MOJI SHI

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EDUCATION

Master of Robotics, Delft University of Technology 2021.09-now
Related courses: Deep Reinforcement Learning(10/10), Model Predictive Control(9.5/10), Stochastic Control(9.5/10), Robot Dynamics(9.2/10), Planning and Decision Making(9.0/10), Machine Perception(9.2/10), Robot Software Practice(9.6/10)

Bachelor of Mechanical Engineering, Shanghai Jiao Tong University 2016.09-2020.06
Related courses: Linear Algebra(94/100), Probability and Statistics(93/100), Theoratical Mechanics(96/100), Mechanics of Materials(95/100), Elementary Numerical Methods(95/100)

Bachelor of Mechanical Engineering, Karlsruhe Institute of Technology 2019.03-2019.08
Related courses: Automotive Engineering(1.7/1.0), Heat and Mass Transfer(1.3/1.0)

WORK EXPERIENCE

Research Assistant, Shanghai Institute of Ceramics, Chinese Academy of Science 2020.07-2021.08

Use Finite Element Analysis to simulate the multifield model of the thermoelectric generator(TEG) and thermoelectric cooler(TEC). Compare the results from simulations with the real experiments. Optimize the performance of TEG and TEC by parameterizing the size of the devices and testing with different sizes in simulation.

Research Assistant, Shanghai Jiao Tong University 2022.07-2022.09

Design a quadrotor frame with Solidworks, and apply topological optimization to reduce the weight. Calibrate the IMU and depth camera and reproduce open-vins on the quadrotor.

Teaching Assistant for RO47005 Machine Perception, TUDelft 2022.10-2023.01

machine vision, object detection, depth estimation

Teaching Assistant for "Hello World with ROS", edX 2021.12-now

ROS, robot environment construction, autonomous navigation, manipulation, and robot vision

PUBLICATIONS

Gang Chen, Siyuan Wu, **Moji Shi**, Wei Dong, Hai Zhu, Javier Alonso-Mora "RAST: Risk-Aware Spatio-Temporal Safety Corridors for MAV Navigation in Dynamic Uncertain Environments", *IEEE Robotics and Automation Letters* [paper, code]

PROJECTS

Spherical omnidirectional robot design

Worked with a group to design a spherical omnidirectional robot and is responsible for designing the dynamic control system. I helped designed the robot and equipped the robot with simultaneous localization and mapping functions. (Top 3 design out of over 60 groups)

k-PRM* UAV planner with corridor-based trajectory optimization

Implemented k-PRM for front-end path searching and an iterative method for back-end corridor-based trajectory optimization. My main contribution is implementing an adjacent-list graph, an A* graph search algorithm, and adding some constraints for trajectory optimization. (score 9.5/10 for this course project, one of the top groups)

Model predictive control for UAV collision avoidance

Designed an MPC controller with terminal cost and terminal set for cost function, added an observer to predict unknown disturbance, and strictly prove the asymptotic stability of the system. (score 9.5/10 for this course project, one of the top groups)

Dynamic programming for peak shaving problem

Designed a stochastic controller to solve peak shaving problems with dynamic programming. Specifically, we discretized the state space and action space and modeled the system into a Markov chain. Then we solved the dynamic programming given a time horizon to minimize the cost. (score 9.5/10 for this course project, first among 20 groups)

RESEARCH INTEREST

Motion Planning, Autonomous Exploration, Optimal Control, MPC, Deep Reinforcement Learning

SKILLS

CAD:	Solidworks, UG-NX
CAE:	ANSYS, Fluent
Programming:	C++ (with OpenGL, OpenCV), Python (pytorch), ROS, Keil, MATLAB
Languages:	English (TOEFL 101, GRE 322+3.5), German (DSH 2.0)