Robin Inho Kee

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Education

University of Michigan **Aug 2023 – Dec 2024(expected)**
Master of Science in Mechanical Engineering *Ann Arbor, MI, USA*

- GPA: 4.0/4.0
- Relevant Course: Math for Robotics (A+), Linear Systems Theory (A0), Design of Digital Control Systems (A0), Computational and Data-Driven Methods in Engineering (A+), Model Predictive Control (A+), Robot Kinematics and Dynamics (A+), Adaptive Control (ing), Convex Optimization Methods in Control (ing)

Yonsei University **Mar 2016 – Feb 2022**
Bachelor of Science in Mechanical Engineering | Military Service: Oct 2020 – Feb 2022 *Seoul, South Korea*

- Cumulative GPA: 3.69/4.0 (Upper: 3.92/4.0, Major: 3.87/4.0)
- Thesis: Linear motor active damper for precision manufacturing vibration reduction (Advisor: Prof. Jun Young Yoon)

Research Interest

Learning-based Control, Data-Driven Inference, Control Barrier Function, Uncertainty-Aware Control, Safety Governor

Publications

: Equally Contributed

In progress

1. **Robin Inho Kee***, Taehyeun Kim*, Anouck Girard, and Ilya Kolmanovsky, "Safe Adaptive Cruise Control for Autonomous Vehicles Using MPC-CBF and Time Shift Governor", *manuscript in preparation* [Project Page]

Journals

1. **Robin Inho Kee**, Dahyun Nam, and SeokJun Bu, "Disentangled Prototyping with Triplet-trained Prototypical Network for Few-shot Learning in In-vehicle Noise Classification", *IEEE Access*, 2024 [Paper] [Project Page]
2. Hobin Kim, Jongbok Lee, Sunwoo Kim, **Inho Kee**, Sangdo Kim, Shinsuk Park, Kanggeon Kim, and Jongwon Lee, "Gait Phase Estimation Method Adaptable to Changes in Gait Speed on Level Ground and Stairs", *The Journal of Korea Robotics Society*, 2023
3. Byonghun Kim, Sunghyun Hong, Inwook Oh, Yangwoo Lee, **Inho Kee**, and Saeyong Lee, "Measurement of ankle joint movements using IMUs during running", *Sensors*, 2021 [Paper] [Project Page]

Conferences

1. Taekyung Kim, **Robin Inho Kee**, and Dimitra Panagou, "Learning to Refine Input Constrained Control Barrier Functions via Uncertainty-Aware Online Parameter Adaptation", *2025 IEEE International Conference on Robotics and Automation (ICRA)*, *Submitted* [Arxiv] [Project Page] [Github]
2. Taehyeun Kim*, **Robin Inho Kee***, Ilya Kolmanovsky, and Anouck Girard, "Deep Learning-accelerated Time Shift Governor for Spacecraft Proximity Operations in Elliptic Orbits", *AIAA SciTech 2025 Forum*, *Accepted* [Project Page]
3. Dahyun Nam, **Inho Kee**, Seok-Jun Bu, and SungBae Cho, "Dynamic Prototype-guided Memory Replay for In-Vehicle Noise Classification", *Korea Data Mining Society (KDMS) 2023*, **SAS Student Paper Award (Honorable Mention)**
4. Woojin Jo, Sehyun Hwang, **Inho Kee**, and Soohong Lee, "An Intelligent Lock-Out Tag-Out System for Monitoring and Control of the Locked Device", *2019 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)* [Project Page]

Patents

1. Woojin Jo, **Inho Kee**, Sehyun Hwang, Soohong Lee, "Smart LOTO system", Korean patent 10-2019-0192612
2. Youngho Seo, Hyeseong Lee, **Inho Kee**, Gilho Lee, Seongchan Jun, "Manufacturing Method of Multi-Gas Sensor Using Ultra-Thin Film Lens", Korean patent 10-2019-0044429

Research Experiences

Graduate Research Assistant, University of Michigan **Jan 2024 – Present**
Vehicle Optimization, Dynamics, Control and Autonomy Lab (Advisor: Prof. Anouck Girard) *Ann Arbor, MI, USA*

- Developed an LSTM-accelerated Time Shift Governor (DL-TSG) for spacecraft rendezvous and docking in elliptical orbits, implementing a phase-adaptive sliding window and a mission-specific loss function to optimize the handling of dynamic input sizes, ensuring precise time shift predictions and adherence to space mission constraints [Project Page]
- Integrated Model Predictive Control (MPC), Control Barrier Functions (CBF), and a Time Shift Governor (TSG) to enhance safety and efficiency in adaptive cruise control systems for autonomous vehicles, ensuring compliance with dynamic constraints and optimizing performance [Project Page]

Researcher, Yonsei University **Mar 2023 – Aug 2023**

Soft Computing Lab (Advisor: Dr. Seok-Jun Bu) *Seoul, South Korea*

- Engineered a disentangled prototypical convolutional network for advanced in-vehicle noise classification, enhancing few-shot learning in automotive acoustic analysis with accuracy of 96.81% on a 9-way 1-shot task [Project Page]
- Presented novel in-vehicle noise classification deep learning model using dynamic prototype-guided memory replay method demonstrating 6.38% improvement in accuracy

Research Intern, Korea Institute of Science and Technology **Jul 2022 – Jul 2023**

Assistive and Interactive Robotics Lab (Advisor: Dr. Jongwon Lee) *Seoul, South Korea*

- Improved wearable hip complex assistive robot with 4DOF active joint [Project Page]
- Developed a deep learning model for estimating foot trajectory by fusing data from hip exoskeleton and insole sensors, achieving 100% accuracy in identifying sarcopenia patients through gait parameter analysis.
- Led and administered motion capture system (Motion Analysis) experiments over 40 subjects, including patients and outdoor hiking experiments over 200km

Research Engineer, Yonsei University **May 2020 – May 2021**

Integrative Sports Science Research Lab (Advisor: Prof. Byong Hun Kim) *Seoul, South Korea*

- Initiated and developed a portable real-time ankle angle analysis audio-visual feedback system [Project Page]
- Validated IMU measurement of joint kinematics against Vicon system using a developed wearable device
- Conceptualized subtalar joint angle estimation algorithm with random forest method

Selected Awards and Honors

SAS Student Paper Award, Conference of Korea Data Mining Society, Korea Data Mining Society, 2023
1st Place, International S.M.A.R.T Startup Competition, Innovative Technology and Energy Center, 2020
2nd Prize, Robot Open Source Lab, Samsung Open Source Conference, 2019
Science and Engineering Undergraduate Internship Program Scholarship Yonsei University, 2020
Academic Excellence Scholarship Yonsei University, 2018, 2019
Academic Honors in Yonsei University, 2019, 2020
Academic Highest Honors in Yonsei University, 2019, 2020

Extracurricular experience

Yonsei University Alumni Association at the University of Michigan **Jul 2024 – Present**

Vice President *University of Michigan, MI, USA*

Roboin, Robotics club **Jun 2018 – Aug 2023**

Advisory Committee (2020-2023), President (2019) *Yonsei University, Seoul, South Korea*

- Administered and directed various seminars, projects, and competitions related to robotics
- Selected mainly led projects
  - Autonomous fire extinguisher (Autonomous driving, detecting, and extinguishing heat source) [Project Page]
  - Teo-Jansen mechanism autonomous robot (Completed missions using OpenCV and tiny-YOLOv4) [Project Page]

Military Service

1st Fighter Wing, Republic of Korea Air Force **Oct 2020 – Jul 2022**

Staff Sergeant, Military Intelligence Airman *Gwangju, South Korea*

- Received honorable discharge and recognized as the top sharpshooter among over a thousand peers.
- Enhanced command decision-making by delivering critical intelligence briefings and analyzing national security threats.