

Yongseok Kwon

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EDUCATION

University of Michigan

M.S.E. in Mechanical Engineering

Ann Arbor, MI

Aug. 2020 – Aug. 2022

- Focus: Robotics, Motion Planning, Control, Optimization, Deep Learning
- GPA: 4.0/4.0

Ulsan National Institute of Science and Technology (UNIST)

B.S. in Mechanical and Aerospace Engineering, Human Factors Engineering

Ulsan, Republic of Korea

Mar. 2016 – Feb. 2020

- Honors: *Summa Cum Laude*
- GPA: 3.94/4.3

PUBLICATIONS

- Jonathan Michaux, Qingyi Chen, **Yongseok Kwon**, Ram Vasudevan. “Reachability-based Trajectory Design with Neural Implicit Safety Constraints.” *Robotics: Science and Systems*, Daegu, Republic of Korea, 2023. [[webpage](#), [arXiv](#), [code](#)]

EXPERIENCE

Korea Army Research Center for Future and Innovation (KARCFI), Republic of Korea Army

Feb. 2023 – Aug. 2024

Robotics Researcher (Mandatory Military Obligation)

- Conducted fieldwork near the Korean Demilitarized Zone to identify technological needs for national defense.
- Managed national defense research initiatives with a specific focus on unmanned reconnaissance systems.
- Formulated proposals for national defense projects, successfully securing grants totaling up to 20 billion Korean Won, approximately 15 million U.S. Dollars.

Robotics and Optimization for Analysis of Human Motion (ROAHM) Lab &

Jul. 2021 – Jan. 2023

Ford Center for Autonomous Vehicles (FCAV), University of Michigan

Jun. 2022 – Jan. 2023

Research Assistant & Research Engineer

Advisor: Prof. Ram Vasudevan

- Developed a Python framework for parallel reachable set computation using polynomial zonotopes, resulting in a 2,000-fold speed enhancement. [[webpage](#), [code](#)]
- Trained a neural signed distance function between reachable workspace and surrounding objects using Eikonal loss.
- Developed a novel trajectory planner with neural implicit constraints, achieving a speed of 40 Hz for 7 DoF robot arm.
- Created a provably safe reinforcement learning algorithm incorporating polynomial zonotope-based safety shield.

Locomotor Control Systems (LOCO) Lab, University of Michigan

Jan. 2021 – May 2021

Research Assistant

Advisor: Prof. Robert D. Gregg IV

- Trained a neural network for a gait model with positional encoded gait phase based on human walking data.
- Designed a gait state estimator using an Extended Kalman Filter (EKF) integrated with the neural gait model.
- Demonstrated real-time swing motion of an EKF-based controller using open-source robotic leg hardware.

Bio-Robotics and Control (BiRC) Lab, UNIST

Mar. 2019 – Jul. 2019

Research Intern

Advisor: Prof. Joonbum Bae

- Designed a novel decoupling mechanism for tendon-driven serial link robots.
- Managed various components of a hydraulic robot arm, including hydraulic actuators, encoders, and assembly.

COURSE PROJECTS

Transformers for Motion Planning, University of Michigan

Fall 2021

Course: Introduction to Robotic Manipulation

Advisor: Prof. Nima Fazeli

- Generated expert dataset via trained agent for offline reinforcement learning.
- Deployed the decision transformer for a multi-link arm reaching task.

Model Predictive Control for Autonomous Car, University of Michigan

Fall 2021

Course: Self Driving Car

Advisor: Prof. Ram Vasudevan

- Implemented a high-level planner to predict waypoints for lane-changing maneuvers in autonomous driving.
- Formulated convexified collision avoidance constraints for trajectory planning in dynamic racing scenarios.

UAV Navigation via Dubins Path Planning, UNIST

Spring 2019

Course: UAV Flight Control and Simulation

Advisor: Prof. Hyondong Oh

- Developed a comprehensive simulation dynamics model and a tracking controller for UAV navigation.
- Implemented a Dubins-curve-based RRT to generate paths under kinematic constraints for UAVs.

SKILLS

Programming

Python, MATLAB

Software

IPOPT, Gurobi, OSQP, MuJoCo

Frameworks and Others

Pytorch, Stable-Baseline3, Weights & Biases, Linux, Conda, Git

HONORS AND AWARDS

National Science and Engineering Scholarship, Korea Student Aid Foundation (KOSAF)

2018 – 2019

- Full-tuition scholarship for the last two years of undergraduate studies.

Academic Performance Scholarship, UNIST

2016 – 2017

- Full-tuition scholarship for the first two years of undergraduate studies.