Kailai Yan

LinkedIn | GitHub: Perian-Yan | kaiyan@student.ethz.ch

EDUCATION

ETH Zürich, Zürich, Switzerland   Sept 2021 – Present
M.Sc. in Robotics, Systems and Control

Wuhan University, Wuhan, China   Sept 2017 – Jun 2021
B.Sc. in Electrical Engineering and Automation | GPA: 3.92/4.0
Bachelor Thesis: Surface Charge Decay Characteristics of SiC/Epoxy-coated Insulators   *Supervisor: Prof. Cheng Pan*

RESEARCH EXPERIENCE

Autonomous Systems Lab, ETH Zürich   Jun 2023 – Present
Visual-Predictive Models for Manipulating Granular Materials
Supervisors: Nikhilesh Alatur, Dr. Olov Andersson, Dr. Helen Oleynikova, and Prof. Roland Siegwart

- Set up a cube-pushing simulation environment with the robot arm and RGB cameras in Isaac Sim Orbit.
- Trained a convolutional neural network as a predictive-model using PyTorch, given initial images and the actions to predict final images.
- Collected real data with Franka Emika Panda and the depth camera (Pico Monstar) by developing a planner under MoveIt framework.

Automatic Control Lab (IfA), ETH Zürich   Jul 2022 – Oct 2022
Transversal Hyperplane Selection in Identification of Local Limit Cycle Dynamics
Supervisors: Mingzhou Yin and Prof. Roy Smith

- Developed a non-convex optimization algorithm to select hyperplanes for identification.
- Implemented the proposed algorithm and kernel-based identification on numerical examples including Van der Pol oscillator and a periodic trajectory generated from closed-loop control.
- Used Matlab and Simulink extensively, especially Matlab optimization tools such as fmincon and particleswarm.

PROJECTS

ETH RobotX Summer School, Caserne Epeisses, Geneva   Jul 2023 – Jul 2023
Teamwork and Hands-on Experience on an autonomous rough-terrain UGV

- Integrated existing ROS packages for navigation of the Super Mega Bot in a search and rescue scenario.
- Contributed to mapping and localization, setting waypoints in the occupancy map for planning.
- Awarded the winning team in the exploration robotic competition: using a frontier-based planner to explore a dark narrow indoor space.

Introduction to Machine Learning, ETH Zürich   Feb 2023 – May 2023
Tasks Including Regression, Classification, and Transfer Learning

- Predicted electricity prices: data imputation using KNN; linear regression with regularization; kernel regression.
- Classification of similarity between 3 images, using PyTorch to build a parallel convolution neural network to extract embeddings.
- Predicted HOMO-LUMO gap of molecules using transfer learning, by building a backbone network and freezing the first layer of a pretrained network.

ROS Course, ETH Zürich   Feb 2023 – Mar 2023
Control a Super Mega Bot in Simulation

- Learned how to create software including simulation, to interface sensors and actuators, and to integrate control algorithms.

- Successfully controlled a Super Mega Bot based on lidar scan, demonstrating proficiency in using Gazebo and RViz, and gained a deeper understanding of ROS architecture, topics, and services.

Multi-Scale Robotics Lab, ETH Zürich   Feb 2022 – May 2022

Model and Control a Ball Balancing System

- Calibrated the camera and implemented PID control to keep the ball on a plate using C and Arduino.
- Wrote lab reports in LaTeX, improving proficiency in technical writing.

Soft Robotics Lab, ETH Zürich   Feb 2022 – May 2022

Design and Control a Soft Gripper for Grasping Competition

- Participated in fabricating a triple-finger pneumatic gripper using Ecoflex 50.
- Wrote Arduino code to control the inflation and deflation of the pneumatic gripper and tested it on a 6-DOF robot arm.

SCHOLARSHIPS & AWARDS

"Ultra-High Voltage" Scholarship   Oct 2020

1% in 346, granted for excellent students in EE, State Grid of China

China National Scholarship   Dec 2019 & 2018

0.2% in China, awarded by Chinese Ministry of Education

The First Prize Scholarship of Wuhan University   Sept 2020 & 2019 & 2018

5% in 346, granted for high GPA

LANGUAGES

- **Chinese**: Native language
- **English**: Fluent (C1)

TECHNICAL SKILLS

- **Programming Languages**: Python, C/C++
- **Softwares**: Matlab/Simulink, ROS, COMSOL, OrCAD Pspice, Multisim, ATP-EMTP, Altium Designer