



HERL Hosts PVA Leaders

HERL was honored to host the leadership of the Paralyzed Veterans of America at our laboratory space on November 7-8, 2019.

Top leadership attending included PVA President David Zurfluh (pictured right), PVA Deputy Executive Director Shaun Castle, PVA Chief Fiscal Officer Cheryl Topping, and PVA Director of Research and Education Cheryl Vines.

PVA and PVA Research Foundation Board Members attending included Peter Axelson, Ken Ness, Eduardo Tinoco, Cheryl Lewis, Hodge Wood, as well as Lindsay Perlman, Program Manager, and Jon Gensel, PhD, Technical Advisor to the Board.

Members of the PVA Executive Committee in attendance were Charles Brown, Hack Albertson, Robert Thomas, and Marcus Murray.

Other attendees within PVA leadership included Carl Blake, Executive Director; Heather Ansley, AED Government Relations; Peter Gaytan, AED, Veterans Benefits; Amanda Milisits, Director of Medical Services; and Leonard Selfon, General Counsel.

In honor of HERL's 25th anniversary, PVA and HERL held a celebration the night of Nov. 7, featuring speakers from HERL, PVA, the University of Pittsburgh, VA Pittsburgh Healthcare System, and Pittsburgh Mayor Bill Peduto. *(See p. 7 for photos.)*

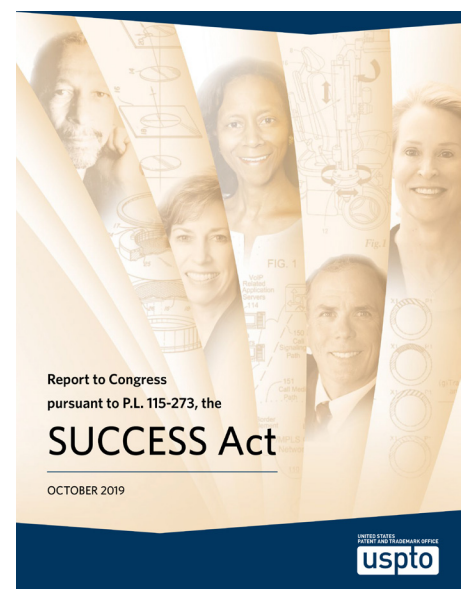


Two invention-related covers for HERL's chief inventor



HERL Director Dr. Rory Cooper was recently featured on the covers of two separate publications about inventors and their inventions. Likewise, both publications included profiles of Dr. Cooper. However, each publication's audiences and functions are quite different, which shows the true breadth of Dr. Cooper's experience as an inventor.

Inventors Digest is a popular magazine meant for anyone interested in inventions, innovation, or new technology. Its function is to inform and
(cont. on p. 4)



Current Research Abstracts

Hogaboom N, Fyffe DC, Botticello AL, Worobey LA, Boninger ML, *A cross-sectional study to investigate the effects of perceived discrimination in the healthcare setting on pain and depressive symptoms in wheelchair users with spinal cord injury, Archives of Physical Medicine and Rehabilitation*, pp. 2233-2243, Vol. 100, No. 12, December 2019. <https://doi.org/10.1016/j.apmr.2019.06.016>

Objectives: In a sample of wheelchair users with spinal cord injury (SCI), the objectives were to investigate which participant characteristics are associated with greater perceived discrimination in the health care setting, and how such discrimination relates to health outcomes of pain and depressive symptoms.

Design: Survey, cross-sectional.

Setting: Spinal Cord Injury Model Systems (SCIMS) Center.

Participants: Full-time wheelchair users with SCI from 9 SCIMS centers (N=410), with data collected between 2011 and 2016.

Main Outcomes: A 7-item questionnaire inquiring about perceived discrimination by hospital staff, self-reported pain severity over the past month using a 0-10 Numeric Rating Scale, and depressive symptoms using the 2-question Patient Health Questionnaire screener.

Results: Participants who were black or from the lowest income group were more likely to report experiencing more discrimination than those who were white or from the highest income group, respectively (incidence rate ratio=2.2-2.6, $P<.01$). Those who reported more perceived discrimination had greater risk of severe pain compared to no pain (relative risk [RR]=1.11; 95% confidence interval [95% CI], 1.01-1.23; $P<.05$), mild depressive symptoms (RR=1.09; 95% CI, 1.02-1.17; $P<.05$), and severe depressive symptoms (RR=1.12; 95% CI, 1.04-1.21; $P<.05$) compared to no symptoms.

Conclusions: Wheelchair users with SCI who were from more disadvantaged groups (black, lower income levels) reported experiencing more discrimination in their health care setting. Furthermore, those who reported more discrimination were more likely to report worse mental and physical health outcomes. Attempts to reduce discrimination in health care settings may lead to better outcomes for people with SCI. These observations were correlational and not causal; a prospective analysis is necessary to prove causation. Future investigations should further explore the effect of discrimination on the many facets of living with SCI.

SUMMARY: Wheelchair users with SCI who were from more disadvantaged groups reported experiencing more discrimination.

Candiotti JL, Kamaraj DC, Daveler BJ, Chung C, Cooper RM, Grindle GG, Cooper RA, *A heuristic approach to overcome architectural barriers using a robotic wheelchair, IEEE Transactions on Neural Systems and Rehabilitation Engineering*, pp. 1846-1854, Vol. 27, No. 9, September 2019. <https://doi.org/10.1109/TNSRE.2019.2934387>

The Mobility Enhancement roBotic (MEBot) wheelchair was developed to improve the safety and accessibility of wheelchair users when facing architectural barriers. MEBot uses pneumatic actuators attached to its frame and six wheels to provide curb ascending/descending for heights up to 20.3 cm. To improve MEBot's application, this study used a heuristic approach with power wheelchair users to evaluate and improve the MEBot application at different curb heights. Wheelchair users were trained on MEBot's features to operate its curb ascending/descending application. Three trials were carried out with wheelchair users ascending and descending three curbs of different height. Quantitative variables were analyzed to improve the sequential steps to ascend/descend curbs. Additionally, the application's effectiveness and efficiency were measured by the number of completed tasks, change in seat angle, and task completion time. Results showed that participants completed each trial and applied alternative strategies to traverse different curb heights. Furthermore, results suggested the combination and/or re-arrangement of steps to reduce task completion time. MEBot demonstrated its effectiveness to ascend/descend different curb heights with a heterogeneous participant sample. Future work will incorporate participant's most efficient strategies to improve the ascending/descending process and the efficiency of the MEBot application.

SUMMARY: MEBot demonstrated its effectiveness to ascend/descend different curb heights.

Cooper RA, Cooper RM, *Rehabilitation Engineering: A Perspective on the Past 40-Years and Thoughts for the Future, Medical Engineering and Physics*, pp. 3-12, Vol. 72, October 2019. <https://doi.org/10.1016/j.medengphy.2019.08.011>

Over the past four decades, there have been breakthroughs in communication, mobility and tools to manipulate objects. Probably the most important transformation has been the growing inclusion of people with disabilities into the prioritization, conceptualization, and design of new assistive devices. Advances in technology, demands from people with disabilities, and changes in cultural perceptions have made noteworthy changes in the technologies that have improved lives, and affected transformations that benefit both individuals and society. People with disabilities lives have been improved but there is still much to be done. Unfortunately, people with disabilities in low income countries have lagged people in higher income countries in benefitting from technical and social changes. Assistive devices have benefitted from the availability of powerful, portable computing power, from small low-power sensors, from new materials, from rapid prototyping and flexible manufacturing. There are exciting emerging technologies that show promise for future advances.

SUMMARY: A review of Rehabilitation Engineering over the past 40 years.

Key 2019 Publications

Duvall J, Karg P, Brienza D, Pearlman J.
Detection and classification methodology for movements in the bed that supports continuous pressure injury risk assessment and repositioning compliance.

Journal of Tissue Viability, pp. 7-13, Vol. 28, No. 1, February 2019.

Determined the E-scale system could identify and monitor movements in bed relevant for pressure injury risk.

<https://doi.org/10.1016/j.jtv.2018.12.001>

Candiotti JL, Kamaraj DC, Daveler B, Chung C, Grindle GG, Cooper RM, Cooper RA.

Usability Evaluation of a novel robotic wheelchair for indoor and outdoor environments.

Archives of Physical Medicine and Rehabilitation, pp. 627-637, Vol. 100, No. 4, April 2019.

Evaluated the efficacy of the MEBot power wheelchair in driving indoors and outdoors and determined it was fully usable in all terrains.

<https://doi.org/10.1016/j.apmr.2018.07.432>

Dicianno BE, Joseph J, Eckstein S, Zigler CK, Quinby E, Schmeler M, Schein R, Pearlman J, Cooper RA.

The Future of the Provision Process for Mobility Assistive Technology: A Survey of Providers.

Disability and Rehabilitation: Assistive Technology, pp. 338-345, Vol. 14, No. 4, 2019.

Survey of a large number of individuals who participate in the process of wheelchair provision to identify themes of wheelchair design and continuing education priorities.

<https://doi.org/10.1080/17483107.2018.1448470>

Marino DJ, Rivera V, Joseph J, Williams R, Jeannis H, Goldberg M, Grindle GG, Kimmel J, Cooper RA.

Accessible Machining for People who use Wheelchairs.

WORK: A Journal of Prevention, Assessment, and Rehabilitation, pp. 361-370, Vol. 62, No. 2, 2019.

Identified and evaluated possible accommodations for people with disabilities in a machine shop environment.

<https://doi.org/10.3233/WOR-192870>

Greenhalgh M, Landis JM, Brown J, Kulich H, Bass S, Alqahtani S, Deepak N, Crytzer TM, Grindle G, Koontz AM, Cooper RA.

Assessment of Usability and Task Load Demand Using a Robotic Assisted Transfer Device Compared to a Hoyer Advance for Dependent Wheelchair Transfers.

American Journal of Physical Medicine and Rehabilitation, pp. 729-734, Vol. 98, No. 8, August 2019.

Compared a novel robot-assisted transfer device to a standard Hoyer lift; participants favored the novel device to the standard.

<https://doi.org/10.1097/PHM.0000000000001176>

Jeannis H, Goldberg M, Seelman K, Schmeler M, Cooper RA.

Participation in science and engineering laboratories for students with physical disabilities: survey development and psychometrics.

Disability and Rehabilitation: Assistive Technology, pp. 692-709, Vol. 14, No. 7, 2019.

Concluded the FPSEA survey is a reliable instrument for reporting barriers and facilitators for science and engineering laboratories.

<https://doi.org/10.1080/17483107.2018.1499049>

Candiotti JL, Kamaraj DC, Daveler BJ, Chung C, Cooper RM, Grindle GG, Cooper RA.

A heuristic approach to overcome architectural barriers using a robotic wheelchair.

IEEE Transactions on Neural Systems and Rehabilitation Engineering, pp. 1846-1854, Vol. 27, No. 9, September 2019.

Subjects tested MEBot power wheelchair ascending and descending different curb heights and demonstrated effectiveness of MEBot curb climbing application.

<https://doi.org/10.1109/TNSRE.2019.2934387>

2019 HERL Employee of the Year: Ben Gebrosky

Ben Gebrosky is HERL's Testing Engineer. He's unfailingly reliable and is great to work with. Congratulations, Ben - it's an honor well deserved.



Covers for HERL's Chief Inventor (cont.)

inspire, and it can be found on magazine racks around the country. Dr. Cooper's cover story is in the September 2019 issue, which can be downloaded or read online at <https://www.inventorsdigest.com/>. Click on the "Issues" tab, and click on Dr. Cooper's issue - September 2019.

The second publication, released October 31, 2019, is an official report transmitted to the U.S. Congress by the United States Patent and Trademark Office (USPTO), as directed by the Study of Underrepresented Classes Chasing Engineering and Science Success (SUCCESS) Act of 2018. The SUCCESS Act directed the Under Secretary of Commerce for Intellectual Property and Director of the USPTO, in consultation with the administrator of the Small Business Administration, to prepare a report that:

- Identifies publicly available data on the number

of patents annually applied for and obtained by women, minorities, and Veterans

- Identifies publicly available data on the benefits of increasing the number of patents applied for and obtained by women, minorities, and Veterans and the small businesses owned by them
- Provides legislative recommendations for how to promote the participation of women, minorities, and Veterans in entrepreneurship activities and increase the number of women, minorities, and Veterans who apply for and obtain patents.

Of course, it is a very high honor for Dr. Cooper to be profiled and featured on the cover of such an important government document. Learn more about the SUCCESS Act and download the report at <https://www.uspto.gov/successact>.

HERL News & Notes

On September 17, 2019, HERL Director Dr. Rory Cooper was appointed to the Commonwealth of Pennsylvania Department of Health's Spinal Cord Research Advisory Committee by PA Secretary of Health Rachel L. Levine, PhD.

Dr. Alicia Koontz was elected to the American Institute for Medical and Biological Engineering (AIMBE) College of Fellows.

HERL researcher Josh Marino was profiled on the VAntage blog series "Veterans Serving Veterans: VA Researchers Who Served" on August 13. Read his interview at <https://www.blogs.va.gov/VAntage/64639/veterans-serving-veterans-va-researchers-served-3/> and check out the whole "VA Researchers Who Served" series at https://www.research.va.gov/researchers_whoserved/.

HERL Director Dr. Rory Cooper was interviewed for New Mobility Magazine's cover article about the new iBOT wheelchair: <http://www.newmobility.com/2019/07/the-ibot-is-back/>

HERL Director Dr. Rory Cooper had an article on "Big Ideas in Technology" in New Mobility's September 2019 "Big Ideas" issue (http://newmobility.unitedspinal.org/NM_Sep_19/mobile/index.html?id=19).

The open-source publisher PLOS announced that HERL Associate Director for Research Dr. Alicia M. Koontz is now Editor of PLOS's Veterans Disability and Rehabilitation Channel (<https://channels.plos.org/vdrrc>).

HERL researcher Brandon Daveler appeared on WPXI's "Our Region's Business" TV show on Sunday, September 15, to discuss the PneuMobility project, the PneuChair air-powered wheel-

chair, and Daveler's new startup business Atimize.

Dr. Cooper attended the 2019 Parapan American Games in Lima, Peru from August 23 - September 1 as an official member of the International Paralympic Committee Science and Research Team.

Dr. Cooper was the subject of the October 2019 featured story on the U.S. Patent and Trademark Office's website; the story is available at <https://www.uspto.gov/learning-and-resources/journeys-innovation/audio-stories/engineering-better-life>. He was also the subject of a Pittsburgh Tribune-Review story on the USPTO feature; story available at <https://triblive.com/local/pittsburgh-allegheeny/pitt-researchers-work-featured-by-u-s-patent-trademark-office/>.

October was National Disability Employment Awareness Month. As part of that recognition, HERL hosted 20 students from the Upper St. Clair and West Jefferson School Districts at our labs in Bakery Square. In addition to learning about HERL, students heard presentations from HERL post-docs and staff, toured our facilities, and had demos of various research projects. Their visit concluded with a lunch where the students met with HERL faculty members to learn more about educational and career opportunities associated with rehabilitation engineering and assistive technology.

Former HERL trainee David Gifford was awarded the 2019 Comeback Award by the Western Pennsylvania Trial Lawyers Association.

Mathworks, creators of MATLAB, posted a news story on HERL and our work at <https://www.mathworks.com/company/mathworks-stories/HERL.html>.

Find HERL Jobs Online!

Now it's easy to find open positions at HERL!

Just go to the HERL website and click on the "Jobs" tag at the top of every page. Clicking this link will take you to a page with all current open job descriptions, along with links to the sites where you can apply.

It's never been easier to apply for jobs - check our site often, and feel free to share this information!



State of the Science Symposium, 25 October 2019 Metabolic Pathways and Therapeutics to Promote Resilience, Rehabilitation and Delayed Aging

The State of the Science Symposium entitled “Metabolic Pathways and Therapeutics to Promote Resilience, Rehabilitation and Delayed Aging” met in Bethesda, Maryland at the Uniformed Services University of the Health Sciences. The symposium was presented by the Center for Rehabilitation Science Research, the Department of Physical Medicine and Rehabilitation at The Uniformed Services University for the Health Sciences; the Department of Rehabilitation, Walter Reed National Military Medical Center; the Human Engineering Research Laboratories (a VA RR&D Center); and the University of Pittsburgh School of Health and Rehabilitation Sciences, Department of Rehabilitation Science and Technology. Course Directors were Rory A. Cooper, PhD; COL (Ret) Paul F. Pasquina, MD; and William Kennedy Smith, MD.



Metformin - Jamie Nicole Justice, PhD, Wake Forest School of Medicine

Glycolytic Inhibition - Donald Ingram, PhD, Pennington Biomedical Research Center

Acarbose - Daniel Larry Smith, PhD, University of Alabama at Birmingham

Sirtuin Activators and NAD Precursors - Joseph Baur, PhD, University of Pennsylvania

Nicotinamide Mononucleotide and eNAMPT - Shin-ichiro Imai, MD, PhD, Washington University School of Medicine

Rapamycin - Arlan Richardson, PhD, University of Oklahoma Health Science Center

Ketone Bodies - John Newman, MD, PhD, University of California San Francisco

Senolytic - Yi Zhu, PhD, Mayo Clinic Rochester

PARP Activators - Sajish Mathew PhD, University of South Carolina College of Pharmacy

Mitochondrial Derived Peptides - Su-Jeong Kim, University of Southern California

Closing Remarks/Adjournment - William K. Smith, MD, Uniformed University of the Health Sciences

Videos, presentations, and photos from archived symposia are available on the HERL website at <https://herl.pitt.edu/education-outreach/symposia>.

Due to privacy restrictions on many of these presentations, this symposium is not available online.

Presentations at the Symposium:

Opening Remarks and Welcome - Dr. Paul Pasquina, Uniformed University of the Health Sciences

The Importance of Nutrition and Metabolic Research to Military Readiness and Resilience - Patricia Deuster, PhD, MPH, FACSM, Uniformed Services University of the Health Sciences



Overview of Calorie Restriction and Aging as a Field of Research - Yih-Woei Fridell, PhD, National Institute on Aging, NIH

Time-Restricted Feeding - Rafael de Cabo, PhD, National Institute on Aging

Low Calorie Diet for Chemotherapy Augmentation - Sebastian Brandhorst, PhD, University of Southern California



Recent HERL Grants Awarded

- Dr. Jorge Candiotti - VA CCDF: Implementation and evaluation of a self-leveling power wheelchair for tip prevention on uneven terrains
- Dr. Lynn Worobey - NIH K23: Mentored Patient-Oriented Research Career Development Award
- Dr. Brad Dicianno - PA Dept of Health: Addressing Social Determinants of Health for Persons Living with Spina Bifida
- Dr. Rory Cooper - Craig Neilsen: Research and Design Experience for Undergraduates with SCI
- Dr. Dan Ding - NIDILRR: Autonomy, Safety, and Social Integration via Smart Technologies
- Theresa Crytzer - Healthy Lifestyle Institute at the University of Pittsburgh
- Dr. Rory Cooper - VA out of cycle equipment request for 3D printer



Above: Pittsburgh Mayor Bill Peduto with HERL Medical Director Dr. Brad Dicianno.

Right: Demonstrations of HERL technology during PVA leadership tours. Top to bottom: Machine shop, Biolab, Robotics lab.

Below: HERL Director Dr. Rory Cooper with U.S. Secretary of Veterans Affairs Robert Wilkie.





Human Engineering Research Laboratories



VA Center for
Wheelchairs and Associated
Rehabilitation Engineering



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



University of Pittsburgh
NIDILRR Model Center on
Spinal Cord Injury



National Science Foundation
Advanced Technology
Education Center

Rory A. Cooper, PhD
Director

Brad Dicianno, MD
Medical Director

Michael L. Boninger, MD
Senior Associate Medical Director

Alicia Koontz, PhD, RET
Associate Director for Research

Daniel Kysela, MA
Assistant Director for Finance & Research Administration

Garrett Grindle, PhD
Assistant Director for Engineering

Stacy Eckstein, BS, MT (ASCP)
Assistant Director for Clinical & Regulatory Affairs

Randy Williams, BA, MBA
Assistant Director for Education & Outreach

Andrea Bagay, BS, CRA
*Assistant Director for VA Finance
& Research Administration*

Interested in helping out?

VOLUNTEER!

<https://www.herl.pitt.edu/volunteer>



DONATE!

<https://is.gd/herldonation>

Select "Human Engineering Research Laboratories" under "Choose Area(s) to Support"



And check out open jobs at <https://www.herl.pitt.edu/jobs>

Contact us!

To subscribe to the newsletter mailing list:

<https://herl.pitt.edu/subscribe>

6425 Penn Avenue, Suite 400

Pittsburgh, PA 15206-4022

Phone: 412-822-3700

Fax: 412-822-3699

Email: herl@shrs.pitt.edu

On the web at <https://herl.pitt.edu/>

Facebook: <https://www.facebook.com/herlpitt>

Join our LinkedIn group: <https://www.linkedin.com/groups/8227261/>

Editor: Michael Lain

The HERL Newsletter and all photos and text within are copyright
© 2020 Human Engineering Research Laboratories, except where noted.
All rights reserved. Not to be duplicated or reprinted without permission.