

# Haesung Oh

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## RESEARCH INTEREST

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### Autonomous Vehicles/Robots

- Decision making with AI-Based Approach using Deep Learning
- Autonomy optimization using Multi Agent Reinforcement Learning
- Autonomy simulation

## EDUCATION

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**POSTECH, Convergence IT Engineering**, Bachelor's Degree

Feb 2016 - Feb 2023

**UC Berkeley**, Exchange Student

Jun 2017 - Dec 2017

## RESEARCH EXPERIENCE

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**Decision Transformer VAE** *Advisor: Seungchul Lee*

Sep 2022 - present

- Deep reinforcement learning model in VAE inverse design manner
- Trains decision transformer which is a sequence of reinforcement learning
- *Keywords: Decision Transformer, Offline RL, Inverse Design, Variational Autoencoder*

**Autonomous Recycle Robot (Dudaji Start-up Company Internship)**

Jul 2022 - Aug 2022

- 6-joints-robot that classifies and does pick-and-place trashes by using ROS, Deep Learning, and computer vision
- Contributed to robot detection by camera, robot movement optimization via ROS, pick-and-place logic development, converting algorithm from computer vision to robot coordinate, and collecting plastic waste image data for classification
- *Keywords: Robotics, ROS, Computer vision, Yolo v5, Deep learning, Pick-and-place*

**Autonomous Delivery Mobile Robot (SNU ARIL Internship)** *Advisor: Sungwoo Kim*

Dec 2021 - Feb 2022

- 6-wheel, skid steering autonomous delivery robot for SNU campus
- Contributed as a simulation software engineer, optimized robot mobility and autonomy by simulator
- *Keywords: ROS, Unity simulation, Embedded system, 3D CAD, Hardware assembly*

**Autonomous Parking Simulation** *Advisor: Suhee Han*

Sep 2021 - Dec 2021

- Using Unity ML-Agent and reinforcement learning to simulate and visualize autonomous parking
- Trained an average of 8 million episodes for the front, parallel, and diagonal parking situations respectively
- *Keywords: Reinforcement learning, AI-based autonomy, Autonomy simulation, Unity ML-Agent*

**Autonomous Drone** *Advisor: Suhee Han*

Feb 2021 - Jun 2021

- Drone that drives autonomously with avoiding obstacle and terrain and comes back safely using ultra sonic sensors
- Targets to explore an extreme environment based on a rule-based approach which are dependent on obstacle conditions
- *Keywords: Rule-based autonomy, Arduino, Obstacle detection, PID control, Drone system dynamics*

**Auto Training Routine Recording System** *Advisor: Chulhong Kim*

Sep 2020 - Dec 2020

- Detects human pose to get exercise, repeats, and sets automatically for weight training using computer vision
- *Keywords: OpenPose, Pose estimation, Vector similarity*

**Auto Strike Zone Detection** *Advisor: Sungjun Jung*

Feb 2018 - Jun 2018

- Auto strike zone detection for baseball
- *Keywords: Computer vision, Real-time, Line detection, Object detection*

## **Cable Detection and Tracking Algorithm Control of Quadrotor** Advisor: Jinbae Park

Sep 2014 - Nov 2014

- Quadrotor drone that follows cable by detecting it
- Keywords: Cable detection, Hough transform, Canny edge, Gimbal camera, Color threshold

## **RELATED COURSES (SELECTED)**

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### **Hyundai H-Mobility Class: Autonomous Car Class**

Jul 2022 - Jan 2023

Keywords: Recognition, Decision making, Machine learning, Vehicle system control, Vehicle network

### **MECH527: Adv. Artificial Intelligence for M.E.**

Fall 2022

Keywords: Tensorflow, CNN, XAI, LRP, Transfer Learning, CAE, FCN, GAN, RNN, GNN, PINN

### **MECH437: Artificial Intelligence for M.E.**

Spring 2022

Keywords: Deep learning, SVM, KNN, K-Means, Decision tree, PCA, SVD, ICA, ANN, Autoencoder

### **CITE490I: Creative IT Advanced Lecture: Robotics Introduction**

Spring 2022

Keywords: Components, Locomotion, Mechanics, AI, Autonomy, SLAM, Recent trend of Robot

### **MECH323: System Control**

Fall 2021

Keywords: LTI, Closed-loop, System stability, PID control, Root locus, Bode plot, Nyquist plot, Compensation

### **CITE201, 202, 301, 302: Creative IT Design I, II, III, IV**

Spring 2018 - Fall 2021

Keywords: Personal research projects

## **HONORS AND AWARDS**

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### **Creative ICT Scholarship** Feb 2016 - Dec 2021

### **Korea Art Management Service: ART Hack-A-Thon**

May 2018

Excellence Prize: Art and coding education using drones for the next generation

## **SKILLS**

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**Programming Language** Python, ROS, C/C++, Git

**2D/3D Graphic** Unity, Fusion 360, AutoCAD

## **EXTRA-CURRICULAR EXPERIENCES**

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### **Military Service**

Nov 2018 - Sep 2020

Republic of Korea Airforce: Military residence management airman

### **Berkeley Media Club: Berkast**

Nov 2017 - Dec 2017

Actor, Cinemaphotographer, and Video editor

### **Creative IT Camp**

Aug 2016, Aug 2018

Team leader, Instructor, and Photographer

### **POSTECH Photography Club: Bitt-Noeul**

Feb 2018 - Jun 2018

Photographer, and Photography advisor

### **POSTECH Baseball Club: Tachyons**

Feb 2016 - Dec 2022

Catcher, First-baseman, Cleanup hitter

### **POSTECH Musical Club: OPCA**

Feb 2016 - Jun 2016

Actor, Played a musical named 'Laundry' as the main character