

WONKYUNG DO

482 Wilton Ave, Palo Alto, CA 94306, United States
dowon1379@gmail.com ◊ [Website](#) ◊ [Google Scholar](#)

RESEARCH INTERESTS

Tactile sensing, dexterous manipulation, machine learning, monocular depth and force estimation, hardware design, control theory, and human-robot interaction

EDUCATION

Ph.D. Mechanical Engineering, The Leland Stanford Junior University *Jan 2026*
Academic advisor: Monroe Kennedy III (Stanford University)

M.S. Mechanical Engineering, The Leland Stanford Junior University *June 2022*
Academic advisor: Monroe Kennedy III (Stanford University)

B.S. Mechanical Engineering, Seoul National University *Mar 2019*
Academic advisors: Dongjun Lee, Insoon Yang, and Jin Young Choi
Overall GPA: **4.03** / 4.30 , Major GPA: **4.10** / 4.30

RESEARCH EXPERIENCE

Improving Robotic Assistant Dexterity, Research Assistant *Oct 2020 - Sep 2025*
Prof. Monroe Kennedy III, Dept. of Mechanical Engineering, Stanford University

- Pioneered the lab's tactile sensing research platform from the ground up, developing the [DenseTact](#) family ([2.0](#), [Mini](#)) and [TensorTouch](#)—high-resolution optical sensors for precise force and shape estimation. [[Video](#)]
- Engineered a physics-informed calibration framework ([TensorTouch](#)) that combines Finite Element Analysis (FEA) and Deep Learning to reconstruct dense 3D stress tensors and surface deformation.
- Developed an inter-finger manipulation system enabling the grasping, control, and classification of micro-scale objects in cluttered environments utilizing vision-based tactile feedback. [[Website](#)]
- Established a novel methodology for the tactile exploration and detection of embedded objects within soft materials, enhancing robotic perception in non-rigid environments. [[Website](#)]

Visual-inertial Hand Tracking with Occlusion Resilience, Research Intern *Mar 2018 - June 2019*
Prof. Dongjun Lee, Dept. of Mechanical Engineering, Seoul National University

- Developed AR-based UAV interaction interface using HMD and hand-tracker.
- Proposed and developed algorithm and AR interface for IMU-based hand tracker through HMD and stereo camera
- Visual-inertial hand motion tracking with robustness against occlusion, interference, and contact: [paper](#)
- Based on C/C++, C# and Unity3D.

Management System for Electric Vehicle Charging Station, Research Intern *June 2018 - Aug 2018*
Prof. Insoon Yang, Dept. of Electrical and Computer Engineering, Seoul National University

- Proposed and developed an optimal management system for electric vehicle charging station using approximate dynamic programming (ADP) based on a realistic EV demand model in MATLAB.
- Awarded 2nd prize at BMW X SNU Research Competition and independently wrote a grant proposal for the BMW Korea Group and Seoul National University (\$2,000).

WORKING EXPERIENCE

RAI Institute (formerly Boston Dynamics AI Institute), Boston, Research Intern *June 2024 - Sept. 2024*
Main Advisors: Dr. Seun Araromi, Dr. Lael Odhner

- Developed a visionless tactile sensing system for in-hand reorientation of baseballs, using particle filtering to stochastically estimate the ball's pose.
 - Applied Gaussian Process to estimate the delta of roll, pitch, and yaw for evolving each particle.
 - Used template matching to determine the maximum likelihood of each particle's pose.
 - Integrated a force-sensitive resistor (FSR) array with underactuated hand for tactile feedback.

- Achieved high-frequency sensing (80 Hz) and ensured mechanical robustness with 5,000+ trials.
- With 5 iterations of particle filtering, reduced ball pose errors: from 30° to 18° in roll, and minimal errors in pitch and yaw.
- Optimized sensor conformality and spatial resolution through material design.
 - Improved tactile contact measurement and demonstrated system robustness.

Naver Labs, Korea, Research Intern

July 2017 - Feb. 2018

Main Advisor : Dr. Sangok Seok

- Proposed and developed Shelly, a robot designed to reduce childrens' aggressive behavior.
 - [NBC News](#) article about Shelly: "Robot abuse is real, but maybe this little tortoise can help."
 - More articles about Shelly: [Guardian](#), [IEEE Spectrum](#), [Techcrunch](#), [Video](#) of Shelly.
 - Designed robot hardware and implemented social touch pattern recognition system using 3D-CNN, LSTM, and HMM.
- Developed controller for two-wheeled robot that is robust under strong perturbations.
 - Designed constrained explicit model predictive control (MPC) on two-wheeled inverted pendulum robot.
- Researched and proposed company directives on technology trends and key players for HD maps and advanced driver-assistance systems (ADAS). This led to a partnership with HERE technologies, a German mapping and location company.

PUBLICATIONS AND PATENTS

Publications

- **W. Do**, M. Strong, A. Swann, B. Lei, and M. Kennedy, "**TensorTouch: Calibration of Tactile Sensors for High Resolution Stress Tensor and Deformation for Dexterous Manipulation**", *Accepted to Transaction on Robotics* [[arXiv](#)]
- Y. You, **W. Do**, A. Swann, R. Antonova, M. Kennedy, and L. Guibas, "**DOT-Sim: Differentiable Optical Tactile Simulation with Precise Real-to-Sim Physical Calibration**", *Accepted to ICRA 2026*
- A. Swann, M. Strong, **W. Do**, G. S. Camps, M. Schwager, and M. Kennedy, "**Touch-GS: Visual-Tactile Supervised 3D Gaussian Splatting**", *IROS 2024*, Oct 2024 [[arXiv](#)]
- **W. Do**, A. Dhawan, M. Kitzmann, and M. Kennedy, "**DenseTact-Mini: An Optical Tactile Sensor for Grasping Multi-Scale Objects From Flat Surfaces**", *2024 International Conference on Robotics and Automation (ICRA, Best paper award finalist in Manipulation)*, May 2024 [[arXiv](#)]
- J. Solano-Castellanos, **W. Do**, and M. Kennedy, "**Embedded Object Detection and Mapping in Soft Materials Using Optical Tactile Sensing**", *SN Computer Science*, 5, 1-11., Apr 2024 [[doi](#)]
- **W. Do**, B. Aumann, C. Chungyoun, and M. Kennedy, "**Inter-finger Small Object Manipulation with DenseTact Optical Tactile Sensor**", *IEEE Robotics and Automation Letters*, Nov 2023 [[doi](#)]
- **W. Do**, B. Jurewicz, and M. Kennedy, "**DenseTact 2.0: Optical Tactile Sensor for Shape and Force Reconstruction**", *2023 International Conference on Robotics and Automation (ICRA)*, May 2023 [[doi](#)]
- **W. Do** and M. Kennedy, "**DenseTact: Optical Tactile Sensor for Dense Shape Reconstruction**", *2022 International Conference on Robotics and Automation (ICRA)*, May 2022 [[doi](#)]
- Y. Lee, **W. Do**, H. Yoon, J. Heo, W. Lee, and D. Lee, "**Visual-inertial hand motion tracking with robustness against occlusion, interference, and contact**", *Science Robotics*, Sept 2021 [[doi](#)]
- H. Ku, J. J. Choi, S. Jang, **W. Do**, S. Lee, and S. Seok, "**Online Social Touch Pattern Recognition with Multi-modal-sensing Modular Tactile Interface**", *2019 16th International Conference on Ubiquitous Robots (UR)*, June 2019 (co-first author) [[doi](#)]
- H. Ku, J. J. Choi, S. Lee, S. Jang, and **W. Do**, "**Designing Shelly, a Robot Capable of Assessing and Restraining Children's Robot Abusing Behaviors**", *13th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Chicago, USA, Mar 2018 (co-first author, Late-Breaking Report) [[doi](#)]
- H. Ku, J. J. Choi, S. Lee, S. Jang, and **W. Do**, "**Shelly, a Tortoise-Like Robot for One-to-Many Interaction with Children**", *13th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Chicago, USA, Mar 2018 (co-first author, Student Design Competition) [[video](#)], [[doi](#)]
- **W. Do**, S. Jang, and J. Choi, "**Constrained Explicit Model Predictive Control of Two-wheeled Inverted Pendulum Robot under Strong Perturbation**", *13th Korea Robotics Society Annual Conference (KRoC)*, Gangwon, Korea, Jan 2018 (all co-authors)
- H. Ku, **W. Do**, S. Lee, S. Jang, and J. Choi, "**Shelly: An Educational Robot for Restraining Children's Abusive Behaviors towards Robots**", *13th Korea Robotics Society Annual Conference (KRoC)*, Gangwon, Korea, Jan 2018 (all co-authors, Best Undergraduate Paper)

- J. Park, J. Lim, D. Kang, **W. Do**, I. Jeung, et al., “**Bring-Back Cansat Mission for a simulated resupply mission on a remote planet**”, *The Korean Society for Aeronautical & Space Sciences Conference (KSAS)*, Jeju, Korea, Nov 2014 (all co-authors) [[link](#)]

Patents

- M. Kennedy III and W. Do, “Optical Tactile Sensor”, US Patent Appl. No. 18/714,268, filed Jan. 16, 2025.
- KR10-2018-0026268, “METHOD AND DEVICE FOR PROCESSING SENSING DATA ASSOCIATED WITH A USER’S TOUCH INTERACTION”, Korea.

HONORS AND AWARDS

- Best Paper Award Finalist in Manipulation, ICRA 2024** *May 2024*
For paper ‘DenseTact-Mini: An Optical Tactile Sensor for Grasping Multi-Scale Objects From Flat Surfaces’
- 2019 Graduate Study Fellowship (\$25,000/yr), Kwanjung Educational Foundation** *Sep 2019 -2024*
Supports Korean students pursuing a Ph.D. in the U.S. for 5 years
- Presidential Science Scholarship (\$10,000/yr), Korea Student Aid Foundation** *2012 - 2018*
Full tuition and partial stipend awarded for academic excellence.
- 1st prize at the Student Design Competition, 13th ACM/IEEE International Conference on Human-Robot Interaction (HRI)** *Mar 2018*
For “Shelly, a Tortoise-Like Robot for One-to-Many Interaction with Children.”

TEACHING EXPERIENCE

- Course Assistant, Stanford University *Fall 2020, Fall 2021*
 - Dynamics (ENGR 15)
- Tutor at College of Engineering, Seoul National University *Fall 2018 - Feb 2019*
 - Engineering Mathematics 2 (033.015), Dynamics (M2794.001200), and Fluid Mechanics (M2794.001300)
- Tutor at Department of Physics, Seoul National University *Fall 2018 - Feb 2019*
 - Basic Physics 2 (034.006)

TECHNICAL STRENGTHS

- Programming Languages
 - C/C++, Python, C#, MATLAB, and LabVIEW
- Software and Tools
 - Pytorch, Solidworks, ROS, Abaqus, Unity3D, TensorFlow, and CATIA

REFERENCE

- Prof. Monroe Kennedy III**, Professor in Mechanical Engineering, Stanford University, US (monroek@stanford.edu)
- Prof. Dongjun Lee**, Professor in Mechanical Engineering, Seoul National University, Korea (djlee@snu.ac.kr)
- Prof. Insoon Yang**, Professor in Electrical Engineering, Seoul National University, Korea (insoonyang@snu.ac.kr)
- Dr. Sangok Seok**, Executive Vice President, Naver Labs, Korea (sangok.seok@navercorp.com)