JEONGHWAN LEE

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PROFESSIONAL SUMMARY

- Highly driven engineer and researcher with 5+ years of experience in human subject research that requires deep knowledge of following:
    - Experimental design
    - Biomechanical signal processing
    - Motion analysis
    - Statistical modeling using a mixed-effects model
    - Cluster analysis
    - Design principle for wearable devices

- Excellent collaboration skills in inter- and multidisciplinary projects, as evidenced by authored and co-authored 5+ peer-reviewed publications from research projects consisting of engineers and clinical team

- Competence in hands-on prototyping and its verification, validation, reliability testing, and documentation

EDUCATION

PhD in Mechanical Engineering, University of Texas at Austin, Austin, TX   **Expected 2022**
MS in Mechanical Engineering, Seoul National University, Seoul, KR   **2017**
BS in Mechanical Engineering, Hanyang University, Seoul, KR   **2013**

TECHNICAL SKILLS

Programming	C/C++, Python, MATLAB, R
Design Tools	Solidworks, EAGLE
Engineering Tools	OpenSim, Simulink (real-time), Labview, Multisim
Experimental	Force sensors, IMU, EMG, Motion capture, Wearable metabolic system

PROFESSIONAL & RESERACH EXPERIENCE

University of Texas at Austin, Austin, TX   **Sept 2017 — Present**
Graduate Research Assistant
- Characterize post-stroke stiff-knee gait by time-series clustering and latent profile analysis to reveal gait phenotypes with different motor control deficits and to contribute phenotype-specific intervention

- Delineate effects of robotic exoskeletal gait assistance on quadriceps muscle to develop an optimal assistance strategy to suppress quadriceps muscle overactivation resulting in spasticity

- Research biomechanical effects of lower-limb exoskeletons' weight to design the most transparent hip-knee rigid exoskeleton robot for post-stroke gait rehabilitation via 20+ human subjects experiment

- Evaluated planar linkage designs for a single motor-driven robotic gait trainer in terms of human-like end-effector motion trajectory accuracy by an unbiased, generalized comparison to 100+ healthy individuals gait data using cross-validation

- Examined the sensitivity of inertial motion capture system to small changes in gait compared to the optical motion capture system based on a linear mixed-effects model

Harmonic Bionics, Inc., Austin, TX   **May 2019 — Aug 2019**
System Validation Engineer - Internship
- Managed system quality of mechatronics and software solutions for EtherCAT motion controller and sensor interface to ensure quality and effectiveness of products; devised hardware debugging tools and quality control frameworks to minimize failure rates

Harmonic Bionics, Inc., Austin, TX   **May 2018 — Aug 2018**
System Validation Engineer - Internship
- Built a source code library for EtherCAT motion controller and sensor interface to allow users to create their own application solutions

- Designed demonstration kits (e.g., haptics interface) of Esmacat products to exhibit at a tech conference

Korea Institute of Science and Technology (KIST), Seoul, KR   **Mar 2017 — July 2017**
Research Assistant
- Researched a non-invasive, patient-specific surgical navigation method for an orbital reconstructive surgery, improving registration and tool tracking accuracy by up to 50%

Seoul National University, Seoul, KR   **Mar 2016 — Feb 2017**
Graduate Research Assistant
- Devised a needle steering scheme with a pivoted super-elastic needle made of Nitinol for MR image-guided breast needle intervention robot, improving needle insertion angle and tip movement with zero actuator addition in robot
- Designed a low-cost (< $1K) vehicle mockup with four adjustable parameters for the research to predict human motion in ingress/egress movement using an artificial neural network
- Recruited ten healthy subjects, and collected human subject data including kinematic and kinetic data during vehicle ingress/egress trials

The University of Texas Health Science Center, Houston, TX   **Sept 2014 — Feb 2016**
Research Assistant
- Designed surgical grasper with an outer diameter of less than 3mm using an elastic element
- Designed and prototyped a cable-driven continuum robotic manipulator for a minimally invasive single-port surgery

Seoul National University, Seoul, KR   **Sept 2013 — Aug 2014**
Graduate Research Assistant
- Researched a calibration method of C-arm X-ray machine to develop 2D/3D medical image registration method for a robot-assisted total knee arthroplasty surgery

TEACHING EXPERIENCE

University of Texas at Austin   **Feb 2018 — May 2021**
Graduate Teaching Assistant   Austin, TX
- Introduction to robot modeling and control
- Mechatronics
- Mechatronics laboratory
- Freshman introduction to research in engineering (FIRE) program

SELECTED PUBLICATIONS (3 OF 7)

[1] **J. Lee**, L. Li, S. Y. Shin, A. D. Deshpande, and J. Sulzer, "Kinematic comparison of single degree-of-freedom robotic gait trainers," *Mechanism and Machine Theory*, vol. 159, p. 104 258, 2021.

[2] **J. Lee**, S. Y. Shin, G. Ghorpade, T. Akbas, and J. Sulzer, "Sensitivity comparison of inertial to optical motion capture during gait: Implications for tracking recovery," in *2019 IEEE 16th International Conference on Rehabilitation Robotics (ICORR)*, 2019, pp. 139–144.

[3] **J. Lee**, K. Mekuria, T. G. Son, W. S. Jeong, J. W. Choi, and Y. Kim, "A novel noninvasive patient-specific navigation method for orbital reconstructive surgery: A phantom study using patient data," *Plastic and reconstructive surgery*, vol. 143, no. 3, 602e–612e, Mar. 2019.