Minhyuk Park

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EDUCATION

PhD, Computer Science,   Aug 2024 - now
Texas State University, San Marcos, Texas, United States   Expected grad: Sep 2027

Master of Science, Computer Science,   Mar 2022 - Aug 2024
Ulsan National University of Science and Technology (UNIST), Ulsan, South Korea
Dissertation: Wind Field Modeling for Formation Planning in Multi-Drone Systems

Bachelor of Engineering (Dual), Mechanical and Aerospace Engineering,   Feb 2022
Bachelor of Engineering (Dual), Computer Science and Engineering,   Feb 2022
Ulsan National University of Science and Technology (UNIST), Ulsan, South Korea

TECHNICAL SKILLS

- **Artificial Intelligence**: Computer Vision, Reinforcement learning, Data-based Trajectory prediction
- **Simulators**: Gazebo, Airsim, Moveit Library for robotic arms
- **Embedded Systems**: Jetson Xavier NX, Raspberry Pi, Pixhawk, Arduino, Robotis OpenCR
- **Robot Platforms**: Ardupilot drones, Crazyflie, Turtlebot 3 and 4, Kuka Youbot, Husky A200
- **Sensors**: Optitrack Motion Capture System, Real-Time Kinematic GPS, Marvelmind Ultrasound Beacon system, Crazyflie Ultra Wide Band System, Visual Inertial Odometry on ZED Stereo cameras, Lidar sensors, and other misc. digital and analog sensors for maker projects
- **Manufacturing**: Computer Aided Modelling for 3D printing and CNC manufacturing of robotic parts
- **License**: 1st class Unmanned Multicopter pilot's license, South Korea (VTOL Aircraft capable)

EXPERIENCE

Graduate researcher in AI, Robotics and Transportation lab   2022 - 2024
Ulsan National Institute of Science and Technology, Ulsan, South Korea
- Self-motivated and proactive researcher leading various robotics project teams
- Demonstrated experience in the development and system-level integration of autonomous aerial and ground robots' custom hardware and software including in a competition context
- Hands-on experience in Robot Operating System, including setting up simulators
- Experience in Integration and deployment of AI software and robots with embedded systems

Teaching Assistant   2021 - 2023
Ulsan National Institute of Science and Technology, Ulsan, South Korea
- Taught students and designed coursework and projects for new incoming faculty members
- Courses include Introduction to Robotics, Artificial Intelligence and Data-based ML Design
- Course contents include Machine Learning, Reinforcement Learning, Robot Operating Systems, use of Turtlebot 3 to conduct physical project missions, Kalman and Particle Filter

Civil Engineer, Staff Sergeant   2019 - 2021
Republic of Korea Air Force, Chungju, South Korea
- Demonstrated leadership as squad leader for 12 men
- Participated in operations such as emergency runway repair, CBRN exercises, maintenance of air base infrastructure and base defense exercises against ground and aerial targets

HONORS AND AWARDS

- 5th place, DNA+ Outdoors **Autonomous Drone Survey Flight Competition**   Sep 2021
- 4th place, IROS 2018 Award for **Autonomous Drone Racing**,   Oct 2018
- 2nd Place, Airbus **Autonomous Drone Racing**, Seoul Adex   Aug 2017

PROJECTS

First Author Research - Multiagent Aerial Systems   Feb 2023 - May 2024
- Implementation of original makespan-optimized motion planning algorithm considering inter-swarm aerodynamic interference for fast-paced drone light shows
- Implementation of collision avoidance algorithms on the crazyflie platform including *Artificial Potential Field* (APF), *Buffered Voronoi Cell* (BVC), and Stop and Go algorithm,
- *Wind Field Modeling for Formation Planning in Multi-Drone Systems, ICRA 2024*

Research: Lead Programmer - Robotic Arm for Nuclear Environment   Nov 2023 - May 2024
- Blender 3D modeling, Moveit library and Gazebo implementation, and original motion planning algorithm for a virtual robotic arm based on specifications of a real Nuclear Reactor.
- *Motion Planning Algorithm of An Articulated Robotic Arm for Inspecting Double Null Divertor in Fusion Experimental Device, ICRA 2024 Workshop Robotics for Nuclear Environments*

Lead Programmer - Service Robot Development   Feb 2023 - Nov 2023
- NRF Korea Funding project: Design and prototyping of an AI Companion Service Robot with the collaboration with the design department
- Voice recognition and other accessory functions implemented with ROS 1 library
- Human skeleton detection based on OpenPose and Jetson NX

Project Leader - Reinforcement learning-based Delivery drone   Feb 2023 - Nov 2023
- UNIST AI Challengers Program: Time-optimal visual obstacle avoidance and planning for autonomous emergency drone delivery systems with electromagnetic actuators
- Development of Airsim simulation environment and a physical prototype delivery drone with object detection neural network and mission guidance neural network

Project Leader - Smart 3D Printer Farm Development   Feb 2022 - Nov 2022
- UNIST AI Challengers Program: Generative AI (Variational AutoEncoder) and object detection (Darknet YOLO) for automated 3d printer diagnostics
- **PATENT:** AI-based real-time FDM 3D printing defect detection and automation process, No 1020230023102, 2023 (South Korea)

Project Leader - Survey Drone Development   Feb 2021 - Nov 2021
- UNIST AI Challengers Program: Outdoor and indoor survey drone hardware development along with custom-trained Darknet You Only Look Once for long-range object detection
- 5th place, DNA+ Outdoors **Autonomous Drone Survey Flight Competition** Sep 2021

Team Leader - Autonomous Drone Racing   Feb 2017- Nov 2018
- Leading UNIST Dronebot team in IROS autonomous drone racing
- Constructing custom drone (3D print), Designing Computer-Aided Control system based on ROS and hardware setup (Optitrack, ZED stereo camera, and Jetson TX2)
- *Challenges and implemented technologies used in autonomous drone racing. Intel Serv Robotics 12, 137–148 (2019)*