

# JEONGHWAN ‘JAY’ LEE

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## SUMMARY

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**Ph.D. in Mechanical Engineering** with expertise in **biomechanics** and **robotics** for healthcare applications. Over 5 years of clinical research experience, specializing in human subject study design, statistical analysis, musculoskeletal simulation, and time-series biomechanical signal processing (kinematics, kinetics, inertial measurement units and electromyography). Additional 3 years of industrial experience leading robot perception software development, with a focus on multi-modal sensor data acquisition, computer vision, and cloud-based AI pipelines. Demonstrated track record of delivering innovative solutions in fast-paced start-up and scale-up environments.

## CURRENT AFFILIATION

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Massachusetts Institute of Technology

Cambridge, MA

**Postdoctoral Associate** at the Department of Brain and Cognitive Science

Apr 2025 – Present

- **Direct research in physics-informed imitation learning** to develop a neuromechanics-grounded behavioral model capable of forecasting age-related neuromuscular deterioration affecting human locomotion stability.
- **Led the development and writing of a successful grant proposal**, securing \$100K in funding from the MIT Generative AI Impact Consortium for 2025–2026.

## RESEARCH EXPERIENCE

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Contoro Robotics

Austin, TX

**Senior Robotics Engineer – Perception**

Sept 2022 – Mar 2025

- **Led the development of a ROS-integrated, multi-functional robot perception pipeline** with object detection, image segmentation, 6D pose estimation, optical character recognition, and teleoperation feedback, enhancing reliability and flexibility in real-world use.
- **Designed a cloud-based human-in-the-loop segmentation and online data re-labeling workflow** combining instance and zero-shot segmentation, achieving 2% operational failures and improving model robustness through continuous data annotation.
- **Established a decentralized machine learning model training pipeline** for customer-specific training, collaboratively enhancing a global model by 10% in performance and scalability.
- **Developed an automated, multi-step hand-eye calibration methodology** for a multi-camera setup (eye-in-hand, eye-to-hand, and stereo), achieving localization accuracy within 0.5% of working distance.
- **Led technical demonstrations** that played a pivotal role in securing \$4.7 million in Seed and \$12 million in Series A funding.

Harmonic Bionics, Inc. (now Bioness Medical)

Austin, TX

**System Validation Engineer Intern**

May 2019 – Aug 2019

- **Developed C/C++ EtherCAT library** for motion controllers and sensor interfaces.
- **Built dual-motor haptic demo kits** for exhibitions, demonstrating advanced motion control capabilities.

## RESEARCH EXPERIENCE

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University of Texas at Austin

Austin, TX

**Graduate Research Assistant**

Aug 2017 – Aug 2022

- **Led three data-driven research initiatives** in human movement biomechanics to advance wearable robotics for post-stroke gait rehabilitation, culminating in four first-authored publications.
- **Supervised two master’s students in research** on gait biomechanics related to cognitive decline and exoskeleton design, resulting in two co-authored publications.
- **Managed the end-to-end research process:** study conceptualization, securing funding, data collection/analysis (kinematics, kinetics, and EMG), interpretation, visualization, publication authorship, and presentation.
- **Collaborated with a multidisciplinary team** of neuroscientists and clinicians to drive innovative solutions.

Korea Institute of Science and Technology (KIST)

Seoul, South Korea

**Research Assistant**

Mar 2017 – July 2017

- **Devised a non-invasive, patient-specific surgical tool navigation method** for orbital reconstructive surgery, achieving up to 50% improvement in registration and tool tracking accuracy using a 3D-printed phantom model.

Seoul National University

Seoul, South Korea

**Graduate Research Assistant**

Mar 2016 – Feb 2017

- **Developed a needle steering scheme** using pivoted super-elastic Nitinol for an MR-guided breast needle intervention robot, enhancing insertion angle control with a targeting error of less than 5mm.
- **Designed a vehicle door and driver's seat mockup** with ten adjustable parameters, enabling controlled ingress/egress experiments.

The University of Texas Health Science Center (UTHealth)

Houston, TX

**Research Assistant**

Sept 2014 – Feb 2016

- **Prototyped and tested hysteresis** of a 7-DOF dual-segmented cable-driven continuum robotic manipulator for single-port surgery using a motorized testbed.
- **Contributed to transitioning a lab innovation into a commercial venture**, supporting initial product development and establishing scalable engineering processes (now Endoquest Robotics).

## EDUCATION

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**Ph.D. in Mechanical Engineering**, University of Texas at Austin, TX 2022

**M.S. in Mechanical Engineering**, Seoul National University, Seoul, South Korea 2017

**B.S. in Mechanical Engineering**, Hanyang University, Seoul, South Korea 2013

## SKILLS

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<b>Programming:</b>	Python, C/C++, C#, MATLAB, Bash/Shell
<b>Statistics / ML Platform:</b>	SciPy, R, PyTorch, TensorFlow
<b>DevOps / SysAdmin:</b>	Docker, Git, Linux/Unix
<b>Robotics Middleware:</b>	Robot Operation System (ROS / ROS2)
<b>Simulation Tools:</b>	MuJoCo, OpenSim (Musculoskeletal Simulation), ROS Gazebo, Simulink, Simscape
<b>Design Tools:</b>	SolidWorks, Eagle

## CERTIFICATES

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**Data Science and Applied Machine Learning** May 2021

The University of Texas at Austin, Department of Statistics and Data Sciences

**Scalable Machine Learning: Methods and Tools** May 2021

The University of Texas at Austin, Department of Statistics and Data Sciences

## SELECTED PEER REVIEWED ARTICLES (3 OUT OF 12) – [GOOGLE SCHOLAR](#)

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\*Selected works focus on data-driven approaches, biomechanics, and wearable sensors for developing personalized solutions in post-stroke rehabilitation.

1. **Lee, J.**, Seamon, B. A., Lee, R. K., Kautz, S. A., Neptune, R. R., & Sulzer, J. S. (2025). Post-stroke Stiff-Knee gait: are there different types or different severity levels?. *Journal of NeuroEngineering and Rehabilitation*, 22(1), 36.
2. **Lee, J.**, Akbas, T., & Sulzer, J. (2023). Hip and knee joint kinematics predict quadriceps hyperreflexia in people with post-stroke Stiff-Knee gait. *Annals of Biomedical Engineering*, 51(9), 1965-1974.
3. **Lee, J.**, Li, L., Shin, S. Y., Deshpande, A. D., & Sulzer, J. (2021). Kinematic comparison of single degree-of-freedom robotic gait trainers. *Mechanism and Machine Theory*, 159, 104258.

## PATENTS

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1. Kim, Y., **Lee, J.**, Park, S., Park, S.M., Cho, H., Kim, L., Noh, G., Lee, J.W., Lee, B.H., (2020). Automatic bending apparatus of plate for surgery, Republic of Korea (KR) Patent, No. 1021566940000.