# Joshua Julian Damanik

Robotics researcher on learning-based agile robot navigation

+82-10-2188-5002 joshuajdmk@gmail.com linkedin.com/in/damanikjosh github.com/damanikjosh

## Experience

**Laboratory for information and Control Systems, KAIST** **Aug. 2021 – Present**
*PhD Researcher* *Daejeon, South Korea*

- Research on learning-based navigation algorithm for safe and agile, high-speed mobile robot.
- Developed immitation learning for industrial robot navigation in cluttered environment, experiment speed 1.5 $m/s$.
- 1st winner on simulation and 1st winner on physical navigation challenge on ICRA 2024 BARN Challenge.
- Research on flight pattern and air traffic flow on Incheon Airport (Collaborative research with Incheon Airport).

**Daewoong Pharmaceutical** **Jan. 2024 – Feb. 2024**
*Full-stack Web Developer Freelance* *Daejeon, South Korea*

- Designed UI/UX for company project web portal using React, deployed to production on serverless architecture, AWS.
- Developed the database system using DynamoDB and authentication system using AWS Cognito.

## Projects

**The 3rd F1tenth Korea Championship** | *Learning-based Perception, ROS, C++, Python, Gazebo* **Jul. 2024 – Present**

- Built F1tenth racing car hardware, including design and wiring.
- Developed F1tenth racing car simulation using ROS 2 and Gazebo Harmonic.
- Built robotics software stack for racing car using ROS 2 on NVIDIA Jetson and Arduino.
- Developing learning-based dynamics model using Transformer for robust controller.

**ICRA 2024 BARN Challenge** | *Imitation learning, Python, ROS, Gazebo, 2D LiDAR* **Apr. 2024 – May 2024**

- 1st winner on physical competition of BARN Challenge 2024. Fastest navigation performance.
- Achieved all-time-high score on simulation competition at BARN Challenge (bit.ly/barn-challenge-2024)
- Developed an imitation-learning based navigation stack for Jackal robot. Used Transformer model.

## Technical Skills

**Robotics hardware**: 2D/3D LiDAR, Depth camera, Sensors & actuators, NVIDIA Jetson, Raspberry, Arduino
**Robotics design**: Solidworks, OnShape, Autodesk Fusion, Altium Designer
**Robotics software**: ROS, Gazebo (Classic & Gz), Webots, Matlab
**Machine learning**: PyTorch, Tensorflow, Reinforcement learning, Immitation learning, Time-series analysis
**Software development**: Python, C++, Docker, Git, Linux, Javascript
**Web development**: React, Node.js, SQL, AWS, Svelte, MongoDB, DynamoDB

## Education

**Korea Advanced Institute of Science and Technology** **Aug. 2021 – Aug. 2025**
*PhD in Aerospace Engineering, Fully funded by Hyundai Motor CMK Foundation* *Daejeon, South Korea*

**Korea Advanced Institute of Science and Technology** **Aug. 2019 – Aug. 2021**
*MS in Aerospace Engineering, Fully funded by Korean Government Scholarship Program* *Daejeon, South Korea*

**Bandung Institute of Technology** **Aug. 2014 – Jul. 2018**
*BSc in Engineering Physics* *Bandung, Indonesia*

## Highlight Publications

**IEEE Robotics and Automation Magazine** | *Co-author* **Sep. 2024**
Autonomous Ground Navigation in Highly Constrained Spaces: Lessons Learned from The Third BARN Challenge at ICRA 2024

**IEEE Transactions on Aerospace and Electronic Systems** | *2nd author* **Aug. 2024**
Aircraft Trajectory Segmentation-based Contrastive Coding: A Framework for Self-supervised Trajectory Representation (In review)

**IEEE Robotics and Automation Letters** | *1st author* **Jun. 2024**
LiCS: Navigation using Learned-imitation on Cluttered Space (In review)

**Journal of Control and Decision** | *Co-author* **Jul. 2023**
Polygon formation of multiple nonholonomic mobile robots with double-level-control collision avoidance scheme