HO JAE LEE

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RESEARCH INTEREST

- Machine learning and cooperation in autonomous robotic systems
- Trajectory planning and decision making of multi-agent mobile/flying robots
- Deep reinforcement learning for robotics manipulation

EDUCATION

ETH Zürich, Switzerland *August 2021 - Present*
Robotics, Systems and Control
1st Year, Master of Science

Seoul National University, South Korea *Mar. 2016 - Aug. 2021*
B.S. in Mechanical and Aerospace Engineering Cumulative GPA: 4.01 / 4.3
Minor: Mathematics Class Rank: 10/144

RESEARCH EXPERIENCE

Robotic Systems Laboratory Zürich, Switzerland
Semester Student Project (Advisor: Prof. Marco Hutter) *Feb 2022 - Present*

· Developed deep reinforcement learning algorithms for learning human robot handover skills from human demonstrations

Saige Research Seoul, South Korea
Software Engineer Research Intern (Advisor: Prof. Frank Chongwoo Park) *Feb 2021 - August 2021*

· Developed deep learning-based OCR algorithms for detecting characters on various textures and angles

Integrated Design of Aerospace System 1, 2 Seoul, South Korea
Undergraduate Researcher (Advisor: Prof. Hyoun Jin Kim) *Mar 2020 - Dec 2020*

· Developed monocular visual odometry for pose estimation and trajectory tracking of UAV for autonomous UAV control

Machine Intelligence & Pattern Recognition Lab(MIPAL) Seoul, South Korea
Undergraduate Researcher (Advisor: Prof. Nojun Kwak) *Jul 2020 – Aug 2020*

· Estimated age from a person's image using various CNN models with IMDb-Wiki dataset
· Compared algorithms efficiency of various object detection model

Undergraduate Independent Study 1 Seoul, South Korea
Undergraduate Researcher (Advisor: Prof. Hyoun Jin Kim) *Mar 2020 – Jun 2020*

· Researched vision-based automatic control of an unmanned delivery drone for variable target points

Student-Directed Education Undergraduate Research Program Seoul, South Korea
Undergraduate Researcher (Advisor: Prof. Hyoun Jin Kim) *Jun 2019 – Nov 2019*

· Designed a drone for unmanned delivery service and developed algorithms for automatic control for variable target points

PUBLICATION

Ho Jae Lee, Seung Won Yeo, Hoseong Seo.
Design and Flight Control to Variable Target Points of a Drone for Unmanned Delivery Service.
Proceedings of the 2020 Fall Conference of The Korean Society for Aeronautical and Space Sciences

RELEVANT COURSES

1. Robot Dynamics (*Lectured by Prof. Marco Hutter*)
Learn - How to kinematically and dynamically model typical robotic systems such as robot arms, legged robots, rotary wing systems, or fixed wing.

2. Planning and Decision Making for Autonomous Robots (*Lectured by Prof. Emilio Frazzoli*)
Learn - Discrete planning, shortest path problems, planning under uncertainty, game-theoretic planning, geometric representations, configuration space, grids, lattices, visibility graphs, sampling-based methods.

3. Dynamic Programming and Optimal Control (*Lectured by Prof. Raffaello D'Andrea*)
Learn - Dynamic Programming Algorithm; Deterministic Systems and Shortest Path Problems; Infinite Horizon Problems, Bellman Equation; Deterministic Continuous-Time Optimal Control.

4. Probabilistic Artificial Intelligence (*Lectured by Prof. Andreas Krause*)
Learn - Probability; Probabilistic inference (variational inference, MCMC); Bayesian learning (Gaussian processes, Bayesian deep learning); Probabilistic planning (MDPs, POMPDPs); Multi-armed bandits and Bayesian optimization; Reinforcement learning

5. Model Predictive Control (*Lectured by Prof. Melanie Zeilinger*)
Learn - Design and implement Model Predictive Controllers (MPC) for various system classes to provide high performance controllers with desired properties (stability, tracking, robustness,..) for constrained systems.

6. Recursive Estimation (*Lectured by Prof. Raffaello D'Andrea*)
Learn - Bayes' theorem; Bayesian tracking; extracting estimates from probability distributions; Kalman filter; extended Kalman filter; particle filter; observer-based control and the separation principle.

7. Machine Perception (*Lectured by Prof. Otmar Hilliges*)
Learn - Timeseries modelling (RNN, GRU, LSTM); Latent variable models (VAEs); Generative adversarial networks (GANs); Autoregressive models (PixelCNN, PixelRNN, TCNs); Invertible Neural Networks / Normalizing Flows; Fully Convolutional architectures for dense per-pixel tasks (i.e., instance segmentation); Neural shape modeling (implicit surfaces, neural radiance fields);

TECHNICAL SKILLS

Programming skills: C, C++, Python, Matlab
Framework: ROS, PX4(MAVROS, MAVSDK), Gazebo, PyTorch, OpenCV
Languages: English(Fluent, TOEFL: 111), Korean(Native)