JEONGHWAN 'JAY' LEE

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SUMMARY

Ph.D. in Mechanical Engineering with expertise in **biomechanics** and **data-science** 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

Massachusetts Institute of Technology — Cambridge, MA
Postdoctoral Associate at the Department of Brain and Cognitive Science — Apr 2025 – Present

- **Developing physics-informed, neuromechanics-grounded behavioral foundation model** for predictive simulation of age-related neuromuscular deterioration and its impact on human locomotion stability.

INDUSTRY EXPERIENCE

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

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

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

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

CERTIFICATES

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

*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

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.