Ung Hee Lee

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EDUCATION

- **The University of Michigan** — Ann Arbor, MI
  Ph.D. in Mechanical Engineering, Focus: Robotics; GPA: 3.9/4.0 — Sep 2015 - Aug 2022
  Dissertation: *Actuation, Control, and Customization: Key Elements Toward Real-world Deployment of Powered Exoskeleton Systems*
  Committee: *Elliott Rouse, Sehoon Ha, Ram Vasudevan, Robert Gregg*

- **Korea University** — Seoul, Korea
  Bachelor of Science - Physics; GPA: 4.0/4.5 — Sep. 2009- Feb. 2015

SKILLS SUMMARY

- **Programming Languages** Python, C/C++, Matlab
- **Frameworks/Tools**   Scikit, TensorFlow, TFLite, Keras, GIT, Google Colab
- **Platforms**   Linux, Windows, Raspberry Pi, Jetson Nano

INDUSTRY EXPERIENCE

- **Nuro** — Mountain View, CA
  Software Engineer in Planning & Control — July 2022 - Present

- **(Google) X** — Mountain View, CA
  Resident, ML for Robotics — May 2021 - Dec 2021
  Mentored by Dr. Jie Tan, Dr. Georgios Evangelopoulos
  - Research and development for a project focused on mobility assistance
  - Develop ML models for control of robotic systems
  - Implement ML-based controllers on-device with high bandwidth, safety and reliability requirements

- **Nuro** — Mountain View, CA
  Software Engineering Intern, Planning & Control — Jun 2020 - Aug 2020
  Mentored by Dr. Mohammad Shakiba
  - Improve Nuro's self-driving control system with an emphasis on energetic efficiency and smooth control
  - Implement and develop a regenerative braking system

- **Fetch Robotics** — San Jose, CA
  Software Engineering Intern — Jun 2017 - Aug 2017
  Mentored by Dr. Russell Toris
  - Develop 3D object segmentation system for mobile manipulators using RGB-D images
  - Segmentation utilized for grasp calculation in Programming by Demonstration

ACADEMIC EXPERIENCE

- **Neurobionics Lab** — Ann Arbor, MI
  Doctoral Research Assistant — Sep 2017 - Present
  Advised by Dr. Elliott Rouse
  - Develop intelligent exoskeleton by employing image-based intent recognition system
  - Develop preference-based reinforcement learning controller for locomotion
  - Develop a system of predicting biomechanical signal using sensor-fusion based ML approach

- **The Laboratory for Progress** — Ann Arbor, MI
  Software Engineering Intern, Planning & Control — Jan 2016 - May 2016
  Mentored by Dr. Chad Jenkins
  - Implement grasp localization for mobile manipulator.
  - Localize grasp affordance in 3D point Clouds

SIDE PROJECTS

- **Exploring biases in CNNs for supervised monocular depth estimation**: Examine CNNs trained on monocular depth datasets are susceptible to over-reliance on certain features or visual cue

- **Query-Efficient Preference-Based Reinforcement Learning with Active Learning**: Develop query-efficient and sample-efficient strategies to reduce the number of elicitations while learning an accurate utility function in robotic tasks

- **Reinforcement Learning with Musculoskeletal Models, NeurIPS 2019 Competition: Learn to Move - Walk Around**: Develop an intelligent controller for a physiologically plausible human model to run in a physics-based simulation environment

SOFTWARE DEVELOPMENT

- Intent Recognition System for Predicting Locomotor Activities
- Robot Operating System (ROS) Package Wrapper for RGBD segmentation

Peer Reviewed Publications

- V Shetty, **U Lee**, K Ingraham, E J Rouse. A Data Driven Approach for Predicting Preferred Ankle Stiffness of a Quasi-Passive Prosthesis. *IEEE Robotics and Automation Letters with Presentation at International Conference on Robotics and Automation 2022.*

- **U Lee**, J Bi, R Patel, D Fouhey, and E J Rouse. Image Transformation and CNNs: A Strategy for Encoding Human Locomotor Intent for Autonomous Wearable Robots. *IEEE Robotics and Automation Letters with Presentation at International Conference on Intelligent Robots and Systems* 2020.

- **U Lee**, C Pan, and E J Rouse. Empirical Characterization of a High-performance Exterior-rotor Type Brushless DC Motor and Drive. *IEEE International Conference on Intelligent Robots and Systems* 2019.

- J Xu, T Bao, **U Lee**, C Kinnaird, W Carender, Y Huang, K H Sienko, P B Shull. Configurable, Wearable Sensing and Vibrotactile Feedback System for Real-time Postural Balance and Gait Training: Proof-of-Concept. *Journal of NeuroEngineering and Rehabilitation* 2017.

- J Xu, **U Lee**, T Bao, Y Huang, K H Sienko, P B Shull. Wearable Sensing and Haptic Feedback Research Platform for Gait Retraining. *IEEE International Conference on Wearable and Implantable Body Sensor Networks* 2017.

- J Choi, H Kang, S Chung, Y Kim, **U Lee**, J Lee, S Kim, M Chun, H Kim. Detecting Voluntary Gait Intention of Chronic Stroke Patients Towards Top-down Gait Rehabilitation using EEG. *International Conference of the IEEE Engineering in Medicine and Biology Society* 2016.

Conference Workshop Papers and Abstracts

- D Kent, **U Lee**, S Elliott, R Toris. Leveraging Autonomous Segmentation and Grasp Calculation for Programming by Demonstration. *IEEE International Conference on Robotics and Automation : Machine Learning in the Planning and Control of Robot Motion Workshop* 2018.

- **U Lee**, J Choi, S Chung, H Kim. Comparing the Performance of Movement Artifact Removal Algorithm between Wired and Wireless EEG Data Acquisition System. *7th International IEEE EMBS Conference on Neural Engineering 2015*

Conference Posters and Demonstration

- **U Lee**, N. Doraiswamy, J. Ferris, S. Gupta. Query-Efficient Preference-Based Reinforcement Learning with Active Learning. *Eastern European Machine Learning Summer School* 2021

- V. Shetty, **U Lee**, E J Rouse. A data driven approach for predicting preferred ankle stiffness. *8th IEEE RAS/EMBS International Conference on Biomedical Robotics & Biomechatronics* 2020.

- **U Lee**, K Ingraham, E J Rouse, A Azocar. Innovations in Controls of Agricultural Exoskeleton. *8th Annual D. Dan & Betty Kahn Michigan-Israel Partnership Symposium* 2019.

- E J Rouse, L Hargrove, A Azocar, **U Lee**. The Open Source Leg. *Amazon re:MARS* 2019.

- **U Lee**, A Azocar, E J Rouse. The Open Source Leg: Steps Toward Real-world Deployment of Bionics. *IEEE International Conference on Robotics and Automation: Towards Real-World Deployment of Legged Robots Workshop* 2019. **The Best Poster Award**

- **U Lee**, E J Rouse. Torque Control of the Open-source Leg Prosthesis. *Dynamic Walking* 2018

- **U.Lee**, J. Fan, Z. Zhou, Z. Sui, K. Desingh, C. Jenkins: Handle Grasp Localization for Manipulation in Clutter. *Robotics Science and Systems* 2016.

- **U.Lee**, J. Fan, Z. Zhou, Z. Sui, K. Desingh, C. Jenkins: Handle Grasp Localization for Manipulation in Clutter. *IEEE International Conference on Robotics and Automation* 2016.

Honors and Awards

- Semester High Honors, Korea University — *2009, 2012, 2013, 2014*
- SNational Science and Engineering Scholarship, Government of South Korea — *2013 - 2014*
- National Honors Scholarships, Government of South Korea — *2009*

Professional Memberships and Service

- Student Member, IEEE Society — *2018-Present*
- Student Member, IEEE Robotics and Automation Society — *2018-Present*
- Reviewer, IEEE Engineering in Medicine and Biology Conference — *2019*

References

- **Dr. Elliott Rouse ejrouse@umich.edu**
  Associate Professor, Department of Mechanical Engineering, Robotics Institute, University of Michigan
  Technical Advisor, X the Moonshot Factory

- **Dr. Georgios Evangelopoulos gevang@x.team**
  Research Scientist, X the Moonshot Factory

- **Dr. Sehoon Ha sehoonha@gatech.edu**
  Assistant Professor, School of Interactive Computing, Georgia Institute of Technology
  Research Scientist, Google Brain

- **Dr. Hyungmin Kim hk@kist.re.kr**
  Principal Research Scientist, Center For Bionics, Korea Institute of Science and Technology