Alfred Cueva

(+82) 01043351708 alfred11@snu.ac.kr /alfredcueva /alfred11x

Research Interests

Learning-based control, dynamics, machine learning, and reinforcement learning, particularly in the context of locomotion and manipulation.

Education

Seoul National University **Mar. 2020 – Feb. 2024**

BS in Mechanical Engineering (Robotics Concentration) *Seoul, South Korea*

- Coursework: Reinforcement Learning (Graduate), Humanoid Robot Bipedal Walking and Control (Graduate), Sensor-Based Spatial Intelligence (Graduate), Deep Learning (Graduate), Mechanical System Modeling and Control
- Thesis: RL-Policy Guided Optimal Design of Parallel Elastic Actuator for Weak Actuation of Bipedal Robot. Advisor: Prof. Jaeheung Park, Prof. Yong-Lae Park. Awarded **Outstanding BS Thesis Presentation Award**

Research Experience

Dynamic Robotics Systems Lab **Aug. 2023 – Feb. 2024**

Undergraduate Thesis Research Intern - PI: Prof. Jaeheung Park *Seoul, South Korea*

- Developed a Deep Reinforcement Learning framework to find optimal actuator designs for legged robots with weak actuation using PPO, Potential Based Rewards and Bayesian Optimization.
- Achieved a 19% improvement of the maximum forward velocity under curriculum learning and increased velocity tracking accuracy. Reduced cost of transportation by 22% while ensuring a symmetric gait for added mass scenarios.

Samsung C&T Corporation **Jul. 2023 – Aug. 2023**

Research Intern - Supervisor: Ph.D. Jun-ho Hyun *Seoul, South Korea*

- Engineered a deep learning algorithm for detecting heat anomalies, improving positional accuracy and heat map estimation efficiency by 40%.
- Researched and implemented out-of-distribution detection algorithms for defect identification in battery and PCB images, enhancing detection rates by 15%.

Dynamic Robotics Systems Lab **Dec. 2022 - Jul. 2023**

Research Intern - PI: Prof. Jaeheung Park *Seoul, South Korea*

- Analyzed rewards' impact on RL algorithms (PPO, SAC) for locomotion tasks, leading to a performance enhancement in IsaacGym simulator trials.
- Streamlined the learning and evaluation pipeline, optimizing the simulation framework for faster model convergence.

Beam Studio **Jul. 2022 – Aug. 2022**

Research Intern - PI: Young-Beom Jeong *Seoul, South Korea*

- Created StyleGAN-based model for real-time video editing of time-series data using pixel2style2pixel encoders

Soft Robotics & Bionics Lab **Dec. 2021 – Mar. 2022**

Research Intern - PI: Prof. Yong-Lae Park *Seoul, South Korea*

- Designed a Capacitive Touch Sensing Grid as a force control interface for an Industrial Sewing Robot. Modeled force dynamics using Arduino and CoppeliaSim, improved sewing speed by 20%

Work Experience

Samsung C&T Corporation **March. 2024 – Present**

Robotics Engineer *Seoul, South Korea*

- Developed obstacle detection system using YOLOv5 for collaborative robots with 92% accuracy
- Engineered control software using Disturbance Observer, reducing steady-state error by 30% and enhancing precision of a 7-DOF manipulator
- Implemented RRT-based motion planning for drill manipulator arms operating on cluttered environments.
- Designed a human-machine interface for robotic operation, integrating ROS with visualization tools like Rviz and Gazebo.

Scholarships

- Global Korea Scholarship - Full ride for undergraduate studies (1 out of 300) **Mar. 2019 – Mar. 2024**
- COAR Scholarship - Full ride for IB Program funded by Peruvian Government **Mar. 2016 – Feb. 2019**

Awards & Honors

- Smart Construction Robotics Challenge: Awarded 10k USD for novel drilling robot for semiconductor sites **Sep. 2024**
- Outstanding BS Thesis Award (1 out of 120) **Dec. 2023**
- Samsung C&T Corporation Global Intern (1 of 40 recipients nationwide) **Jul. 2023**
- Student Researcher Fellowship: Awarded 1k USD funding for undergraduate research **Jan. 2023**

Teaching Experience

Seoul National University **Mar. 2021 – Jul. 2021**

Instructor *Seoul, South Korea*

- Taught programming (Python) to high school students as member of AI Tech Play Program.
- Conducted Workshop with a Hands-on Session for 30+ students on ROS and Gazebo
- Prepared problem sets on robotics foundations including linear algebra, kinematics and linear control

Extracurricular Activities

Peruvian Korean Academic Association (ASAPEC) **Mar. 2023 – Present**

- Lead a team of 20 members to organize fraternity meetings and informative sessions for prospective students in STEM fields and those interested in higher education in Korea.

Sigma Intelligence Group **Mar. 2020 - Mar. 2021**

- Reviewer for Creative Engineering Fair, evaluating freshman projects on LIDAR, PLC control, and PID-based path planning techniques.

Skills

- Languages: Python, C++, C, MATLAB, Julia
- Frameworks: Pytorch, Numpy, Scikit Learn, ROS, YOLO, MuJoCo, CoppeliaSim, IsaacGym, IsaacSim, PyBullet
- Optimization: Gurobi, Eigen, PuLP, GLPK