

# JEONGHWAN ‘JAY’ LEE

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## SUMMARY

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Ph.D. in Mechanical Engineering with expertise in **wearable robotics**, **biomechanics**, and **robot perception systems**. Over 2 years in industrial robotics software development, focusing on computer vision and machine learning processes. Skilled in multi-modal sensor data analysis (IMU, EMG, vision), motion analysis (kinematics and kinetics), optimization, and statistical analysis. Proven ability to deliver innovative solutions in dynamic start-up and scale-up environments.

## EDUCATION

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<b>Ph.D. in Mechanical Engineering</b> , University of Texas at Austin, TX	2022
<b>M.S. in Mechanical Engineering</b> , Seoul National University, Seoul, South Korea	2017
<b>B.S. in Mechanical Engineering</b> , 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>	Gazebo, MuJoCo, Simulink, Simscape, OpenSim (Musculoskeletal Simulation)
<b>Design Tools:</b>	SolidWorks, Eagle

## WORK EXPERIENCE

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<b>Senior Robotics Engineer – Perception</b> Contoro Robotics, Austin, TX	Sept 2022 – Present
<ul style="list-style-type: none"><li><b>Led the development of a ROS-integrated, multi-functional robot perception pipeline</b> with object detection, segmentation, 6D pose estimation, optical character recognition, and teleoperation feedback, enhancing reliability and flexibility in real-world use.</li><li><b>Designed and implemented a multi-step hand-eye calibration methodology</b> for a multi-camera setup (eye-in-hand, eye-to-hand, and stereo), achieving localization accuracy within 0.5% of working distance.</li><li><b>Developed a human-in-the-loop segmentation workflow</b> with instance and zero-shot segmentation, achieving 0% operational failures and enhancing model robustness through continuous data annotation.</li><li><b>Established a decentralized machine learning pipeline</b> for customer-specific training, collaboratively enhancing a global model by 10% in performance and scalability.</li><li><b>Led impactful technical demonstrations</b> that played a pivotal role in securing \$4.7 million in Seed funding.</li></ul>	
<b>System Validation Engineer Intern</b> Harmonic Bionics, Inc., Austin, TX	
<ul style="list-style-type: none"><li><b>Developed C/C++ EtherCAT library</b> for motion controllers and sensor interfaces.</li><li><b>Built dual-motor haptic demo kits</b> for exhibitions, demonstrating advanced motion control capabilities.</li></ul>	

## RESEARCH EXPERIENCE

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<b>Graduate Research Assistant</b> University of Texas at Austin, Austin, TX	Aug 2017 – Aug 2022
<ul style="list-style-type: none"><li><b>Led three data-driven research initiatives</b> in human movement biomechanics to advance wearable robotics for post-stroke gait rehabilitation, culminating in four first-authored publications.</li><li><b>Supervised two master’s students in research</b> on gait biomechanics related to cognitive decline and exoskeleton design, resulting in two co-authored publications.</li><li><b>Managed the end-to-end research process</b>: study conceptualization, securing funding, data collection/analysis (kinematics, kinetics, and EMG), interpretation, visualization, publication authorship, and presentation.</li></ul>	

- **Collaborated with a multidisciplinary team** of neuroscientists, clinicians, and engineers to drive innovative solutions.

#### **Research Assistant**

Mar 2017 – July 2017

Korea Institute of Science and Technology (KIST), Seoul, South Korea

- **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.

#### **Graduate Research Assistant**

Mar 2016 – Feb 2017

Seoul National University, Seoul, South Korea

- **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.

#### **Research Assistant**

Sept 2014 – Feb 2016

The University of Texas Health Science Center (UTHealth), Houston, TX

- **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).

## **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 center on data-driven human movement biomechanics, gait rehabilitation, and wearable exoskeleton design, which are integral to developing personalized, effective solutions for post-stroke rehabilitation and assistive robotics.

1. **Lee, J.**, Seamon, A. Bryant., Lee, K. Robert., Kautz, A. Steven., Neptune, R. Richard., & Sulzer, J. (2024). Post-Stroke Stiff-Knee Gait: Are there different types or different severity levels?, *Journal of NeuroEngineering and Rehabilitation* (in review).
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.