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LABS EARN ^{up to} \$41.5M

ARPA-H AWARD FOR AI
BREAKTHROUGHS

VOLUME 24, NO. 4

OCTOBER - DECEMBER 2025

VA



U.S. Department
of Veterans Affairs



University of
Pittsburgh

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HERL AWARD *in Focus*

University of Pittsburgh to Lead Team on Up to \$41.5M Project to Create Robotic Wheelchair

Pittsburgh, PA, Nov. 4, 2025—Researchers at the Human Engineering Research Laboratories (HERL), an institute under the University of Pittsburgh's Schools of Health Sciences and part of the U.S. Department of Veterans Affairs, were awarded up to \$41.5 million from the Advanced Research Projects Agency for Health (ARPA-H) to develop the Robotic Assisted Mobility and Manipulation Platform (RAMMP) system. HERL will lead a team using next-generation robotics and new assistive technology to reimagine a

Mobility Manipulation Simulation (RAMMS) environment, a virtual platform that enables precise, safe and scalable testing and development within realistic simulated settings.

“Most powered wheelchairs aren’t designed to overcome many of the common challenges in the real world—and changing the environment to accommodate them is nearly impossible,” said Cooper. “We need smarter technology that prevents tipping and falling, improves mobility and adds more function such as coordinated mobility and robotic arm manipulation of objects so people with disabilities can fully participate in everyday life.” The RAMMP system will advance the design of powered mobility and manipulation devices by improving their function, obstacle detection and negotiation and seamless integration with robotic arms for more effective object interaction. Its real-time 360°

We are redesigning everything from the ground up. In terms of the seating system, the base, its robotic arm, the control system, the mechanical design, the operating system —everything will be new.

wheelchair and assistive robotic arm that will improve the independence, safety and quality of life for people with disabilities, including veterans.

The project’s coprincipal investigators are Rory Cooper, director of HERL and Distinguished Professor of Rehabilitation Engineering at the University of Pittsburgh, and Jorge Candiotti, associate professor of physical medicine and Rehabilitation at the University of Pittsburgh, and research biomedical engineer, within HERL and the U.S. Department of Veterans Affairs.

RAMMP will integrate advanced robotics, artificial intelligence, a novel operating system, and digital twin technology through the Robotic Assistive

environmental awareness and adaptive control features will allow users to navigate complex environments with enhanced capabilities, confidence and safety. “We are redesigning everything from the ground up,” Cooper said. “In terms of the seating system, the base, its robotic arm, the control system, the mechanical design, the operating system —everything will be new.”

HERL received this landmark award—the first

read all about it



from ARPA-H to Pitt as its lead—in recognition of its pioneering work in advanced mobility technology. HERL previously developed the Mobility Enhancement Robotic Wheelchair (MEBot), a robotic wheelchair capable of autonomously climbing curbs and stairs and maintaining a stable, level seat using six independently controlled wheels and onboard sensors.

Each year, more than 100,000 wheelchair-related injuries are treated in U.S. emergency departments due to tips and falls. To directly address these safety issues, RAMMP will apply Participatory Action Design and Engineering (PADE)—a user-centered process that actively involves wheelchair users, clinicians, and advocacy groups in co-designing solutions that meet real-world needs.

RAMMP will also create a new workforce and manufacturing opportunities in Pittsburgh and across Pennsylvania, with the goal of producing advanced mobility systems domestically.

Joining Pitt in this national consortium are Kinova Robotics, LUCI Mobility, ATDev, Carnegie Mellon University, Cornell University, Northeastern University and Purdue University.

The five-year project, “RAMMP: Robotic Assistive Mobility and Manipulation Platform Providing Independence for People with Disabilities,” launched in September 2025.

We need smarter technology that prevents tipping and falling, improves mobility, and adds more function such as coordinated mobility and robotic arm manipulation of objects so people with disabilities can fully participate in everyday life.



The full RAMMP team and partners at the press conference held in Bakery Square.

Accolades & Events

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

Director, **DR. RORY COOPER**, spoke at the 2025 Conference on Disability in October, as well as at the NAE Annual Meeting with Associate Director for Stakeholder Engagement, **ROSEMARIE COOPER**. In November, he presented a lecture on Emerging Technologies and Practice in Rehab Engineering at Delaware State University. He competed in the Army 10-Miler while attending the AUSA Conference in October and was presented with a Lifetime Achievement award at the US Forces in Business Conference in December.

Medical Director, **DR. BRAD DICIANNO**, gave lectures at the Wound & Hyperbaric Centers of Central PA and the Rehabilitation and Neural Engineering Laboratory in October. In November, he spoke at the 2025 AMIA Annual Symposium. He won

University Student Poster Symposium.

Machinist **ROBERT POWELL** received a VA ICARE award for his efforts in coordinating and providing aid to a colleague in need. This event was highlighted in our previous newsletter.

A number of our colleagues gave presentations at a variety of events and conferences around the country this quarter: **DRS. JORGE CANDIOTTI, JASON RAAD**, and **SANGMI PARK** presented their findings on educational gaming at the ACRM Expo in October; Assistant Director for Data Science, **DR. GINA MCKERNAN**, presented her findings on Machine Learning Algorithms at the same conference; Sangmi Park also spoke at the Society for the Study of Occupation:USA on the relationship between people with limited mobility and air travel avoidance;

OUR PROGRESS THIS YEAR

- 13 prestigious science, engineering, and athletics awards received.
- 14 manuscripts published in respected, peer-reviewed journals.
- 2 patents awarded by the USPTO and EPO.
- 27 lectures and visits from distinguished peers and organizations to our lab.
- 8 scholarships for Veterans funded.
- 42 media features of our research.

IN 2025, WE'VE PRESENTED LECTURES AND RESEARCH ACROSS

- 2 continents
- 4 countries
- 7 American states + the District of Columbia

a CLASS Community Hero award in October, and an AAP Outstanding Service Award in November. Students under his mentorship also won awards this quarter: **JEFFREY PETTIGROW** and **OWEN FLAUGH** received the Most Innovative Presentation award at the 18th Annual VAPHS Best Practices Conference; **DINA SILVESTRI** earned first place at the Duquesne

DR. JON DUVALL gave a lecture on 3D Printing Sport and Recreational Equipment for the RESNA 2025 Webinar Series. Assistant Director for Administration and Operations, **PETER HOEGEL**, and Administrative Officer, **ANDREW GRYSKEWICZ**, were named Staff Members of the Year! Peter was also honored at this year's *Hail to Heroes* Pitt Football Game, an event that HERL has planned and conducted since 2015.

BOCCIA

SLALOM

CORNHOLE

TABLE TENNIS

POKER RALLY

Save the date

Wheelchair
KEYSTONE GAMES

2.20.26 | **HERL** | PITTSBURGH, PA



REGISTRATION
OPENING
SOON





Article

Relationship of Seat Interface Pressure to Change in Center of Pressure During Manual Wheelchair Pressure Redistribution Maneuvers

S. Andra Sundaram ^{1,2,3,4,*}, Andrew Hoang ¹, Hannah Kuecker ¹, Sivashankar Sivakanthan ^{1,2,3}, Benjamin Gebrosky ³, Garrett G. Grindle ^{1,3}, Cheng-Shiu Chung ^{1,3}, Alicia Koontz ^{1,3,4,5}, Brad E. Dicianno ^{1,3,4,6}, Bradley S. Duerstock ⁶, Rosemarie Cooper ^{1,2} and Rory A. Cooper ^{1,3,4,6}

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Highlights

What are the main findings?

- As manual wheelchair users perform forward, leftward, and rightward leaning pressure redistribution maneuvers, seat interface pressure under the ischial tuberosities decreases roughly linearly as the magnitude of the seated center of the pressure vector increases.
- The slope of the relationship between seat interface pressure and center of pressure magnitude varies by individual.

What is the implication of the main finding?

- Change in seated center of pressure can be used as a surrogate for measuring reduction in seat interface pressure for wheelchair users executing pressure redistribution maneuvers.
- The most accurate results are obtained by determining the slope of the relationship for each individual.

Abstract

Manual wheelchair users (MWUs) are at high risk of developing pressure injuries (PIs) from prolonged static sitting. Clinical practice guidelines suggest periodic pressure redistribution (PR) to mitigate this risk. Prior work has demonstrated that a wheelchair seat pan instrumented with force sensors can track the change in center of pressure (CoP) as MWUs perform PR and use this measurement to infer the direction and degree of a PR. This study's objective was to quantify the relationship between change in CoP and reduction in seat interface pressure (SIP) under the ischial tuberosities for commonly practiced PR maneuvers. A theoretical model relating SIP and change in CoP for forward leaning PR



Academic Editor: Thais Vi

Kathy Cheng

Received: 22 July 2025

Revised: 13 October 2025

Accepted: 16 October 2025

Published: 22 October 2025

Citation: Sundaram, S.A.; Hoang, A.; Kuecker, H.; Sivakanthan, S.; Gebrosky, B.; Grindle, G.G.; Chung, C.-S.; Koontz, A.; Dicianno, B.E.; Duerstock, B.S.; et al. Relationship of Seat Interface Pressure to Change in Center of Pressure During Manual Wheelchair Pressure Redistribution Maneuvers. *Sensors* 2025, 25, 6507. <https://doi.org/10.3390/s25256507>

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Sensors 2025, 25, 6507

<https://doi.org/10.3390/s25256507>

Relationship of Seat Interface Pressure to change in Center of Pressure During Manual Wheelchair Pressure Redistribution Maneuvers

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Sundaram, S.A.; Hoang, A.; Kuecker, H.; Sivakanthan, S.; Gebrosky, B.; Grindle, G.G.; Chung, C.-S.; Koontz, A.; Dicianno, B.E.; Duerstock, B.S.; et al. Relationship of Seat Interface Pressure to Change in Center of Pressure During Manual Wheelchair Pressure Redistribution Maneuvers. Sensors 2025.



Measuring Health-Related Quality of Life During Pregnancy: a Prospective Cohort Study

This study advances the field of PRO measurement by describing and comparing three widely used measures (EQ-5D, HUI2, and HUI3) of Health-Related Quality of Life (HRQoL) used in pregnancy research with seven PROMIS domains less frequently used during and immediately after pregnancy.

Raad, JH; McCracken, P; Hanmer, J. Measuring health-related quality of life during pregnancy: A prospective cohort study, Advances in Patient-Reported Outcomes, 2025.



Measuring health-related quality of life during pregnancy: A prospective cohort study

Jason H. Raad¹, Polly McCracken, Janel Hanmer

¹University of Pittsburgh School of Medicine, Department of General Internal Medicine, United States

ABSTRACT

Objective: To assess changes in Health-Related Quality of Life (HRQoL) during and after pregnancy. **Methods:** Online administration of four widely used measures of HRQoL including a global subjective rating of overall HRQoL, the five-level version of the EuroQol (EQ-5D-5L), two versions of the Health Utility Index (HUI2 and HUI3), and seven Patient-Reported Outcomes Measurement Information System (PROMIS) domains. **Results:** Global subjective rating of HRQoL did not differ significantly between months 5 and 9, or months 5 to post-partum. Similarly, the HUI2 and HUI3 also did not demonstrate significant changes from months five to nine, but did demonstrate changes from months five to post-partum. In contrast, the EQ-5D-5L demonstrated differences during pregnancy (months five to nine) as well as before and after pregnancy. Five of the seven PROMIS domains changed; importantly, Anxiety and Depression did not demonstrate significant change during or after pregnancy. **Conclusion:** Understanding how measures of HRQoL function during pregnancy is critical for selecting appropriate measures. **Impact:** Assessing HRQoL during pregnancy may help providers identify patients at risk, however, measures of HRQoL function differently.

This study advances the field of PRO measurement by describing and comparing three widely used measures (EQ-5D, HUI2, and HUI3) of Health-Related Quality of Life (HRQoL) used in pregnancy research with seven PROMIS domains less frequently used during and immediately after pregnancy.

Significant changes in health-related quality of life (HRQoL) during pregnancy have been observed (1) using a variety of measures, including the EQ-5D and Health Utility Index (HUI). However, HRQoL during pregnancy has not been systematically assessed using the newer Patient-Reported Outcomes Measurement Information System (PROMIS). We assessed changes in HRQoL starting in the fifth month of pregnancy and one month after delivery (postpartum) to evaluate changes in HRQoL due to physiological and psychological changes that may occur during pregnancy and immediately after delivery. This brief report describes changes in HRQoL during pregnancy measured by EQ-5D-5L, HUI2, HUI3, and PROMIS measures.

The University of Pittsburgh's Institutional Review Board reviewed and approved this study (Study Number: 20220013). All participants were recruited through a community research portal maintained by the University of Pittsburgh, and all participants provided their informed consent. Inclusion criteria were 18 years or older; were pregnant at the time of consent at 20 weeks of gestation or later and had the ability to communicate in English. Participants were asked to complete up to four

assessments administered at one-month intervals. Each assessment included seven PROMIS short-forms: physical function, anxiety, depression, fatigue, sleep disturbance, ability to participate in social roles and activities, and pain interference, scored using a standardized T-score with a mean of 50 (indicating average health) and a standard deviation of 10 points (2); five EQ-5D-5L domains: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression score from 0 = "equivalent to death" to 1 = "perfect health" (3); six HUI2 domains: pain, sensation, emotion, cognition, self-care, and mobility; and eight HUI3 domains: pain, emotion, cognition, dexterity, ambulation, hearing, vision, and speech score from 0 = "equivalent to death" to 1 = "perfect health" (4). Participants also assessed their overall HRQoL using a single-item scale that ranged from 0 = "Worst" to 100 = "Best Possible".

The sample included 135 participants who completed 456 surveys. Of the 135 participants, 85(63%) completed four assessments, 22(16%) completed three, 22(16%) completed two, and six(4%) completed one assessment. A majority of this sample reported being white, non-Hispanic (n = 113; 84%), with a mean age of 31 (SD = 4.9) and a mean global HRQoL score, on a scale of 0-100, was 77.1 (SD = 13.4) at the fifth month of pregnancy. Mean scores on four PROMIS measures significant differed between months five and nine in Physical Function (M = 49.5, SD = 7.29 v. M = 42.9, SD = 6.5), Fatigue

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<https://doi.org/10.1016/j.apo.2025.100525>

Received 12 March 2025; Received in revised form 4 September 2025; Accepted 24 September 2025

Available online 29 September 2025

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WILLIAM'S CORNER

INSIGHTS FROM OUR PARTICIPANTS



I have worked with the Human Engineering Research Laboratories (HERL) for a decade and for me what comes to mind is innovation and independence. I am a power wheelchair user. I am a seventy-eight old male living with Becker Muscular Dystrophy. I have used six different power wheelchair models. The hardest issue I have had to deal with is adjusting to different models. HERL has been a leader in wheelchair research. I have

and usability, positioning them as essential modern mobility aids.

The use of a power wheelchair has led to greater independence. HERL is committed to the independent living movement. The Independent Living Movement began in the 1960s, led by people with disabilities who rejected the medical model and promoted the social model, viewing disability as stemming from societal barriers. Focused on civil rights advocacy, the movement aims to ensure equal rights and opportunities for everyone.

I have spent 25 years working on accessible transportation, including WHEELCHAIR tie-down systems. Transportation access plays a crucial role for

Power wheelchairs enable people with mobility challenges to move independently and comfortably, making everyday tasks and social activities more accessible.

participated in several innovative research studies. This has given me a better understanding of both the benefits and limitations of power wheelchairs. Power wheelchairs enable people with mobility challenges to move independently and comfortably, making everyday tasks and social activities more accessible. Their adjustable features support comfort

people with disabilities, as it gives them independence and choice. It allows them to take part in everyday activities, connect socially, pursue employment, and reach important services like healthcare and education.

- JOHN TAGUE

RECRUITING PARTICIPANTS

SIGN UP TO 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 the Human Engineering Research Laboratories (HERL) Assistive Technology Registry because you might be interested in participating in our current or future research studies.

1 ACCESSIBLE AIRLINE TRANSPORTATION FOR MOBILITY DEVICE USERS: SURVEY



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.

2 DEVELOPMENT AND EVALUATION OF THE PPAL BEDSIDE COMMODE



Purpose: To evaluate the usability of the PPAL in home environments.

Study Requirements: 6-Week independent use of the PPAL in your home. Throughout the 6-Week study period, you will be asked to use the PPAL as your primary toileting method.

3 CLINICAL LIMITS OF USE TOOLS (CLOUT) OFF-ROAD MOBILITY DEVICES



Purpose: To develop clinical limits of use tools (CLOUT) for off-road wheelchairs and hand cycles to ensure their safe operation.

Study Requirements: Participate in one visit lasting up to 4 hours to conduct performance testing and mapping of the features of an off-road wheelchair or hand cycles.

4 ADVANCEMENT OF A NEW VARIABLE-COMPLIANCE SOCKET AND FRAME SYSTEM



Purpose: To test a new prosthetic device to learn its potential to fit a range of Veterans with transradial amputations.

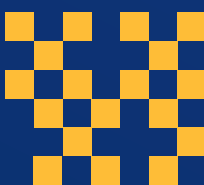
Study Requirements: Test a new prosthetic device & possibly assist with engineering and design to improve the device's usability, function and comfort.

5 ASSESSING THE CAREGIVER ASSISTED TRANSFER TECHNIQUE (CATT) INSTRUMENT



Purpose: To validate the caregiver Assisted Transfer Technique Instrument, a new tool to assess the assisted transfer performance of individuals with disabilities and their caregivers.

Study Requirements: The study takes place over two visits in your home or our lab (your choice), each visit is no longer than two hours.



6 POWERED PERSONAL TRANSFER SYSTEM (PPTS): FOCUS GROUP



Purpose: To study the design of controls to better meet user needs of a robotic, independent-use, Group 3 Powered Personal Transfer System.

Study Requirements: You will be asked to watch a PPTS demonstration video and provide group feedback. The focus group will take no more than two hours.

7 AIRPORT MANUAL WHEELCHAIR: FOCUS GROUP



Purpose: To design a manual wheelchair tailored for airport use, addressing the current practice of airlines requiring wheelchair users to travel in regular passenger seats.

Study Requirements: Participation will take no more than two hours.

8 DESIGN AND DEVELOPMENT OF THE SIMPLIFIED ACCESSIBLE VEHICLE AND ROBOTIC (SAVER) WHEELCHAIR



Purpose: To identify and design needs and wants for a power wheelchair capable of being transported in a non-modified minivan.

Study Requirements: Share comments/feedback during an interview or focus group.

9 TRANSPORTATION VIDEO GAME STUDY TO ASSESS USER EXPERIENCE



Purpose: To collect participants' feedback and outcomes after playing the HERL-Town serious transportation video game.

Study Requirements: Complete a pre-game assessment, play the game 4 times over 30 days and complete a follow-up assessment 30 days later.

10 3D SCANNING STUDY ON PROSTHETIC ARM DESIGN



Purpose: To collect 3D scan data of residual limbs from individuals with upper limb amputations.

Study Requirements: Place your amputated arm in a scanning device that will measure residual limb and locate bony prominences to inform the socket design.



QUESTIONS?

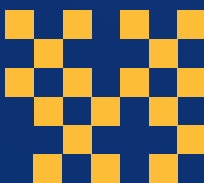
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RESEARCH PARTICIPANT ADVOCATE

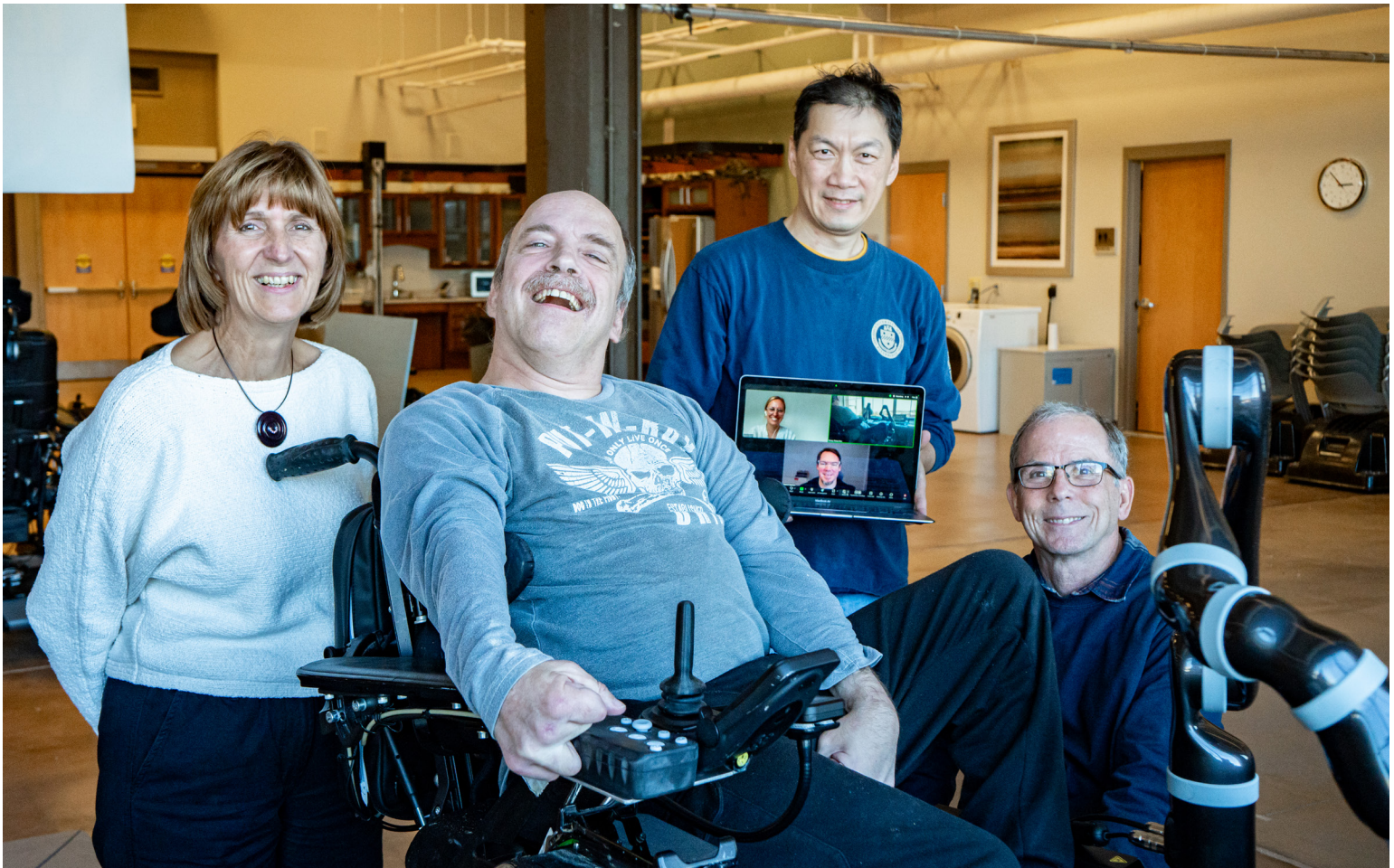
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Left to right, top to bottom: Peter Hoegel being recognized at the 2025 Hail to Heroes game; Brad Dicianno receiving his CLASS award; Rory & Rosi Cooper and Shantanu with Armenian colleague, Marina; Josh Marino educating students from Central Catholic about the lab; Andrew Gryskewicz and Rosi Cooper dressed as each other for Halloween; Jorge Candiotti in Machu Pichu (welcome back); Beth Carmona, Ben Gebrosky, Jackson Williams, Stephen Layton, Peter Hoegel, Garrett Grindle, and Rory Cooper at Bob Powell's VA ICARE award ceremony; the Handcycle Assistance Team (HCAT) comprised of Rosi Cooper, Ben Gebrosky, Dan Fisher, and co. standing behind the para-athletes including Rory Cooper at the Army 10-Miler; Rosi Cooper, Josh Chung, Rory Cooper, and the Kinova team (laptop) at the moment when longtime-participant Alec completed his JACO arm installation.



In the News

10-12/2025

NOVEMBER 4

Pitt Research Lab Awarded up to \$41.5M to Develop Robotic Wheelchair

PITTSBURGH
BUSINESS TIMES



NOVEMBER 4

Pitt Researchers at HERL Awarded Up to \$41.5M to Revolutionize Mobility

PITT SCHOOL OF
MEDICINE



NOVEMBER 4

Pitt Gets \$41.5M to Build a Better Wheelchair

POST-GAZETTE



DECEMBER 8

Rehabilitative Medicine with Dr. Brad Dicianno

DOCTOR RADIO



NOVEMBER 4

University of Pittsburgh Kicks Off Project to Imagine a Better Wheelchair

PITTSBURGH
MAGAZINE



NOVEMBER 7

\$41.5 Million Award to Fuel HERL's Reimagining of Wheelchairs

UNIVERSITY
TIMES



NOVEMBER 24

\$41.5M ARPA-H Award to Reimagine Assisted Mobility

PITT RESEARCH



DECEMBER 8

Rory Cooper Invented Wheelchair Technology

DAILY ATOM



2ND EDITION



ALL OUR LINKS



RUMINATION OF THE QUARTER

"I WAKE UP READY TO **EXCEL** AT WORK. THE MOMENTS I SHARE WITH MY COWORKERS BRING OUT A **CLAIRVOYANCE** THAT I HAVEN'T KNOWN IN A LONG TIME. I'M FOREVER **GRATEFUL** FOR THE NEWFOUND **COURAGE** I'VE OBTAINED BY WORKING IN AN ENVIRONMENT SUCH AS HERL. THE LAB IS THE LIGHT THAT ILLUMINATES MY PATH."

- Andrew Nathan Gyskewicz
Administrative Officer
Co-Staff Member of the Year

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