitation Science and Technology, School of Health and Rehabilitation Sciences and VA Pittsburgh Health Care System, entitled, *An Introduction to Rehabilitation Engineering*. The book, scheduled for publication in April 2005, will also be used in Japan to educate undergraduate and graduate students in Rehabilitation Engineering. Dr. Ohnabe's concentration at HERL in Rehabilitation Engineering stems directly from the need for more advanced technology in Japan. With the booming aging population in all industrialized countries, Dr. Ohnabe has spent a significant amount of time studying wheelchairs in aging societies.



Visiting Professor Hisaichi Ohnabe (L) with HERL faculty Drs. Diane Collins, Rory Cooper, and Dan Ding

During his stay, Dr. Ohnabe has encouraged HERL students to submit research papers to the 2004 19th Japanese Conference of Advancement on Assistive and Rehabilitation Technology (JCAART)/Rehabilitation Engineering Society of Japan (RESJA) conference, which will take place in Sapporo, Japan in August. (More info on RESJA: <http://www.resja.gr.jp/English.htm>) In addition, Dr. Ohnabe plans on attending the Symposium of Welfare Engineering in September to introduce the research results and the VA/HERL system to Japan.

Though he had the chance to study in several other programs, Dr. Ohnabe chose to come to HERL after coming into contact with Dr. Cooper while translating his book, *Wheelchair Selection and Configuration* into Japanese. Dr. Ohnabe felt that working at HERL would allow him to "expand his experience" in the realm of Health and Rehabilitation Sciences. When asked what he enjoys most about working at HERL, Dr. Ohnabe is quick to reply, "the atmosphere!" He enjoys the cooperative ambiance of the lab, using his office of as an example of where a mechanical engineer and a rehabilitation scientist can communicate daily to problem solve and develop new ideas.

-Samantha Goldstein

RECENTLY FUNDED GRANTS



HERL investigators Dr. Alicia Koontz and Dr. Donald Spaeth were granted VA Research Career Development Awards this summer.

"Isometric Controls with Personalized Algorithms for Driving Electric Powered Wheelchairs." Principle Investigator: Donald Spaeth, Ph.D., Co-Principle Investigator: Rory Cooper, Ph.D. U.S. Department of Veterans Affairs, April 1, 2004-March 31, 2007, \$323,100.

"The Center for Excellence for Wheelchairs and Associated Rehabilitation Engineering (WARE)." Principle Investigator: Rory Cooper, Ph.D., Co Principle Investigator: Michael Boninger, M.D. U.S. Department of Veterans Affairs, July 1, 2004-June 30, 2009, \$4,285,000.

"Investigation of Transfer Biomechanics (VA Research Career Development Award)." Principle Investigator: Alicia Koontz, Ph.D. U.S. Department of Veterans Affairs, July 1, 2004-June 30, 2007, \$225,000.

"Enhanced Controls for Assistive Technology (VA Research Career Development Award)." Principle Investigator: Donald Spaeth, Ph.D. U.S. Department of Veterans Affairs, 3 year funding, \$225,000.

Human Engineering Research Laboratories

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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
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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 **Rosi** or **Annamarie** for more information.

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