

Human Engineering Research Laboratories
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HERL QUARTERLY

■ VOLUME 23, NO. 3
JULY - SEPTEMBER 2024

CELEBRATING



30
YEARS



30 Years *of*

HERL celebrated its 30th anniversary on July 24, in various parts of the former Nabisco cookie factory building its fourth-floor labs and offices share with Google Pittsburgh on Penn Avenue in Bakery Square. With the agenda topic of “Disability and Leadership In ...”, the morning-into-afternoon event included a symposium featuring HERL alumni and others speaking on the open-ended theme and how their time at HERL influences their current work...



Innovation.

...The extensive panel of guests included Rob Rutenbar, Pitt’s senior vice chancellor for research, and keynote speaker Paul Pasquina. A retired U.S. Army colonel, Pasquina serves as professor and inaugural chair of the Department of Physical Medicine & Rehabilitation at the Uniformed Services University of the Health Sciences and chief of Walter Reed National Military Medical Center’s Department of Rehabilitation."

Excerpt from the July 26, 2024 issue of University Times.



An RE

This year's Research Experience (RE) program for graduate and undergraduate students was a resounding success! Twenty-eight engineering students from around the country, including eleven from the University of Pittsburgh, participated in this annual summer-long program at HERL aimed at providing scholars with valuable on-the-job work experience. From June to August, the students designed, prototyped, and manufactured technology for real-life use cases alongside HERL faculty and staff mentors, culminating in a symposium where they showcased their work and research.



Summer.

Josh Marino, the head of the program, commented on this year's experience:

"HERL's 2024 cohort of experiential researchers was the largest and most diverse group of students that we've had the pleasure of welcoming to our laboratories. Represented disciplines included bioengineering, mechanical engineering, computer science, and many other fields on the cutting edge of assistive technology device design and implementation. The end-of-term symposium and poster session coincided with the HERL 30th Anniversary Celebration, affording program participants the opportunity to connect with community partners, industry representatives, and leaders in fields such as community planning and medical device design. We expect great things from our students, and will continue to collaborate with them as their careers progress."



US012042444B2

(12) **United States Patent**
Cooper et al.

(16) Patent No.: **US 12,042,444 B2**
(45) Date of Patent: **Jul. 23, 2024**

(54) **PNEUMATIC POWERED MOBILITY CONTROL SYSTEMS**

(71) Applicants: **University of Pittsburgh - Of the Commonwealth System of Higher Education**, Pittsburgh, PA (US); **The United States Government as represented by the Department of Veterans Affairs**, Washington, DC (US)

(72) Inventors: **Rory Alan Cooper**, Gibbstown, PA (US); **Brandon Joseph Dwyer**, Dushar, PA (US); **Garrett G. Grubbs**, Pittsburgh, PA (US); **Benjamin Todd Gibbons**, Gibbstown, PA (US)

(73) Assignees: **University of Pittsburgh—Of the Commonwealth System of Higher Education**, Pittsburgh, PA (US); **The United States Government as represented by the Department of Veterans Affairs**, Washington, DC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 519 days.

(21) Appl. No.: **160966,223**

(22) PCT Filed: **Jun. 30, 2019**

(63) PCT No.: **PCT/US2019/015846**

§ 371 (c)(1),
(2) Date: **Jul. 30, 2020**

(87) PCT Pub. No.: **WO2019/152518**

PCT Pub. Date: **Aug. 8, 2019**

(65) **Prior Publication Data**

US 2021/0045045 A1, Feb. 18, 2021

Related U.S. Application Data

(66) Provisional application No. 62/624,162, filed on Jan. 31, 2018.

(51) **Int. Cl.**
A61G 5/04 (2013.01)
A61G 5/02 (2006.01)

(52) **U.S. CL.** (Continued)
CPC ——— **A61G 5/045** (2013.01), **A61G 5/023** (2013.01), **A61G 5/024** (2013.01), **A61G 5/001**, **A61G 5/008** (2013.01), (Continued)

(55) **Field of Classification Search**
CPC ——— **A61G 5/045**, **A61G 5/024**, **A61G 5/008**, **A61G 5/001**, **A61G 5/00**, (Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,370,857 A 2/1983 Miller
4,575,209 A 8/1983 Fisher
4,538,826 A * 9/1983 Lemarie **A61G 5/025**
280,244 (Continued)

FOREIGN PATENT DOCUMENTS

CN 201117453 Y 8/2009
CN 105123314 12/2015 (Continued)

OTHER PUBLICATIONS

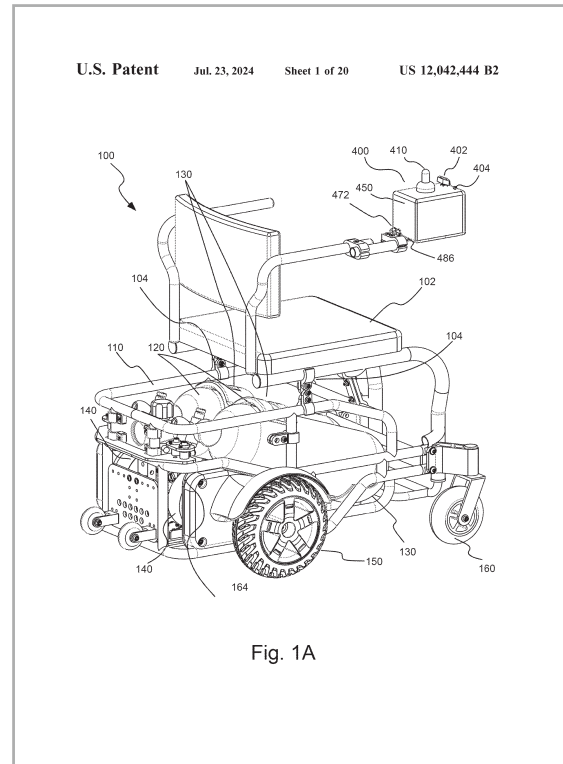
Pressure: Radial Piston Motor, Lufttechnik-Handlung 808, V10, 1984, 1-6. (Continued)

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Assistant Examiner — Harold Eric Pablik, III
(74) **Attorneys, Agent, or Firm** — **BAUTYNYT & ASSOCIATES, LLC**

(57) **ABSTRACT**

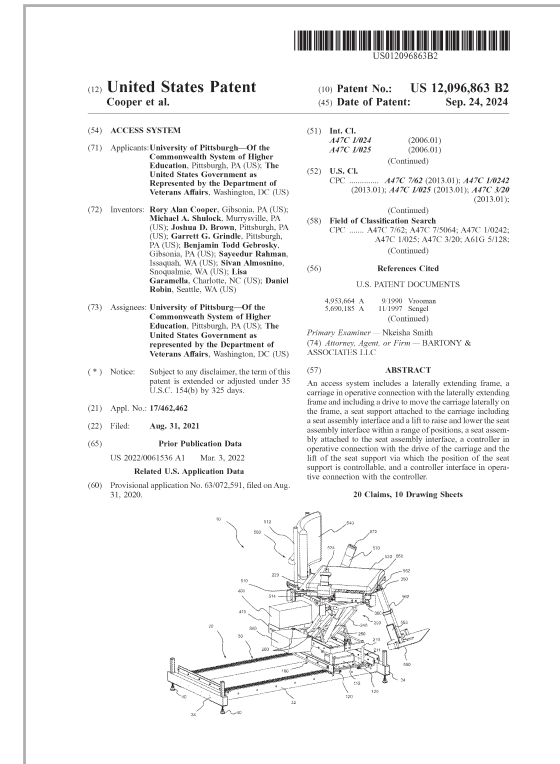
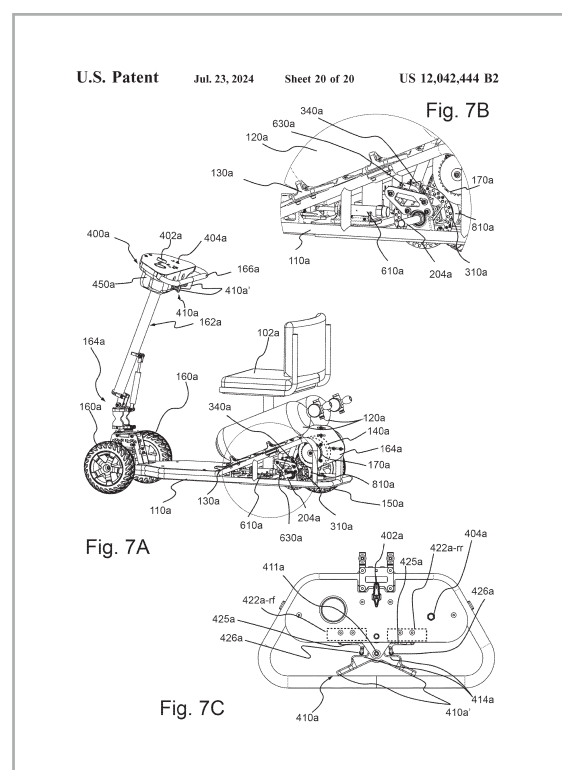
A personal mobility device includes a control system including a manually operated actuator, a first forward control valve having an inlet in fluid communication with a source of pressurized gas and an outlet in fluid communication with a first (Continued)

The diagram shows a side view of a person seated on a motorized personal mobility device. The device has a frame with a seat, handlebars, and a rear wheel assembly. Various components are labeled with letters and numbers: 'A' points to the seat area, 'B' to the handlebars, 'C' to the front wheel assembly, 'D' to the rear wheel assembly, 'E' to a control lever on the handlebar, 'F' to a footrest, 'G' to a rear fender, 'H' to a rear light, 'I' to a rear wheel, 'J' to a rear axle, 'K' to a rear hub, 'L' to a rear brake, 'M' to a rear suspension, 'N' to a rear frame member, 'O' to a rear wheel cover, 'P' to a rear wheel cap, 'Q' to a rear wheel nut, 'R' to a rear wheel bolt, 'S' to a rear wheel washer, 'T' to a rear wheel spacer, 'U' to a rear wheel lock, 'V' to a rear wheel cap screw, 'W' to a rear wheel cap nut, 'X' to a rear wheel cap bolt, 'Y' to a rear wheel cap washer, 'Z' to a rear wheel cap spacer, 'AA' to a rear wheel cap lock, 'AB' to a rear wheel cap cap screw, 'AC' to a rear wheel cap cap nut, 'AD' to a rear wheel cap cap bolt, 'AE' to a rear wheel cap cap washer, 'AF' to a rear wheel cap cap spacer, 'AG' to a rear wheel cap cap lock, 'AH' 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cap cap cap cap cap cap cap cap cap cap cap cap cap screw, 'CI'



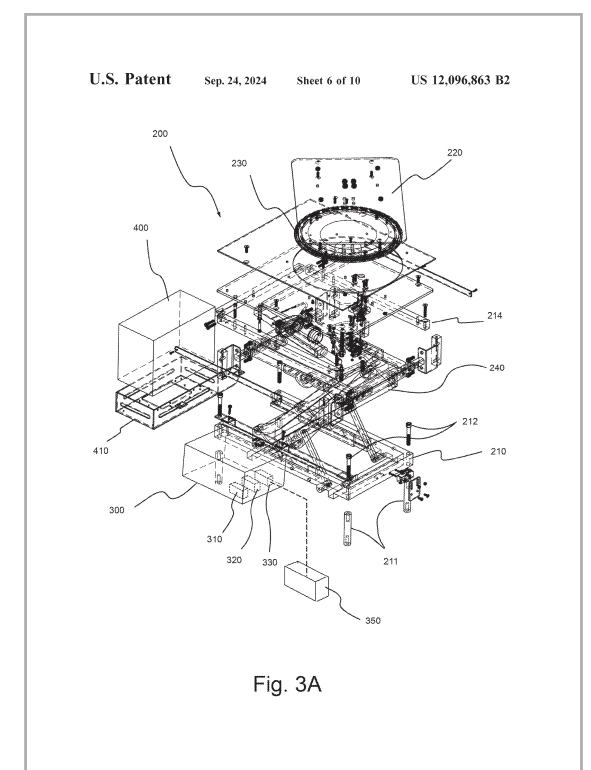
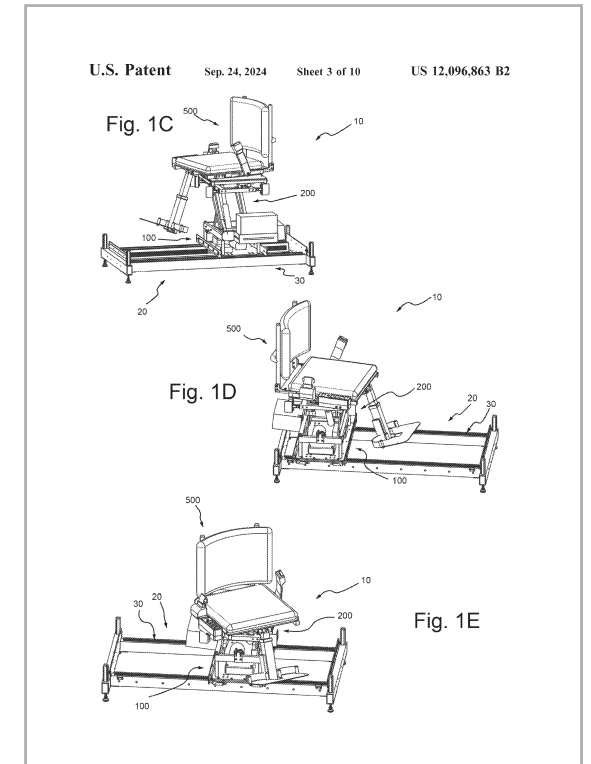
US Patent 12,042,444
July 23, 2024

A personal mobility device includes a control system including a manually operated actuator, a first forward control valve having an inlet in fluid connection with a source of pressurized gas and an outlet in fluid connection with a first forward port of at least a first pneumatic motor, and a first rearward control valve having an inlet in fluid connection with the source of pressurized gas and an outlet in fluid connection with a first rearward port of the first pneumatic motor. Movement of the manually operated actuator controls actuation of the first forward control valve and the first rearward control valve and thereby flow of gas from the source of pressurized gas to the first forward port and the first rearward port.



US Patent 12,042,444
September 24, 2024

An access system includes a laterally extending frame, a carriage in operative connection with the laterally extending frame and including a drive to move the carriage laterally on the frame, a seat support attached to the carriage including a seat assembly interface and a lift to raise and lower the seat assembly interface within a range of positions, a seat assembly attached to the seat assembly interface, a controller in operative connection with the drive of the carriage and the lift of the seat support via which the position of the seat support is controllable, and a controller interface in operative connection with the controller.



BUMPS in the ROAD

The hit documentary about HERL's mission to improve the mobility and function of people with disabilities through advanced engineering in clinical research and medical rehabilitation, *Bumps in the Road*, has been screened around the globe to great acclaim this year. Notable watch event locations have included Disney World in Florida, the National Academy of Inventors in Washington, D.C., the Pentagon, and Department of Defense locations across Germany. Upcoming screenings are planned to be held at Google and the National Inventors Hall of Fame. Directors Rachel Kittner and Alex Halpern have been hard at work promoting their film, including getting it accepted into a major New York film festival being held later this year!



By the Numbers

OUR WORK THIS YEAR:

- 9** prestigious personal and organization awards received.
- 16** manuscripts published in respected, peer-reviewed journals, **3** more accepted.
- 4** patents awarded by the USPTO.
- 20** lectures and visits from distinguished peers and organizations to our lab.
- 1** research web portal published - *RERC - Move It*.
- \$75M+** in grant proposals and funding submitted.
- 28** individual internships funded.

WE'VE PRESENTED LECTURES AND RESEARCH ACROSS...

- 2** continents
- 6** American states + the District of Columbia

Rumination of the Quarter

"Perhaps my **favorite thing** about HERL is being able to see the amount of **care** and **dedication** that is put into all our projects. The **passion** that everyone here shares makes all the collaboration we do extremely **enjoyable**."

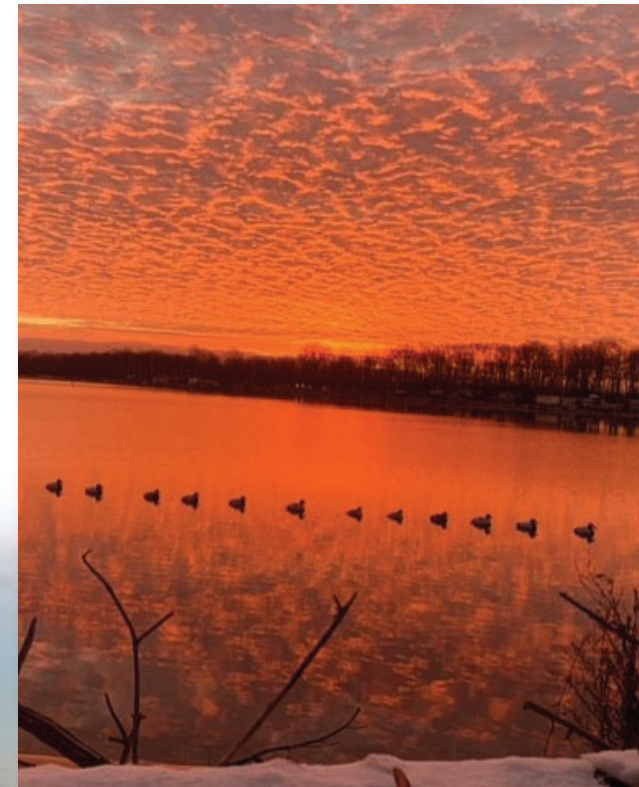
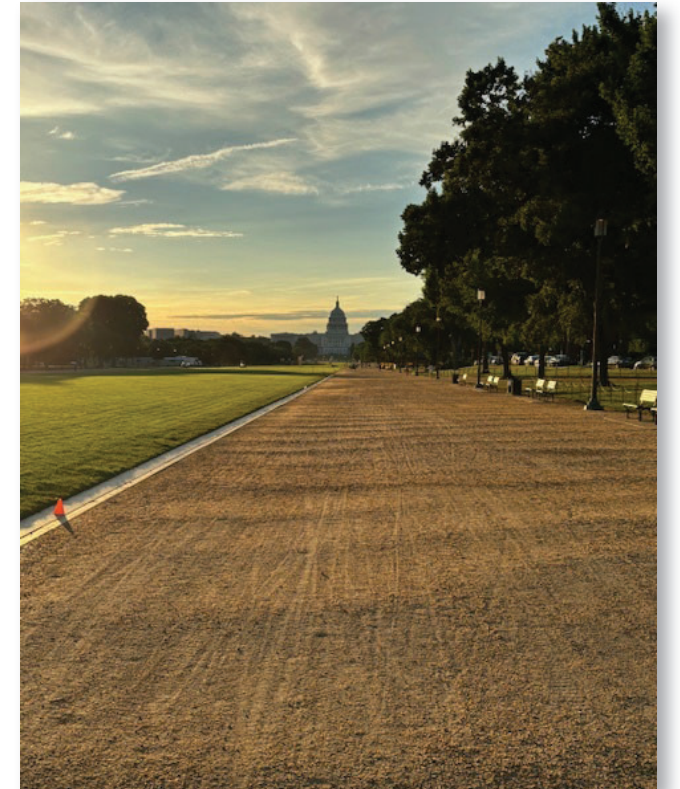
- Owen Flaugh
Student Researcher

HERL SPOT LIGHT

WHO IS ANDREW GRYSKEWICZ?

Andrew is the U.S. Department of Veterans Affairs Administrative Officer at HERL. His hobby of outdoor photography was born out of his love for nature, where he spends his time more than anywhere else. He adds:

"Almost all of my hobbies are nature-based. I hunt, fish, hike, kayak, run, and go camping any chance I get."



SOCIAL CLUB

AHLAD'S WEDDING

HERL Alumn & Graduate Researcher Ahlad Neti tied the knot with longtime girlfriend, Allison Michalowski, in August.





Accolades & Highlights

Celebrating our best moments and achievements from the past three months.

Director **Dr. Rory Cooper** became a member of the United States Olympian and Paralympian Association (USOPA) Executive Committee, prior to attending the 2024 Paris Olympic & Paralympic Games as part of the International Paralympic Committee Scientific Task Force. In July, he competed in the National Veterans Wheelchair Games where he won seven medals in various disciplines and spoke at the IEEE EMBS conference. In August, he gave a presentation in loudoun, VA as Civilian Aide to the Secretary of the Army. Dr. Cooper also flew to Germany in September, visting several federal facilities along the way including the Wiesbaden High School, the Landstuhl Regional Medical Center, and the German Society for Biomedical Engineering where he was the keynote speaker at their 58th annual conference.

Our staff and faculty presented their research at multiple events across the country this quarter. **Dr. Sivashankar Sivakanthan** gave lectures at a variety of institutions including the University of Cambridge and Harvard, and was the main speaker at this year's Disability Pride event held in Oakland. **Dr. Jorge Candiotti** spoke at the 32nd National Association of Veterans' Research and Education Foundations (NAVREF) Conference in Washington, D.C. **Dr. Alicia Koontz** gave a lecture at the National Science Foundation's (NSF) Principal Investigators annual meeting.

The Labs also hosted a variety of tours in the 3rd Quarter of 2024. These included visits from the **Institute of Electrical and Electronics Engineers (IEEE)**, **Benedex Robotics**, the **Ryan Shazier Fund**, **Warrior Canine Connection**, **SciAccess**, and **Ian Bodell**.

HERL organized and participated in multiple events throughout the past three months. These included our **30th anniversary** (see page 1), our annual **team retreat** and **summer barbecue**, the **PVA Summit**, the **VA Research Conference**, the **2024 Olympics & Paralympics**, the Pittsburgh **ReelAbilities** film festival, the **UPMC Wheelchair Wash**, the **3rd annual Disability Pride** event, the annual **Steelwheeler President's Challenge 5k** walk/run/ride, the Pittsburgh **Great Race**, the 32nd annual National Association of Veterans' Research and Education Foundations (**NAVREF**) conference, and the 58th annual German Society of Biomedical Engineers (**DGBMT**) conference.

PHOTO GALLERY (LEFT TO RIGHT, TOP TO BOTTOM):
Sivashankar Sivakanthan giving a speech at the 3rd annual Disability pride event.¹ Owen Flaugh, Brad Dicianno, and William Schoy at the 3rd annual Disability pride event.² Rory Cooper, Maddi Viteri, Johnathan Duvall, Shantanu Satpute, and Sangmi Park at pitt's Salute to Scrimage.³ Part of the HERL team at the annual summer cookout in Gibsonsia.⁴ HERL colleagues at the National Veterans Wheelchair Games in New Orleans.⁵ Scenes from the 2024 Paris Olympic & Paralympic Games.⁶⁻⁹ Siva and Will with a team from Warrior Canine Connection during a visit to the lab.¹⁰ Shots from HERL's 30th anniversary on July 23.¹¹⁻¹³

In the News



WPXI 

July

Pitt professor turns personal tragedy into life-changing inventions for others. [4th of July feature]



University Times 

July

HERL celebrates 30 years of helping those with disabilities, mobility challenges.



PittWire 

July

Rory Cooper was named to the U.S. Olympians and Paralympians Association Executive Committee.



Pittsburgh Post-Gazette 

August

Rostraver native and former Marine Corps captain off to compete in Paris Paralympics.



Our Region's Business 

September

Human Engineering Research Laboratories celebrates its 30th anniversary.



The Spinal ReCord 

September

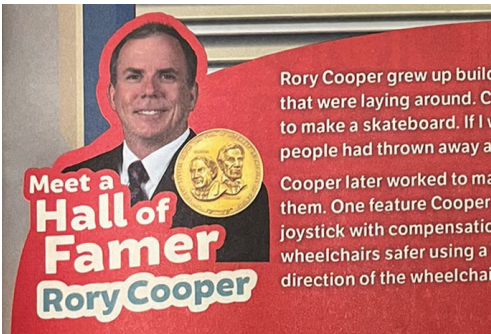
Challenges with mobility devices for female Veterans with spinal cord injuries. [Featured article]



UPMC Physician Journal 

September

Kirigami Engineering and Wheelchair Design - HERL.



National Inventors Hall of Fame 

September

Meet a Hall of Famer - Rory Cooper.

Recruiting Participants.

Sign up for our Registry



A research registry is a collection of individuals interested in learning about research studies that may be of interest to them. We are inviting you to join in the Human Engineering Research Laboratories (HERL) Assistive Technology Registry because you might be interested in participating in our current or future research studies.

Accessible Airline Transportation for Mobility Device Users: Survey

1

Principal Investigator: Rory Cooper, PhD



Purpose: To estimate pent-up demand among mobility device (MD) users to travel on commercial airlines and identify MD users' needs and pain points.

Study Requirements: Complete a survey about your demographics and airline travel experiences. The survey is expected to take no more than 20 minutes to complete.

Socially Connected Exercise System for Wheelchair Users

2

Principal Investigator: Alicia Koontz, PhD



Purpose: To identify the design needs and wants for an at-home, socially-connected fitness machine for use by persons with disabilities.

Study Requirements: Age between 18 and 70, use a wheelchair as their primary means of mobility, have only the use of their upper limbs for exercise, have adequate upper limb strength and function.

Bone Health in Individuals with Spinal Cord Injury

3

Principal Investigator: Adam Sterczala, PhD



Purpose: To learn about the connection between irisin (muscle-secreted bone mediating protein) and bone health in individuals with spinal cord injury (SCI). This study will also explore whether exercise can increase irisin concentrations in circulation.

Study Requirements: For more information or to check eligibility, call 412-822-3685 and mention the Irisin SCI Study.

Transportation of Emerging Adult Aged Mobility Device Users

4

Principal Investigator: Rory Cooper, PhD



Purpose: To understand barriers young adults face while using various modes of transportation. This research will play a critical role in the development of an innovative game researchers at HERL are developing.

Study Requirements: You will be asked to participate in an interview to provide your experiences and perspectives accessing and utilizing transportation services in your community.

Design Improvements and Evaluation of a Knee Stress-Relief Powered Exoskeleton for Veterans with Knee Osteoarthritis

5

Principal Investigator: Dan Ding, PhD



Purpose: To compare the study's performance to a passive knee brace in people with osteoarthritis (OA).

Study Requirements: Participants will answer questions and perform tasks during two visits.



Important save-the-dates for events HERL will be hosting or participating in.

- October 1-31:** National Disability Employment month
- October 13-16:** AUSA Conference
- October 19:** *Bumps in the Road* screening at the Army War College
- October 30:** Graduate Researcher Shantanu Satpute's PhD Defense
- November 2:** Hail to Heros Pitt Football Game
- November 12-13:** UPISC 2024 Workshop
- November 16:** SHRS Fall Open House
- December 17:** Pitt Fall Term ends



HERL Team Photo, Annual Retreat, August 23 2024.

Thank you for reading!
Stay tuned for our next newsletter in December.
Digital signup link on reverse.

Our Affiliations



HERL QUARTERLY

VOLUME 23, NO. 3
JULY - SEPTEMBER 2024



Scan this QR Code to see
all our **relevant links**,
including our **website** and
social media accounts!



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