# RUNING YANG

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## EDUCATIONAL BACKGROUND

University of Southern California *Los Angeles, U.S.* Master of Science in Electrical Engineering *Sept.2020-Jun.2022*
Cumulative GPA: 3.85/4.0

University of California, Irvine *Irvine, U.S.* Undergraduate Student Concurrent Enrollment Program *Sept.2019-Jul.2020*
Major in Electrical Engineering

Dalian University of Technology *Dalian, China* Department of Electronic Information and Electrical Engineering *Sept.2016-Sept.2019* Bachelor of Engineering in Automation
Cumulative GPA: 3.92/4.0 (89.2/ 100) Ranking:10/ 121

## RESEARCH INTERESTS

Control System, Robotics, Autonomous Driving System, Machine Learning, Reinforcement Learning

## RESEARCH EXPERIENCE

Using Reinforcement Learning to Optimize Event-trigger Replanning Model of Autonomous Driving *Supervised by Prof. Changliu Liu Carnegie Mellon University May-Aug.2021 Accepted by ICCA 2021 for Oral Presentation and Publication*
Objective: The target of this project is to help the vehicle find the optimal time to trigger replanning using Reinforcement Learning in order to solve the shortcomings of traditional event-trigger model.
Core Contents:

- Used Q-learning formulations to calculate the distance between the vehicle and obstacle and relative velocity;
- Set up a punishment mechanism when the distance is small or the dot production of relative velocity is negative;
- Completed the model of simulation, training, and testing by MATLAB;
- Avoided the static obstacle successfully and followed a smoother trajectory using Q-table to make the decision.

## PUBLICATION

Runing Yang, Xilun Zhang, Hengyu Cao and Haoran Peng, Optimization of Adaptable Prediction and Event Triggered Replanning using Non-Model Based Methods, Accepted by 2021 International Conference on Com puters and Automation (ICCA 2021).

Yang, Runing, Ruoxi Jia, Xiangyu Zhang, and Ming Jin. "Certifiably Robust Neural ODE with Learning-based Barrier Function." IEEE Control Systems Letters (2023).

## PROJECT EXPERIENCE

Seoul Bike Sharing Demand Prediction USC *Apr.2021* Objective: The main purpose of this project is to use Seoul Bike Sharing Demand dataset to get a regression model, which can predict the demand of bikes at a certain hour of a certain day based on several features.

- Completed dataset training with some features that may influence the people's willingness to rent a bike, such as weather, wind speed, season through Python using JupyterNotebook;
- Decreased time complexity and space complexity by using PCA;
- Used a two layer RBF networks based on K-mean clustering as the regression model to do the prediction;
- Determined the parameters of the second layer using linear regression based on the output of the first layer and the demand for bikes at a certain condition;
- Use cross validation find the optimal number of cluster centers $\mu$m and the value of $\gamma$.

Achieve Hovering Control of Quadcopters Using PID Controller and MPC Method USC *Apr.2021*

- Built simulation model of the 6 Dof system and propeller model through Simulink;
- Designed PID controller to make the quadcopter hover stably;
- Designed MPC algorithm based on the linearized system at a certain time (depends on the values of state variables), and solved the optimization problem of value function to get the sequence of input (using the optimization function "quadprog" provided by MATLAB);
- Added a zero-mean noise to the system and compared the performance of the PID controller and MPC method.

Simulation Model of Quadcopters Used for Spraying Pesticides USC *Apr.2021*

- Built simulation model of 6 Dof

system and propeller model based on state equations through Simulink; • Designed the PID controller and adjusted the parameters that make the quadcopter follow the settled route stably; • Used Unity3D as the visualization tool to show an animation of the simulation result.

Design of An Autonomy Quadcopter for Carrying Cargoes UC Irvine Senior Project *Sept.2019* • Designed a PID controller to control the flight state of the quadcopter;

- Used Arduino IDE to write a program to receive and process sensor data, and then controlled the attitude of the quadcopter;
- Welded each sensor with PCB.

Design and Application of the PIC 51 Single-chip Computer UC Irvine *Jun.2019* • Simulated elevator system and the actual elevator motor with the stepper motor;

- Designed the buzzer sounds at a certain frequency to prompt the arrival of the designated floor;
- Simulated elevator floor keys with keys.

## HONORS & AWARDS

Second-Class Scholarship Dalian University of Technology *2019* Second-Class Scholarship Dalian University of Technology *2018* First-Class Scholarship Dalian University of Technology *2017*

## COMPETITIONS EXPERIENCE

Interdisciplinary Contest in Modeling (ICM) *Apr.2019* • Be awarded Successful Participant.

Green Programming Competition of National University *Nov.2018* • Carried off the national second award (TOP 5%).

## TECHNICAL SKILLS

Programming Languages Python, C/C++, C#, MATLAB

Arduino IDE, Keil, Quartus II, Visual Studio, Jupyter Notebook, Unity3D Mathematica, Latex Fusion 2.5