

Siyuan Wu

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EDUCATION

MSc Robotics, Delft University of Technology, Delft, Netherlands *Sep. 2021 - Aug. 2023 (Est.)*

Supervised by Dr. Javier Alonso-Mora.

Robot Software Practical (9.5), Planning & Decision Making (9.5), Optimisation for System & Control (9.0), Robot Dynamics & Control (9.0), Machine Learning for Robotics (9.0), Machine Perception (9.0), OOP C++ (9.5), etc.

Visiting student, FAST Lab, Zhejiang University, Huzhou, China *Jul. 2020 - Aug. 2021*

Supervised by Dr. Fei Gao.

Finished my Bachelor thesis: Object tracking and collision avoidance with event camera.

B. Eng. in Automation (with Honors), Xi'an Jiaotong University, Xi'an, China *Sep. 2017 - Jul. 2021*

Honors Engineering Program, Qian Xuesen Elite Class GPA: 92/100 top 5%

Linear Algebra(90), Calculus(92), Statistics(98), Complex analysis (100), Operations research(96), etc.

Exchange, University of Edinburgh, Scotland, United Kingdom *Jan. 2020 - Jul. 2020*

Undergraduate Exchange Program courses: Reinforcement Learning, Game Theory, Optimal Control, etc.

SKILLS

Programming: C/C++, Python, MATLAB, Verilog

Softwares&Tools: ROS, Gazebo, PX4, OpenCV, PyTorch, Tensorflow

Theoretical Knowledge: Motion Planning, Convex Optimization, Optimal Control

RESEARCH INTERESTS

Autonomous Navigation, Motion Planning, Unmanned Aerial Vehicles, Optimal Control, MPC

MASTER THESIS

Topic: Risk-Aware Multi-MAV Planning in Unknown and Dynamic Environments

Supervisor: Dr. Javier Alonso-Mora,

Est. completion date: Aug. 2023

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 (RA-L)*, 2023 [[paper](#), [code](#)]

Botao He*, Haojia Li*, **Siyuan Wu**, Dong Wang, Zhiwei Zhang, Qianli Dong, Chao Xu, Fei Gao "FAST-Dynamic-Vision: Detection and Tracking Dynamic Objects with Event and Depth Sensing", *IEEE/RSJ International Conference on Intelligent Robots and Systems(IROS)*, 2021 [[paper](#), [code](#), [video](#)]

SELECTED PROJECTS

MAV Autonomous Navigation in Dynamic Environments *Dec. 2021 - Present*
Supervised by Dr. Javier Alonso-Mora, Cognitive Robotics, TU Delft

- Developed a risk-aware multi-MAV planning framework in ROS for safe navigation in unknown environments.
- Utilized an efficient method to construct spatio-temporal safety corridors from a particle-based uncertainty map, which achieves the highest success rate compared to state-of-the-art algorithms under different noise levels.
- Implemented a minimum jerk trajectory optimizer based on Bernstein polynomials in C++ by solving quadratic programming (QP) problems.
- Designed and assembled a multi-MAV drone system, integrating PX4 flight controls and depth camera for autonomous navigation, which showcases extensive hardware integration expertise.

Perception with Dynamic Vision Sensors

Jul. 2020 - Feb. 2021

Supervised by *Dr. Fei Gao*, FAST Lab, Zhejiang University

- Hardware implementation of a 450mm drone carrying DVXplorer, Realsense 435i and DJI Manifold-2C.
- Developed an onboard perception system for dodging fast-moving objects with low latency and high precision.
- Implemented a moving object detection and trajectory prediction algorithm on an onboard event camera.

Multi-Sensor Pedestrian Perception

Nov. 2021 - Jan. 2022

course project: *Machine Perception*

- Implemented DBSCAN to classify objects from point clouds
- Applied pre-trained CNN pedestrian detector to classify proposal patches from the front camera.
- Implemented Extended Kalman Filter to improve detection.

A Paper Reproduction of *Learning Monocular Dense Depth from Events*

April. 2022 - June. 2022

course project: *Seminar Computer Vision by Deep Learning* [[blog](#)]

- Reproduced the paper "*Learning Monocular Dense Depth from Events*" and trained on a DSEC dataset.
- Discussed the results with different losses, e.g. structural similarity (SSIM) loss.

Adaptive Cruise Control with MPC

May. 2022 - Jun. 2022

course project: *Modeling and Control of Hybrid Systems*

- Modelled the problem by its piecewise affine (PWA) approximation and transformed PWA model to Mixed Logical Dynamical (MLD) system.
- Designed an MPC controller for the MLD model, and rewrote it to MILP formulation
- Applied both explicit and implicit MPC to find the optimal control policy

More projects can be found at <https://edmundwsy.github.io/projects/>

EXPERIENCES

ETH Robotics Summer School

July. 2023

Autonomous Navigation and Artifact Detection in Hazardous Environments

Highly competitive program for MSc and PhD students with a strong background [[program info](#)]

IEEE RAS Winter School on SLAM in Deformable Environments

July. 2021

Monocular depth estimation via transfer learning

3rd Prize

AWARDS

National Scholarship of China

Top 1%

Ministry of Education, China

Nov. 2018

Mechanic Alumni Scholarship

Top 3%

Qian Xuesen's Honors College, XJTU

Mar. 2019

Excellent Graduate

Xi'an Jiaotong University

Jul. 2021

TEACHING

Student Teaching Assistant for the following M.Sc. level courses at TU Delft:

- *RO47003 Robot Software Practical* Instructor: Dr. Julian Kooij, Dr. Mario Garzon, Ir. Gijs van der Hoorn
- *RO47005 Planning & Decision Making* Instructor: Dr. Javier Alonso-Mora