JUSUK LEE

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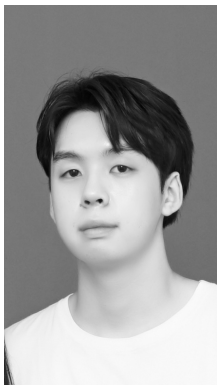

EDUCATION

B. S. Mechanical Engineering, Yonsei University (Mar 2017 – Feb 2024)
Combined M. S. and Ph.D Mechanical and Aerospace Engineering, Seoul National University (Mar 2024 – present)

RESARCH INTERESTS

Reinforcement Learning, Robotics, Machine Learning

WORK EXPERIENCE

Undergraduate researcher experiences

A. Control-Versatile Design for Intelligence & Precision Lab **Dec 2021 – Feb 2022**
- Organize motors in a program through FEMM and MATLAB.
- Design a structure that can reduce torque ripple.

B. Human-Robotics Lab **Jun 2022 – Sep 2022**
- Design a structure that can offset the disadvantage of PAM(Pneumatic Artificial Muscles) which used in soft robotics.

Projects

A. Multi-agent Reinforcement Learning

a. Multi-Agent Actor-Critic for Cooperative Environments
- Implement MADDPG algorithms for making 4 drones cooperate to deliver the box to its destination while keeping it flat.

B. Autonomous Flight of Drone

a. Local Planner
- Implement 3DVFH* local planner by referring to PX4-Avoidance and change the code to operate in 'Offboard mode'.

b. Drone navigation using reinforcement learning
- Using a RL algorithm (DDPG), the drone can navigate successfully from an arbitrary starting position to a goal position in shortest possible way.

c. Precision Landing
- Design safe and accurate landing using aruco marker and PID control. Also, use a Kalman filter to reduce sensor noise.

d. Precision Landing using reinforcement learning
- Using RL algorithm (SAC), the drone can safely land on the desired location.

e. Change controller of PX4-Autopilot to custom controller
- Change the existing drone controller(PID control) to feedback linearization and adaptive sliding mode control.

C. 'Introduction to AI' Subject Project

a. MNIST Dimension Reduction, Visualization and Classification
- Conduct dimension reduction through two methods, PCA(Principal Component Analysis) and CNN.

b. Transfer Learning
- Transfer the knowledge in the ImageNet pretrained ResNet18 to low-resolution face recognition problems.

c. Object Detector
- Design a Fully convolutional ResNet18, which can accept arbitrary-size input image and returns a response map that highlights the labeled object of the input image (detected image).

D. Yonsei Rehabilitation Volunteer Project

a. Wheelchair Rearview Camera and Detection System
- Design a system using raspberry pi and ultrasonic sensor.

b. Posture Correction System
- Design a system that detects disabled children's wrong posture using computer vision.

Research Papers

A. "Collision detection system based on computer vision for Human-Robot Interaction," Fall 2022, Undergraduate Thesis Supervised by Dr. Byeong Kwon Min
- Propose a system that detects collision between an operator and a robot and returns a signal by using computer vision and a Depth camera that obtains RGB images and depth images.

EXTERNAL ACTIVITIES

School Swimming Club — **Mar 2018 – Jan 2019, Sep 2020 – Dec 2021**
- I like swimming and was the club president.

School Robot Club 'Roboin' — **Mar 2022 – Jan 2023**
- Fabricate a 3-axis robotic arm and mimic the pick and place motion

Yonsei Rehabilitation volunteer — **Jun 2022 – Jan 2023**
- Design assistive devices for children with disabilities

Artificial Intelligence Club — **Sep 2022 – Dec 2022**
- Read and Review papers related to computer vision once a week

School Club 'Yonsei Drone' — **Mar 2023 –**
- Won second place in the 21st Korea Robot Aircraft Contest

RELATED COURSEWORK

Dynamics	**2020 Fall Semester**
Understanding and Using Artificial Intelligence	**2021 Fall Semester**
Mechatronics	**2021 Fall Semester**
R and Python	**2022 Winter Seasonal Semester**
Basic Circuit Theory	**2022 Spring Semester**
Mechanical Vibration	**2022 Spring Semester**
Mechanical System Control	**2022 Fall Semester**
Introduction to AI	**2022 Fall Semester**
Automatic Control (Audit)	**2023 Spring Semester**
Neural Network (Audit)	**2023 Spring Semester**
Nonlinear Control	**2023 Fall Semester**

SKILLS

CAD : SolidWorks, Creo
Programming Language : Python, ROS, C
Programming : MATLAB, ANSYS, Unity

SCHOLARSHIPS

Scholarship for academic excellence (2020-2, 2021-2)

Service Scholarship(2020-2)