Hyunsoo Shin, Ph.D.

CONTACT INFORMATION

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RESEARCH INTERESTS

Robotics: Vision-Language-Action (VLA) models, Multi-fingered robot hands, Grasp point detection, Robot calibration
Computer Vision: 3D computer vision, Monocular metric depth estimation, Sensor fusion
Virtual Reality: Immersive virtual reality
Neuroscience: Noninvasive brain stimulation, Proprioception

PROFESSIONAL SKILLS

Core Expertise: Vision-Language-Action (VLA) model, 6D pose estimation, and robot manipulation; Real-time robot control with EtherCAT/CAN communication; Noninvasive brain stimulation
Languages & Libraries: C++, Python, PyTorch, ROS2, MuJoCo, OpenCV, Open3D, Isaac Gym

EDUCATION

Hanyang University, Republic of Korea

Ph.D., Electrical and Electronic Engineering, Feb 2023

- Title: "Development and Application Robotic Transcranial Magnetic Stimulation"
- Advisor: Sungon Lee

M.S., Electronic Systems Engineering, Feb 2017

- Title: "Control of a robot for non-invasive brain stimulation using position based visual servoing"
- Advisor: Sungon Lee

B.S., Electronic Systems Engineering, Feb, 2015

- Graduation Project: "Vibration sensing touch input device using accelerometers"
- Advisor: Youngjin Choi

RESEARCH EXPERIENCE

Research Institute of AI Convergence, Hanyang University

- Research Assistant Professor, Mar 2026 ∼ Present
  - Member of the Robotic Cognition & Manipulation Lab (RoCogMan), advised by Prof. Sungon Lee and Prof. Ji-Hun Bae

Research Institute of Engineering and Technology, Hanyang University

- Research Assistant Professor, Mar 2025 ∼ Feb 2026
- BK Postdoctoral Research Fellow, Mar 2023 ∼ Feb 2024

KU Leuven, Belgium

- Visiting Scholar, Jan 2020 ∼ Jul 2020
  - Research topic: Extraction of shoreline for autonomous shipping

- Professor : Peter Slaets (Intelligent Mobile Platform (IMP) Research Group)

Lectures

Research Assistant Professor, Hanyang University (Mar 2025 ∼ Present)

- 2026 Spring
  - ROB1001: Basic Introduction to Robotics (Link)
- 2025 Fall
  ROB4009: Robot Programming (Link)
- 2025 Spring
  ROB1001: Basic Introduction to Robotics
- 2024 Fall
  ROB4009: Robot Programming
- 2024 Spring
  ROB1001: Basic Introduction to Robotics

Assistant

- Research Assistant, Feb 2015 ∼ Feb 2019
  - Professor : Sungon Lee

Project (Research Grants)

- Development of robotic hand tactile intelligence technology based on tactile data learning for manipulating unstructured multiple objects, KEIT, Jul 2024 ∼ Mar 2026 (Participating Researcher)
- BM development, robot implementation and verification for SDR domain service, KEIT, Sep 2024 ∼ Mar 2026 (Participating Researcher)
- Development of 6D pose estimation technology for markerless navigation, NRF, Mar 2022 ∼ Mar 2026 (Participating Researcher)
- Study on sensation generated by non-invasive nerve/muscle stimulation for realistic and immersive extended reality, NRF, Jun 2022 ∼ Feb 2025 (Co-investigator)
- Development of robotic work control technology capable of grasping and manipulating various objects in everyday life environment based on multimodal recognition and using tools, KEIT, Apr 2018 ∼ Dec 2021 (Participating Researcher)
- Mobile Manipulator-based Obstacle Avoidance and Path Generation Technology Development, Hyundai NGV, Sep 2020 ∼ Jul 2021 (Participating Researcher)
- Global expert training for Korea-Belgium future innovative growth, KIAT, Dec 2019 ∼ Jul 2020 (Participating Researcher)
- Automatic positioning and navigation system developed for brain stimulation device for TMS, MSIT, Jun 2016 ∼ Jun 2018 (Participating Researcher)
- Development of Non-invasive Brain Stimulation System for Innovative Interaction, MSIT, Mar 2015 ∼ Aug 2019 (Participating Researcher)

International Journal

G. Lee, **H. Shin**, S. Lee and J.-H. Bae, "Design of a Passive Finger-Tip Changer for Modular Robotic Manipulation," *IEEE Robotics and Automation Letters (RA-L)*, 2026.

H. Hwang, **H. Shin**, J.-H. Bae and S. Lee, "ICP Enhancement Algorithm for 6D Pose Tracking of Household Objects," *IEEE Access*, 2025.

R. Algabri, **H. Shin**, A. Abdu, J.-H. Bae and S. Lee, "Wquatnet: Wide range quaternion-

based head pose estimation," *Journal of King Saud University - Computer and Information Sciences*, Vol. 37, No. 3, p. 24, 2025.

H. Shin, J. Lee, G. Lee, J. Park and S. Lee, "Effect of vibrotactile feedback and perception induced by transcranial magnetic stimulation over the primary motor cortex in virtual hand illusion," *Virtual Reality*, Vol. 28, No. 4, p. 159, 2024.

R. Algabri, **H. Shin** and S. Lee, "Real-time 6dof full-range markerless head pose estimation," *Expert Systems with Applications*, Vol. 239, p. 122293, 2024.

H. Shin, H. Jeong, W. Ryu, G. Lee, J. Lee, D. Kim, I.-U. Song, Y.-A. Chung and S. Lee, "Robotic transcranial magnetic stimulation in the treatment of depression: a pilot study," *Scientific Reports*, Vol. 13, No. 1, p. 14074, 2023.

J. Seo, **H. Shin**, S. Cho, S. Lee, W. Ryu, S.-C. Han, D.-H. Kim and G.-H. Kang, "A phased array ultrasound system with a robotic arm for neuromodulation," *Medical Engineering & Physics*, Vol. 118, No. 1, p. 104023, 2023.

J. Lee†, **H. Shin**† and S. Lee, "Development of a wide area 3D scanning system with a rotating line laser," *Sensors*, Vol. 21, No. 11, p. 3885, 2021.

H. Shin, W. Ryu, S. Cho, W. Yang and S. Lee, "Development of a spherical positioning robot and neuro-navigation system for precise and repetitive non-invasive brain stimulation," *Applied Sciences*, Vol. 9, No. 21, p. 4561, 2019.

Papers in Preparation

H. Shin and S. Lee, "Robust Hand-Eye Calibration Using Well-Conditioned Motion Guidance," *Robotics and Computer-Integrated Manufacturing* (to be submitted)

Domestic Journal

H. Shin, M. R. Afzal and S. Lee, "Segmentation-Based Depth Map Adjustment for Improved Grasping Pose Detection," *The Journal of Korea Robotics Society*, Vol. 19, No. 1, pp. 16-22, 2024.

H. Shin, J. Kim, and S. Lee, "Toward Precision in Brain Stimulation Technology: Fusion of Neuro-navigation and Robotics," *Robot and Human*, Vol. 22, No. 4, pp. 33-41, 2025.

Conference Presentations

G. Lee, **H. Shin**, S. Lee, and J. Bae, "Design of a magnetically coupled passive remote center compliance for error compensation," *Proceedings of the KSMTE Conference*, pp. 142-142, 2025. **Best Paper Award**

H. Shin, D. Kim, J. Kim, S. Lee, and J. Bae, "Real-time in-hand 6-DoF object pose estimation based on tactile sensing," *Proceedings of the KSMTE Conference*, pp. 201-201, 2025. **Best Paper Award**

J. Kim, **H. Shin**, and S. Lee, "An Optimized Measurement Method for the Magnetic Field Generated by Neural Stimulation Medical Devices," *Proceedings of the KICS Conference*, pp. 88-89, 2024.

J. Kim, **H. Shin**, and S. Lee, "A Study on the TMS-guided Electrical Field Vector Distribution for Haptic Sensory Implementation for Metaverse systems," *Proceedings of the KICS Conference*, pp. 146-147, 2023.

H. Shin et al., "Development of Positioning Robot and Neuro-Navigation System for Non-Invasive Brain Stimulation," *Proceedings of the 12th Korea Medical Robotics Con-*

ference, 2021. **Best Paper Award**

S. Van Baelen, **H. Shin**, G. Peeters, M. R. Afzal, G. Yayla and P. Slaets, "Preliminary results on increased situational awareness for inland vessels using onboard lidar," *Global Oceans 2020: Singapore–US Gulf Coast*, pp. 1-6, 2020.

H. Shin, H. Hwang, H. Yoon and S. Lee, "Integration of deep learning-based object recognition and robot manipulator for grasping objects," *Proceedings of the 16th International Conference on Ubiquitous Robots (UR)*, pp. 174-178, 2019.

H. Shin, W. Ryu and S. Lee, "Design of a 6-DOF Serial Manipulator for Transcranial Magnetic Stimulation," *Asian Conference on Computer Aided Surgery*, 2016.

Intellectual Property (Patent)

- Apparatus and Method for Generating Welding Path, 10-2024-0197854, KR (Filed, 2024)
- Multi-Camera Apparatus and Control Method Thereof, 10-2673936, KR (Registered, 2024)
- MULTI-DEGREE-OF-FREEDOM MEDICAL ROBOT, WO 2022/092554 A1, PCT (Registered, 2022)
- MEDICAL MULTI-DOF ROBOT, 1020200139611, KR (Registered, 2020)
- A robot having a joint structure using parallel mechanism, 10-1914153, KR (Registered, 2018)

Award

Best Paper Award, KSMTE Autumn Conference (2025)

Excellence Award, The 21st Korea Robotics Society Annual Conference (RED Show)(2026)

Best Paper Award, KSMTE Spring Conference (2025)

Best Paper Award, The Journal of Korea Robotics Society (2025)

Best Paper Award, Korean Society of Medical Robotics (2021)

Bronze prize, Capstone Design Contest of Hanyang University (2014)

Scholarship

Lotte Scholarship Foundation, Republic of Korea, (2009 $\sim$ 2010)