Hochul Hwang

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EDUCATION

University of Massachusetts Amherst — Sep.2021 - Present
M.S./Ph.D. in Computer Science (Advisor: Prof. Donghyun Kim)
Research area: Robotics, Human-Robot Interaction, Computer Vision

Hanyang University ERICA — Mar.2013 - Jun.2019
B.S. in Robot Engineering, GPA: 3.91 / 4.5 (**Cum Laude**)

The University of Texas at Austin — Aug.2017 - May.2018
Exchange Program, Electrical and Computer Engineering (Advisor: Prof. Luis Sentis)

PUBLICATIONS

Towards Robotic Companions: Understanding Handler-Guide Dog Interactions for Informed Guide Dog Robot Design
H. Hwang, H. T. Jung, N. A. Giudice, J. Biswas, S. I. Lee*, and D. Kim*
ACM Conference on Human Factors in Computing Systems [**CHI'24**]

System Configuration and Navigation of a Guide Dog Robot: Toward Animal Guide Dog-Level Guiding Work
H. Hwang†, T. Xia†, I. Keita, K. Suzuki, J. Biswas, S. I. Lee*, and D. Kim*
IEEE International Conference on Robotics and Automation [**ICRA'23**]

Dynamic Object Avoidance using Event-Data for a Quadruped Robot
S. Zhu, N. Perera, S. Yu, H. Hwang, and D. Kim
IEEE/RSJ International Conference on Intelligent Robots and Systems IPPC Workshop [**IROS Workshop'23**]

Highly Sensitive Capacitive Pressure Sensors over a Wide Pressure Range Enabled by the Hybrid Responses of a Highly Porous Nanocomposite
K. H. Ha, W. Zhang, H. Jang, S. Kang, L. Wang, P. Tan, H. Hwang, and N. Lu
Advanced Materials'21

ElderSim: A Synthetic Data Generation Platform for Human Action Recognition in Eldercare Applications
H. Hwang, C. Jang, G. Park, J. Cho, and I.J. Kim
IEEE Access'21

Control Scheme and Uncertainty Considerations for Dynamic Balancing of Passive-Ankled Bipeds and Full Humanoids
D. Kim, S. J. Jorgensen, H. Hwang, and L. Sentis
IEEE-RAS International Conference on Humanoid Robots [**Humanoids'18**]

Computationally-Robust and Efficient Prioritized Whole-Body Controller with Contact Constraints
D. Kim, J. Lee, O. Campbell, H. Hwang, and L. Sentis
IEEE/RSJ International Conference on Intelligent Robots and Systems [**IROS'18**]

PATENTS

Human behavior recognition system and method using hierarchical class learning considering safety
J. Cho, I. J. Kim, and H. Hwang — U.S. Patent Application (17/565,453), 2022

RESEARCH EXPERIENCE

Intelligent perception and navigation based guide dog robot development for blind people (video, w/ audio, news)
Graduate Research Assistant, Dynamic and Autonomous Robotic Systems Lab @ UMass Amherst *May.2021 - Present*

- Led **qualitative research** on interviewing 28 human subjects to inform guide robot design [CHI'24]
- Implemented **semantic-aware local path planning** in **legged system**, reflecting human-dog interaction [ICRA'23]
- Generated **synthetic data** (NVIDIA NDDS in Unreal Engine 4) and finetuned models for tactile paving detection
- Evaluated **object detection** and **segmentation** algorithms on **AGX Orin** for safe navigation in sidewalk environment
- Integrating **language and multimodal foundation models** (LLaMA, LLaVA, and CLIP) for safe decision making when crossing streets and implementing navigation algorithms utilizing foundation models (e.g., LM-Nav and ViNT)

Evaluation of human action recognition models and synthetic data for eldercare robot's perception [Access'21]
Research Intern, Center for AI @ Korea Institute of Science and Technology *Sep.2019 - Dec.2020*

- Finetuned RGB/skeleton-based human action recognition algorithms on **our synthetic data** and enhanced accuracy
- Developed a **real-time human action recognition system** with accuracy of 75% (90% in trimmed videos)

Testing and optimizing the 6 DOF passive-ankled biped robot, Mercury [IROS'18, Humanoids'18]
Undergraduate researcher, Human Centered Robotics Lab @ UT Austin *Sep.2017 - Aug.2018*

- Setup experiment protocol and supported dynamic **biped balancing** test
- Wrote python code for plotting **sensor** (joint encoder, IMU, motion capture, and contact) and **state estimation** data
- Designed mechanical components using CAD, 3D printing, and laser cutting

Evaluation of flexible resistive force sensors for lower-limb prosthetic stress distribution [Advanced Materials'21]
Undergraduate researcher, Lu Research Group @ UT Austin *Apr.2018 - Jun.2018*

- Manufactured and optimized resistive force sensor (Silhouette Studio) by analyzing resistance/stress using LabVIEW

HONORS AND AWARDS

CYBATHLON Challenges 2023 2nd place — Mar.2023
University of Massachusetts Amherst CICS Jumpstart Fellowship — Sep.2021 - May.2022
STEAM CUP Creative Technology and Excellence Award — Jun.2017 - Aug.2017
{Hanyang University, Haksan Foundation} Academic Achievement Scholarship — Fall 2016, Spring 2017

SKILLS

Programming: Python, C++, MATLAB

Software: PyTorch, TensorFlow, CUDA, ROS, Unreal Engine, Unity, Docker, Git

Mechatronics: SOLIDWORKS (Certified SolidWorks Associate), CATIA, Onshape

TEACHING AND SERVICE

Teaching Assistant — University of Massachusetts Amherst

- Robotics: mobile robot platform test and setup — Spring 2023
- Introduction to Robotics - Mechanics, Dynamics, and Control: interactive quiz website — Fall 2022

Student Mentor — University of Massachusetts Amherst

- Krisha Adhikari (honors thesis: synthetic data), Matthew Hersey (honors thesis: deep learning), Tim Xia (research: path planning), Ken Suzuki (research: CAD), Millan Taranto (independent study: CAD)

UMass Korean Graduate Student Association (KGSA) President — May.2022- Jun.2023

Reviewer: RA-L'24, CHI'24, IROS'23, ICRA'22