

Hyeongjin Kim

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PROFILE

Undergraduate student in Embedded Systems Engineering with practical experience in robotics, autonomous driving, and embedded systems. Skilled in ROS 2-based robotic system development, sensor fusion, communication system design, and embedded firmware implementation.

RESEARCH INTERESTS

Reinforcement learning for intelligent robotic systems, Multi-agent distributed systems and large-scale infrastructure optimization, multi-modal 3D perception, V2X-enabled networked systems, UAV-assisted intelligent transportation systems.

EDUCATION

- **Hanyang University** Starting Sep. 2026
M.S. in Electrical Engineering (Incoming) Seoul, Republic of Korea
- **Incheon National University** Mar. 2021.03 – 2026.08
B.S. in Embedded Systems Engineering Incheon, Republic of Korea
◦ GPA: 4.28 / 4.5 (140 / 140 credits completed)

RESEARCH AND PROFESSIONAL EXPERIENCE

- **ICONS Laboratory** Mar. 2024 – Present
Undergraduate Researcher (Advisor: Prof. Hyunbum Kim) Incheon, Republic of Korea
 - Investigated network optimization and resource efficiency in UAV-assisted ITS systems
 - Investigated IoT platform-based decision-making architectures in distributed system environments
- **Hyundai H-Mobility Class** Apr. 2025 – Jul. 2025
Autonomous Driving Track (Advanced Communication & Networking) Republic of Korea
 - Completed coursework in perception, decision-making, control, and communication.
 - ROS 2-based autonomous driving training / CAN, LIN, Ethernet, and V2X communication

PUBLICATIONS AND PRESENTATIONS

1. **H. Kim**, H. Kim, W. Kim, A. V. Vasilakos, and P. Bellavista, “**Resting Drone-Enabled Enhanced ITS Coverage and V2X Integration Network Management for Urban Mobility Service,**” *IEEE TNSM*, Mar. 2026.
2. **H. Kim**, J. Ben-Othman, B. Lee, and H. Kim, “**Split Federated Learning-Enabled Deep Q-Networks for Generalized Path Planning in Distributed IoT Edge Computing,**” *IEEE Internet of Things Journal*, Mar. 2026.
3. **H. Kim**, H. Kim, and M. Guizani, “**A Resting Drone-enabled Surveillance Framework for Real-time Monitoring with Resource Efficiency in IoT-based Smart Cities,**” *IEEE Internet of Things Journal*, Aug. 2025.
4. **H. Kim** and H. Kim, “**Analysis of Opportunistic Wi-Fi/LTE Connectivity Strategies for Outdoor Autonomous Driving Platforms in ITS Environments,**” *Proc. of KICS Fall Conf.*, Oct. 2025. (Oral)
5. **H. Kim**, M. Kim, and H. Kim, “**Analysis of V2V Shortest Path Search and Connection Strategies in ITS Environment Using Low-Power Short-Range Communication,**” *Proc. of KICS Fall Conf.*, Oct. 2024. (Poster)

PROJECTS (UNDERGRADUATE)

- **2026 RoboCup Smart Manufacturing : League Mobile Manipulator** Jul. 2025 – Present
 - **Role:** Team Leader, Autonomous Driving Team
 - **Tech Stack:** ROS 2, Jetson Orin AGX, Rainbow Robotics RB-3, RH-P12-RN Gripper, Intel RealSense D435
 - **Key Features:**
 - * Autonomous navigation of a mobile manipulator to task-relevant workstations
 - * Vision-assisted pick-and-place manipulation using a 6-DoF robotic arm and parallel gripper
 - * Integrated perception, navigation, and manipulation pipelines for real-world task execution
- **Capstone Design : Last-Mile Delivery Robot** Nov. 2025 – Present
 - **Role:** Team Leader
 - **Tech Stack:** ROS 2, 2D LiDAR (slamtec), intel RealSense D435, IMU, Jetson Orin Nano, SLAM, Nav2, Moveit
 - **Key Features:**
 - * Enabled autonomous navigation to designated goal locations using localization results

- * Estimated odometry using in-wheel motors with encoders and performed Cartographer-based SLAM
- * Implemented vision-based elevator button recognition and IMU-based floor transition detection
- **FPV-Based RC Car Racing** Nov. 2025 – Dec. 2025
 - **Role:** Team Leader
 - **Tech Stack:** ESP32-C3, Arduino, BLE, ESP-NOW, FPV System (Camera & Goggles), Fusion 360
 - **Key Features:**
 - * Developed FPV-based RC car firmware supporting BLE and ESP-NOW communication
 - * Implemented real-time steering and speed control using joystick-based commands
 - * Designed and fabricated RC car chassis and bumper using Fusion 360 for racing durability
- **Real-World Autonomous Driving Vehicle (ERP-42 Platform)** Apr. 2025 – Nov. 2025
 - **Role:** Team Leader
 - **Tech Stack:** ROS 2, 3D LiDAR (VLP-16), Camera, RTK-GNSS, IMU, Vehicle Control
 - **Key Features:**
 - * Performed navigation driving using sensor fusion of RTK-GNSS and IMU
 - * Developed Pure Pursuit and PID-based vehicle control and onboard communication protocols
 - * Implemented object detection and obstacle avoidance logic using camera and Velodyne VLP-16 sensor fusion
- **Line-Following (CV) Autonomous RC Car** May 2025 – Jun. 2025
 - **Role:** Course Project
 - **Tech Stack:** Raspberry Pi, Arduino, OpenCV, Python, UART/Serial, PID Control
 - **Key Features:**
 - * Built a line-following autonomous RC car using camera-based computer vision for lane detection
 - * Integrated Raspberry Pi image processing with PID steering control and Arduino motor/servo actuation
 - * Implemented dual-mode control enabling manual RC and autonomous driving via UART communication
- **Virtual Gesture Interface Board** Apr. 2025 – May 2025
 - **Role:** Course Project
 - **Tech Stack:** JavaScript, p5.js, ml5.js (HandPose), Webcam, OBS
 - **Key Features:**
 - * Implemented hand gesture recognition using ml5.js HandPose
 - * Developed gesture-based mode switching and interactive on-screen reactions
 - * Integrated drawing palette interactions and streamed output via OBS Virtual Camera
- **Resting Drone** Mar. 2024 – Nov. 2024
 - **Role:** Team Leader
 - **Tech Stack:** Pixhawk 4, PX4 Autopilot, Optical Flow, LiDAR, Servo Motor Control, ECU & PM Board
 - **Key Features:**
 - * Developed an energy-efficient resting drone that attaches to structures to eliminate hovering
 - * Implemented servo-based attachment maneuvers with optical flow-based attitude stabilization
 - * Built a PX4-based autonomous flight control system using Pixhawk 4
- **Automated Tanghulu Manufacturing Machine** Jan. 2024 – Apr. 2024
 - **Role:** Entrepreneurship Club
 - **Tech Stack:** ESP32, OLED Display, DC Motor, Fusion 360
 - **Key Features:**
 - * Developed an OLED-based user interface for motor speed and operation time control
 - * Implemented joystick-based interface control and DC motor speed adjustment
 - * Contributed to filing four related patents (KR 10-2024-0040087 to 10-2024-0040090)
- **FPS Gun Console System** Sep. 2023 – Dec. 2023
 - **Role:** Team Leader
 - **Tech Stack:** ESP32, Bluetooth Classic (SPP), Unity, OpenCV, IMU
 - **Key Features:**
 - * Implemented a semi-virtualized IMU-based aiming system aligning muzzle orientation with on-screen view
 - * Enabled real-time input transmission via Bluetooth using ESP32 for PC FPS game integration
 - * Designed a Unity-based input emulation framework compatible with commercial FPS titles
- **Unity-Based Game Development Project** Jul. 2023 – Sep. 2023
 - **Role:** Personal Projects
 - **Tech Stack:** Unity
 - **Key Features:**
 - * Game Project 1: Bird Flight Simulation Game

- * Game Project 2: 2D Side-Scrolling Action Platformer
- * Game Project 3: Top-Down Arena Roguelike Action Game

• **Wireless Mobile Fan Control System : Fan-Li**

Sep. 2021 – Dec. 2021

- **Role:** Team Leader
- **Tech Stack:** Arduino, ESP32-CAM, Bluetooth Control App, Real-time Streaming, Fusion 360
- **Key Features:**
 - * Enabled wireless control of the fan via a Bluetooth-based mobile app
 - * Implemented real-time video streaming using ESP32-CAM
 - * Integrated mobility and airflow control into a mobile fan system

• **Intelligent Book Arrangement Robot (IBA)**

May 2021 – Sep. 2021

- **Role:** Team Member
- **Tech Stack:** Arduino, RFID, DC Motor, Servo Motor, Stepper Motor
- **Key Features:**
 - * Implemented RFID-based localization using floor-mounted tags
 - * Built a multi-motor control system for navigation and book handling
 - * Supported vision-based book classification for automated sorting

LEADERSHIP & AMBASSADOR ACTIVITIES

• **Autonomous Driving Track Ambassador, Hyundai H-Mobility Class**

Apr. 2025 – Jul. 2025

Hyundai Motor Group

- Selected as an Autonomous Driving Track ambassador and produced weekly educational summary content and promotional materials for the program.

• **President, UNITA Robotics & Mobility Club (3rd Cohort)**

Jan. 2026 – Present

Incheon National University

- Designed, lectured, and led a ROS 2-based autonomous robotics curriculum, incorporating quizzes, student presentations, and hands-on projects.

• **President, UNITA Robotics & Mobility Club (2nd Cohort)**

Apr. 2025 – Dec. 2025

Incheon National University

- Led an autonomous mobility competition team and developed a sensor fusion-based autonomous driving system using 3D LiDAR, cameras, GNSS-RTK and IMU

TECHNICAL SKILLS (CORE TOOLS I USE DAILY)

ROS 2 | C/C++ | Python | Arduino (Platform) | Linux (Ubuntu) | Git/GitHub | Markdown | LaTeX

AWARDS

• **RoboCup Industrial, Smart Manufacturing League**

2026 World Champion, First Place

Jul. 2026

Role: Team Leading Member

• **Outstanding Learner Award, Hyundai H-Mobility Class**

Hyundai Motor Group R&D Division Head Award

Jul. 2025

• **Grand Prize, Department of Embedded Systems Engineering Graduation Project Competition**

College of Information Technology Dean's Award, Incheon National University

Jun. 2026

Role: Team leader

• **Grand Prize, Self-Built Electric Vehicle Competition**

Future Automotive Convergence Innovation Center Director Award, Incheon National University

Dec. 2025

Role: Team leader

• **Special Prize, National Creative Capstone Design Competition**

Korea Technopark Promotion Association President Award

Nov. 2024

Role: Team leader

• **Bronze Prize, Sungkyunkwan University Consortium Creative Capstone Design Competition**

Engineering Education Innovation Center Director Award, Sungkyunkwan University

Nov. 2024

Role: Team leader

• **Grand Prize, Incheon National University Creative Capstone Design Competition**

Incheon National University President Award

Sep. 2024

Role: Team leader

• **Grand Prize, Software Contest of the College of Information Technology**

College of Information Technology Dean's Award, Incheon National University

Dec. 2023

Role: Team leader

• **Grand Prize, INU Maker Competition**

Incheon National University President Award

Jan. 2022

Role: Team leader

• **Honorable Mention, Smart Mobility Competition**

Engineering Education Innovation Center Director Award, Incheon National University

Dec. 2021

Role: Team leader

- **Bronze Prize, INU Autonomous Driving Software Competition**
College of Information Technology Dean's Award, Incheon National University

Nov. 2021
Role: Team member

TEACHING EXPERIENCE

- **Teaching Assistant, Matrix**
Department of Embedded Systems Engineering, Incheon National University

Spring 2025; Fall 2025
Undergraduate course