Jeonghwan **Lee**

Mechanical Engineering · Rehabilitation Engineering · Robotics

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Education.

The University of Texas at Austin — *Austin, TX*

Ph.D. candidate in Mechanical Engineering — *Sept 2017 - present*

Graduate Research Assistant / Advisor: Dr.James Sulzer

Seoul National University — *Seoul, South Korea*

M.S. in Mechanical Engineering — *Feb 2017*

Graduate Research Assistant / Advisor: Dr.Kunwoo Lee

Hanyang University — *Seoul, South Korea*

B.S. in Mechanical Engineering — *Feb 2013*

Professional Appointments / Employment.

System Validation Engineer — *Austin, TX*

Harmonic Bionics, Inc. — *Summer 2018 & 2019*

- Developed an EtherCAT based DAQ systems and motor driver
- Conducted quality control on the developed electro-mechanical systems

Research Assistant — *Seoul, South Korea*

Korea Institute of Science and Technology — *Mar 2017 - July 2017*

- Developed a 3D integrated surgical simulator for orbital reconstructive surgery

Research Assistant — *Houston, TX*

The University of Texas Health Science Center at Houston — *Sept 2014 - Feb 2016*

- Developed a minimally invasive surgical robot system for brain and fetal surgery

Publications.

Kinematic comparison of single degree-of-freedom robotic gait trainers

Lee, J., Li, L., Shin, S.Y., Deshpande, A., Sulzer, J. — *2021*

Mechanism and Machine Theory, 159, p.104258..

Practical bending-angle calculation for an automated surgical plate bending apparatus

Park, S. M., Lee, J., Park, S., Lee, J. W., Park, M., Kim, Y., and Noh, G. — *2020*

Journal of Mechanical Science and Technology, 34(5), 2101-2109.

A novel approach to predicting human ingress motion using an artificial neural network.

Kim, Y., Choi, E.S., Seo, J., Choi, W.S., Lee, J., and Lee, K. — *2019*

Journal of biomechanics, 84, pp.27-35.

A Novel Noninvasive Patient-Specific Navigation Method for Orbital Reconstructive Surgery: A Phantom Study Using Patient Data.

Lee, J., Mekuria, K., Son, T.G., Jeong, W.S., Choi, J.W., and Kim, Y. — *2019*

Plastic and reconstructive surgery, 143(3), pp.602e-612e.

Three-dimensional orbital wall modeling using paranasal sinus segmentation.

Kim, H., Son, T.G., Lee, J., Kim, H.A., Cho, H., Jeong, W.S., Choi, J.W., and Kim, Y. *2019*

Journal of Cranio-Maxillofacial Surgery, 47(6), pp.959-967.

A novel motorized bending apparatus for surgical plates.

Park, S., Lee, J., Park, S.M., Noh, G., Lee, J.W., Park, M.S., and Kim, Y. *2019*

Journal of Mechanical Science and Technology, 33(8), pp.3743-3748.

Refereed Conference Papers.

Sensitivity comparison of inertial to optical motion capture during gait: implications for tracking recovery.

Lee, J., Shin, S.Y., Ghorpade, G., Akbas, T. and Sulzer, J. *2019*

In 2019 IEEE 16th International Conference on Rehabilitation Robotics (ICORR) (pp. 139-144). IEEE.

Conference Presentations.

*oral presentation/ **poster presentation

Sensitivity comparison of inertial to optical motion capture during gait: implications for tracking recovery**

Toronto, Canada

Lee, J., Shin, S.Y., Ghorpade, G., Akbas, T. and Sulzer, J. *June 24–28, 2019*

In 2019 IEEE 16th International Conference on Rehabilitation Robotics (ICORR)

Computational Model to Steer Super Elastic Needle for an MRI Guided Breast Intervention Robot*

Barcelona, Spain

Lee, J., Park, S.B., Lee, K. and Jo, Y.H. *June 20-24, 2017*

Computer Assisted Radiology and Surgery (CARS) 31st International Congress and Exhibition

Efficient registration methods between 2D X-ray and 3D CT data of different parts of human skeleton*

Jeju, South Korea

Woo, S., Lee, J., Kim, Y. and Lee, K. *Oct 26-28, 2016*

Asian Conference on Design and Digital Engineering (ACDDE) 2016

Research Project Experience.

Optimize hip-knee exoskeletal assistance for post-stroke individuals

The University of Texas at Austin, Austin, TX *Fall 2020 - Present*

- Design a hip-knee exoskeleton device
- Develop a musculoskeletal simulation frameworks to optimize exoskeletal assistance while avoiding a spastic response

Characterization of a stiff-knee gait (SKG) after neurological impairment

The University of Texas at Austin, Austin, TX *Fall 2020 - Present*

- Characterize a stiff-knee gait (SKG) by machine learning

Development an affordable, individual-specific robotic gait trainer for people with neurological injury

The University of Texas at Austin, Austin, TX *Sept 2017 - Spring 2019*

- Developed an affordable robotic gait trainer by 1DOF linkage mechanism
- Developed and evaluated mechanism synthesis methodology

Development of an 3D integrated system for cranio-maxillofacial surgery

Korea Institute of Science and Technology, Seoul, South Korea — *Mar 2017 - July 2017*

- Evaluated a 3D integrated surgical tool navigation method for orbital reconstructive surgery
- Developed 3D orbital wall modeling method by paranasal sinus segmentation
- Designed a motorized mandibular reconstruction plate bender machine

Development of an MR image-guided breast needle intervention robot system

National Cancer Center, Gyeonggi-do, South Korea — *Mar 2016 - Feb 2017*

- Developed a localization method of a flexible breast intervention needle by MR image-guided robot

Development of the human ingress/egress motion simulator by using a parametric human model to estimate damages on a vehicle interior material

Hyundai Motor Company, Gyeonggi-do, South Korea — *Mar 2016 - Feb 2017*

- Developed neural network based dynamic motion generation algorithm for vehicle ingress and egress motion
- Designed the vehicle mock-up

Development of a minimally invasive surgical robot system for brain and fetal surgery

The University of Texas Health Science Center at Houston, Houston, TX — *Sept 2014 - Feb 2016*

- Designed a surgical end-effector of the robot system
- Designed a modular manipulator unit

Development of 2D X-ray image to 3D CT image registration for surgical navigation system

Hyundai Heavy Industry, Gyeonggi-do, South Korea — *Sept 2013 - Aug 2014*

- Developed 2D and 3D medical image registration method for robotic TKA surgery
- Developed C-arm X-ray equipment calibration method

Teaching Experience.

Introduction to Robot Modeling and Control (ME397) — *Austin, TX*

Teaching Assistant, (Dr. James Sulzer), The University of Texas at Austin — *Spring 2021*

Mechatronics (ME340) — *Austin, TX*

Teaching Assistant, (Dr. Farshid Alambeigi), The University of Texas at Austin — *Fall 2019*

Mechatronics Laboratory (ME140L) — *Austin, TX*

Teaching Assistant, (Dr. Glenn Masada & Dr. Thomas Connolly), The University of Texas at Austin — *Fall 2018, Spring 2019, and Spring 2020*

Freshman Introduction to Research in Engineering (FIRE) program — *Austin, TX*

Graduate Student Mentor, The University of Texas at Austin — *Fall 2018 and Fall 2019*

Patents.

2017 **Automatic bending apparatus for surgical plate**, Application No: K09263 — *South Korea*

Honors / Awards / Fellowships.

2014 **GenDepot Poster Award**, Korean–American Scientists and Engineers Association — *Houston, TX*
2014 **Participation Award (4th place)**, CAD/CAM Software Contest — *Seoul, South Korea*
2014 **Merit-based Scholarship**, Seoul National University — *Seoul, South Korea*
2014 **Brain Korea 21 Plus**, Seoul National University — *Seoul, South Korea*
2011 **Academic Scholarship**, Hanyang University — *Seoul, South Korea*

Technical Skills.

Programming	C/C++, C#, Python, MATLAB, Mathematica, ROS, R Statistics
Design Tools	Solidworks, SolidEDGE, EAGLE
Engineering Tools	OpenSim, Simulink, LabView
Languages	English, Korean

Extracurricular Activity.

Military Service

South Korea

Republic of Korea Air Force

Sept 2006 - Nov 2008

- Sergeant
- Administrative Clerk