Overview of the Pitt Healthy Home Lab

Jon Pearlman, PhD

University of Pittsburgh

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HEALTHY HOME LABORATORY

Healthy Home Laboratory

Community-based laboratory **bringing together people** from the **community** and the **university** to tackle major **problems** of **aging in place** and provide **scalable solutions** to support older adults and people with disabilities to age safely and independently at home.
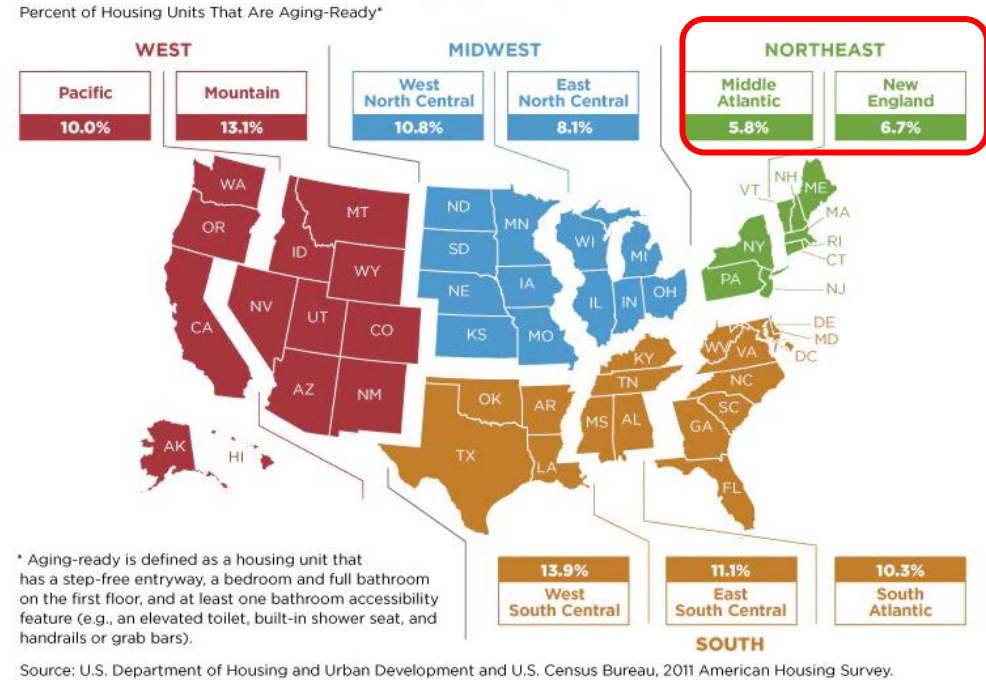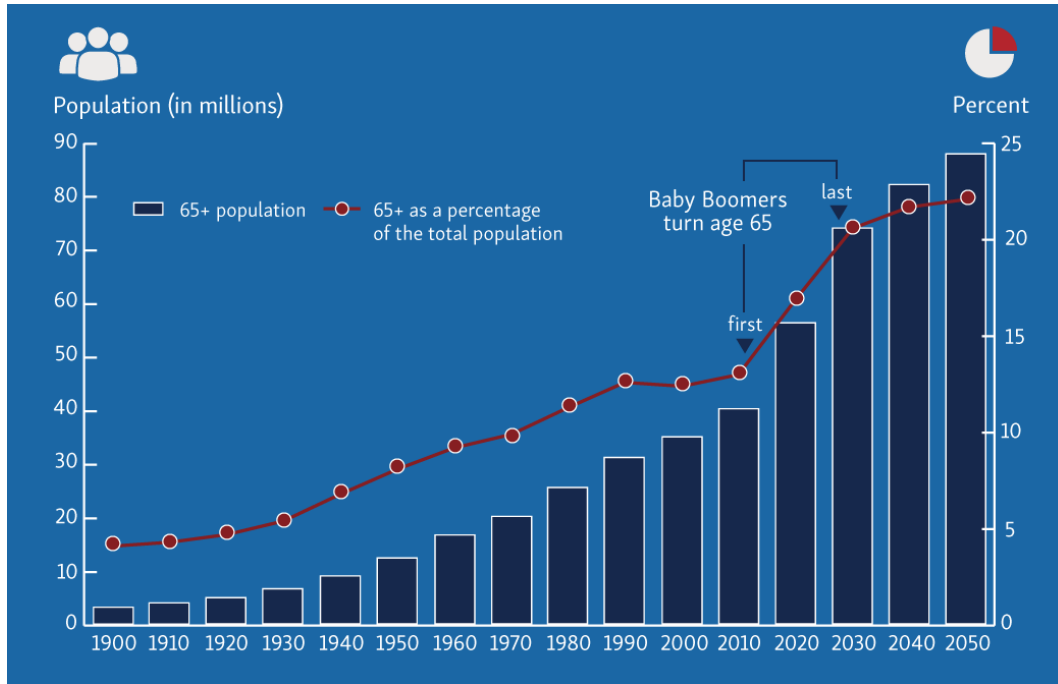
➡️ **Vision**

A world where all individuals can age safely and independently in the comfort of their home so they can enjoy healthy and vibrant lives at home and in their community.

➡️ **Mission**

Create new **technology solutions** and **support services** that enable people to live safely and independently at home.

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Motivation

Percent of Housing Units That Are Aging-Ready*

* Aging-ready is defined as a housing unit that has a step-free entryway, a bedroom and full bathroom on the first floor, and at least one bathroom accessibility feature (e.g., an elevated toilet, built-in shower seat, and handrails or grab bars).

Source: U.S. Department of Housing and Urban Development and U.S. Census Bureau, 2011 American Housing Survey.

- The population ≥65 will more than double by 2050 (Population Report, U.S. Census Bureau, 2020)

- >75% of older adults prefer to age-in-place (AARP Survey on Older Adults)

- < 10% of Homes are **aging-ready** and in the northeastern U.S. (U.S. Department of Housing and Urban Development and U.S. Census Bureau, 2011)

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Healthy Home Laboratory Activities

➡️ **Assessments**

Develop and evaluate tools to assess the health of individuals and the home environment to recommend appropriate interventions to promote safe and healthy homes.


➡️ **Technology**

Develop and evaluate assistive and smart-home technology to support healthy living for older adults, people with disabilities, and their caregivers.

➡️ **Services & Interventions**

Develop and implement personalized home-based interventions that combine the best technology, caregiver support, and professional services.

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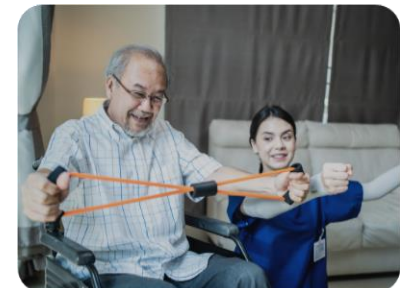
Research Registry

Through support with UCSUR, the HHL now has research registry containing socio-demographic and age-related clinical information allowing targeted recruitment, and includes the following participant groups:

- Individuals $\geq$ 60 years old (81%)
- Caregivers of older adults (7%)
- Adults with a disability (7%)
- Healthcare workers who provide care for older adults (4%).

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Timeline

January 2021
Established the Healthy Home Lab

June 2021
Grants awarded

VA | U.S. Department of Veterans Affairs   PA

Nov-Dec 2021 (& ongoing)
Established HHL Team
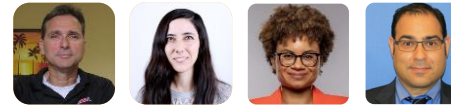
April 2022
HHL House purchase

March 2023 - ongoing
SHRS Student Training

December 2022
Grant awarded

U.S. Department of Housing and Urban Development

November 2022
Official HHL Launch

HEALTHY HOME LABORATORY

May-Oct 2022
Lab spaces & prototype installations

June 2023
Established Startup

VEST INC
HOME SAFE AND SMART

September 2023
Home Safe & Smart Partnership

VEST INC
HOME SAFE AND SMART   UPMC HEALTH PLAN

November 2023
Grant pending

U.S. Department of Housing and Urban Development

November 2023
Ongoing Operations

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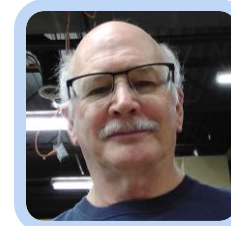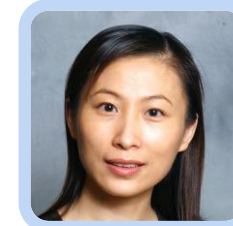# Team Members

Jon Pearlman
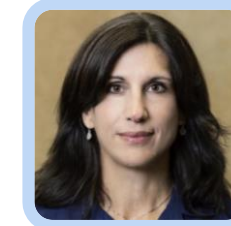Dave Brienza
Todd Hargroder
Paulina Villacreces
Zachary Roy
Bill Ammer
Dan Ding
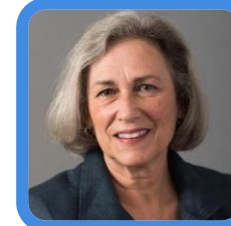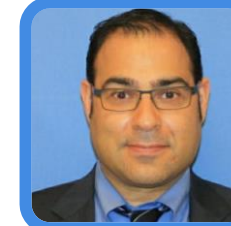Tricia Karg

Yong Choi
Lindsey Morris
Jack Fried
Pamela Toto
Mark Schmeler
Anne Newman
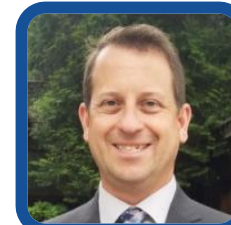Carissa Low
Steven Handler

Anthony Delitto
Thomas Platt
Chris Matek
Heidi Donovan
Allyson LaCovey
Chris Chovan
Andi Saptono
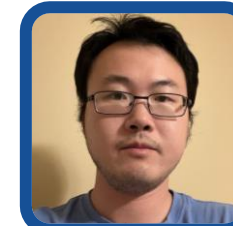Portia Singh

Bambang Parmanto
Steven Albert
Scott Beach
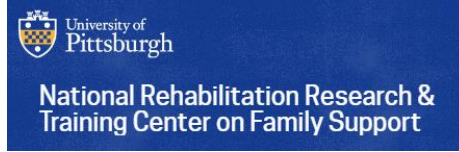Chris Briem
Meredith Hughes
Julie Faieta
Zhendong Wang
Everette James

Partners

Funding Sources

Safety & Mobility Risks in the Home

➡️ Home injuries cause more than **30,000 deaths** annually, **39% among those 60+**[1]

➡️ **12.4 million nonfatal home injuries** annually, with higher injury rates among those 75+[1]

➡️ **Falls-related treatment cost $50 billion annually (CDC)**

➡️ **Falls** are the **leading cause of nonfatal home injuries**, accounting for 41.2% and **2nd most common cause** of **fatal injuries**[1].

➡️ Falls are the leading cause of fatal and non-fatal injuries among older adults[2] and **stairway falls** are the **leading cause of accidental death** among this age group[3]

1. Gielen, A. C., McDonald, E. M., & Shields, W. (2015). Unintentional Home Injuries Across the Life Span: Problems and Solutions. Annual Review of Public Health, 36(1), 231–253.
2. Bergen, G., Stevens, M. R., & Burns, E. R. (2016). Falls and fall injuries among adults aged≥ 65 years—United States, 2014. Morbidity and Mortality Weekly Report, 65(37), 993-998.
3. Jacobs, J. V. (2016). A review of stairway falls and stair negotiation: Lessons learned and future needs to reduce injury. Gait & posture, 49, 159-167.

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Mobility & Safety Technology in the Home
Design Objectives & Areas of Focus

- Highly ergonomic & functional

- System integration across technology

- Single install of system with modular upgrades

- Sensor enabled to support monitoring

- Broad IP coverage

Access
Ramps & vertical lifts

Mobility
Stair climbing support

Safety
Railings & grab bars

Fitness
Safe & ergonomic solutions

Smart Home
Services & training

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Mobility & Safety Technology in the Home

Access
Ramps & vertical lifts

Mobility & Safety Technology in the Home

Mobility
Stair climbing support

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Mobility & Safety Technology in the Home

Safety
Railings & grab bars

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Mobility & Safety Technology in the Home

Fitness

Safe & ergonomic solutions

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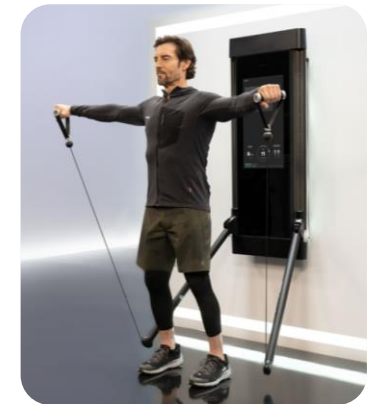
Mobility & Safety Technology in the Home

Smart Home
Services & training

Smart Speakers

Sensors & Controls

Lights & Plugs

Health Monitoring

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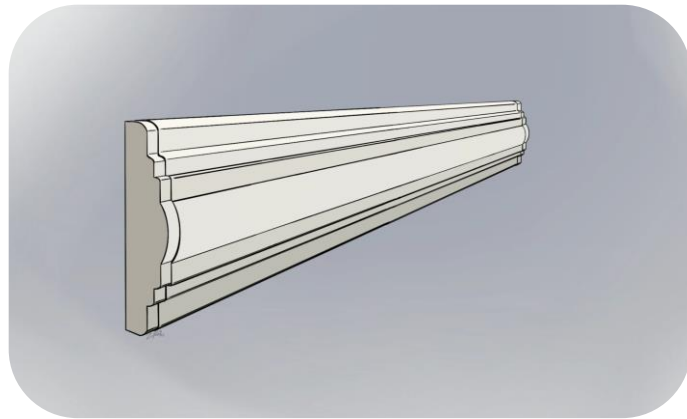
Mobility & Safety Technology in the Home

Mobius – adaptable rail system

Mobius is an adaptable rail system that is used in place of decorative architectural moulding throughout the home and serves as an anchor point for a range of accessibility components.

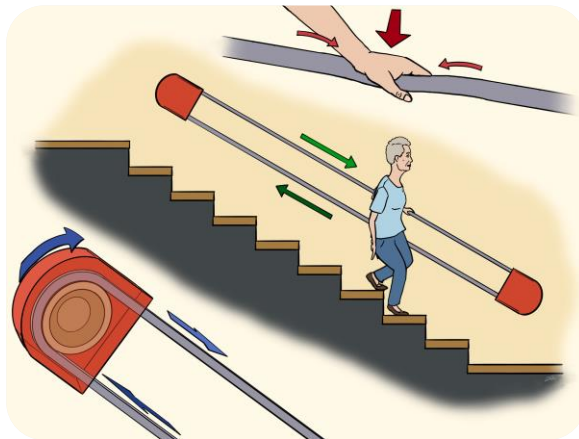Safe mobility and accessibility all throughout the home

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Mobility & Safety Technology in the Home

SafeStep - reactive support for stair climbing

SafeStep is a moving handrail that reacts intuitively to the user's needs by activating when they are ready to climb the stairs and adapting immediately to the speed of the user.
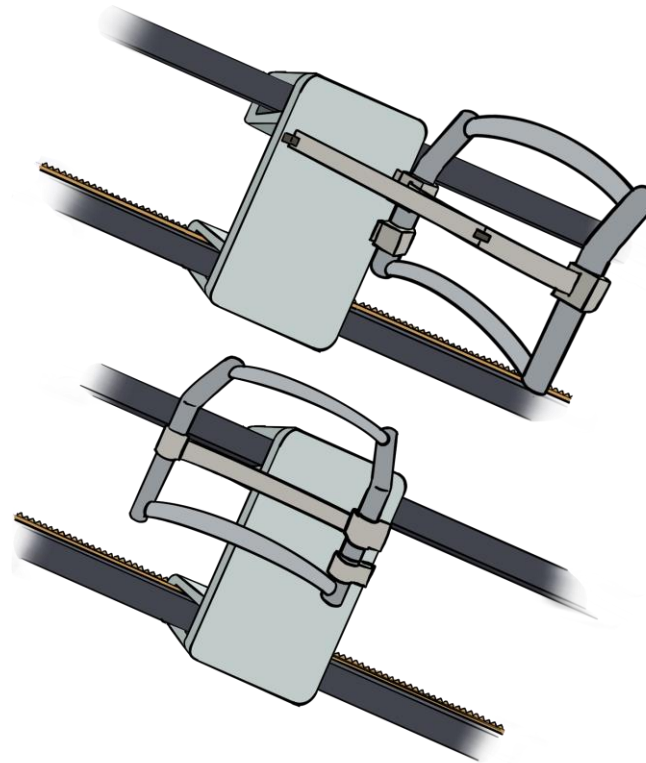
Mobility & Safety Technology in the Home

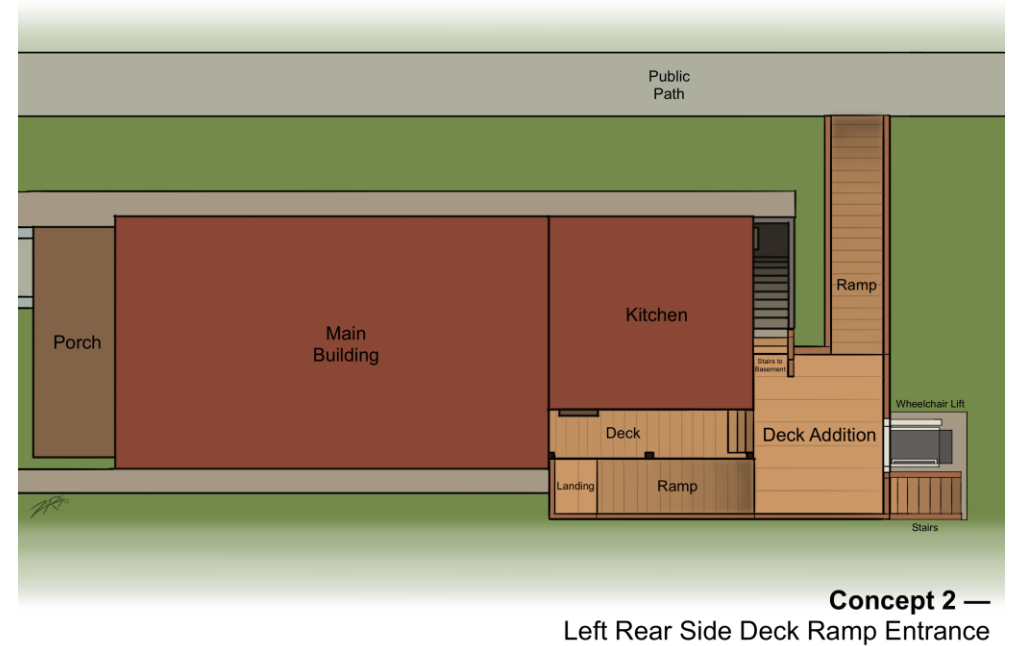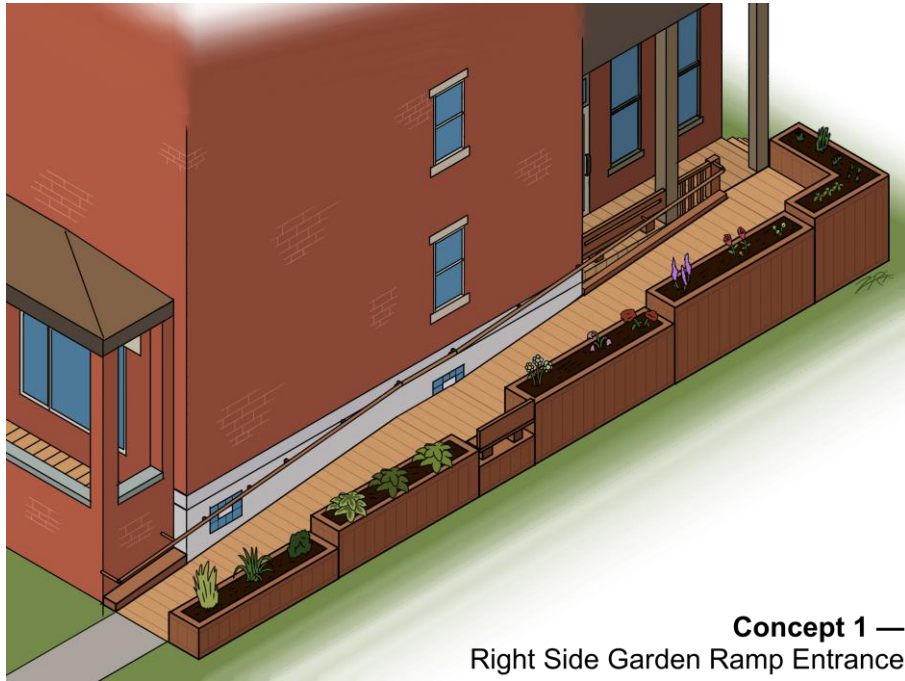## RailBot - powered assistive device for star climbing

RailBot is a powered device that assists users as they walk up and down stairs. RailBot enables and encourages users to maintain their stair-climbing capabilities, and thus contributes to their long-term physical health.

RailBot is a highly compact device that can be easily installed in existing stairways or two continuous wall-mounted rails.

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Mobility & Safety Technology in the Home

Modular Ramps – promoting accessibility

Concept 1 —
Right Side Garden Ramp Entrance

Concept 2 —
Left Rear Side Deck Ramp Entrance

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Smart Home Technology & Monitoring
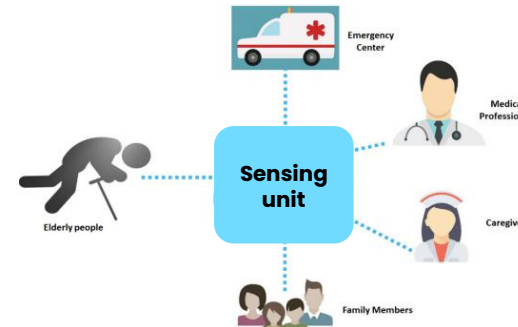

Mobile Device Assessment Tool

Smart Speaker Training

Smart Home Technology Service Delivery Models

Fall Detection

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For more information visit our website at
HealthyHomeLaboratory.pitt.edu

If you are interested in partnering, contributing or joining the Healthy Home Laboratory, contact us at **HealthyHomeLab@pitt.edu**

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