Jianhao ZHENG

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EDUCATION

Eidgenössische Technische Hochschule Zürich (ETH), Switzerland *Expected:* *Sep. 2022 - Mar. 2023*

- Master thesis in Computer Science, D-INFK

École polytechnique fédérale de Lausanne (EPFL), Switzerland *Sep. 2020 - Present*

- MSc in Robotics; GPA: **5.46/6.0**

- Selected courses: Model predictive control, Applied machine learning, Advanced algorithms, Aerial robotics, Artificial neural networks, Vision Algorithms for Mobile Robotics

Shanghai Jiao Tong University (SJTU), Shanghai, China *Aug. 2016 - Jul. 2020*

- B.E. in Mechanical Engineering, School of Mechanical Engineering; GPA: **3.63/4.0**

- Awarded Academic Excellent Scholarship (Second-Class) of SJTU for three consecutive years

PUBLICATIONS & SUBMISSIONS

1. Q. Yan, **J. Zheng**, S. Reding, S. Li, I. Doytchinov, "CrossLoc: Scalable Aerial Localization Assisted by Multimodal Synthetic Data", *CVPR 2022*. [arXiv][code][website]

2. I.K. Erunsal, **J. Zheng**, R. Ventura, A. Martinoli, "Linear and Nonlinear Model Predictive Control Strategies for Trajectory Tracking Micro Aerial Vehicles: A Comparative Study", *IROS 2022*. [video]

PROJECT EXPERIENCES

Advanced Robot Companion (ARCO)
Intern, Schindler Elevator AG, Switzerland *Feb. 2022 - Aug. 2022*

- Developed a system, consisting of an ABB robot arm, a RealSense D415 camera and a self-designed opening-tool, to automatically open the elevator door and clean the rail.

- Built a robust object localization method with an existing instance segmentation method, YOLACT.

- Proposed an automatic labelling pipeline utilizing ORB-SLAM3 for camera pose tracking, estimating the 3D position of the polygons out of the shapes of objects, and projecting them into each frame to create annotations in COCO format. Such pipeline significantly reduces the time to generate training data for YOLACT.

Absolute Visual Localization Domain Adaptation via Domain Decluttering Techniques
Semester project, obtained grade: **5.75/6** *Sept. 2021 - Feb. 2022*
Advisor: Dr. Doytchinov Iordan, Geodetic Engineering Laboratory, EPFL

- Developed a real data efficient 6D pose estimation scheme for flying systems w/o GNSS signals in large-scale a priori known environment with available aerial photogrammetry data.

- Proposed **DDLoc**, a sim-to-real coordinate regression method for absolute localization, which better leverages the synthetic data for train and outperforms the base line in a clear margin.

- Adapted the concept of **Domain Decluttering**, which learns to translate real images into synthetic domain as well as to identify, remove and fill in novel (hard) regions, to zero-shoot training of **CrossLoc**, a scene coordinate regression model. [slides][code]

Distributed Model Predictive Control Architectures for Multi-Rotor Micro Aerial Vehicles
Semester project, obtained grade: **5.75/6**   *Feb. 2021 - Jun. 2021*
Advisor: Izzet Kagan Erunsal and Prof. Alcherio Martinoli, Distributed Intelligent Systems and Algorithms Laboratory (DISAL), EPFL

- Conducted literature survey on multiple multiple MAVs' formation control and investigated into different types of **Distributed Model Predictive Control** (Distr-MPC) architectures.

- Theoretically formulated three most prominent Distr-MPC schemes and prototyped them in MATLAB to simulate a benchmark formation control problem. Performances regarding to the formation error, computational time and robustness to communication quality were compared.

- Implemented the best Distr-MPC architecture and a Decentralized MPC scheme in a high-fidelity framework consisting of the Webots simulator and the Robotic Operating Systems (ROS) with **ACADO Toolkit** as the MPC solver. The Distributed MPC has 37% less formation error than the Decentralized MPC. [project web][slides]

Crazyflie: Auto Navigation and Landing
Course project (Aerial Robotics), obtained grade: **5.88/6**   *Apr. 2021 - Jun. 2021*
Advisor: Prof. Dario Floreano, Laboratory of Intelligent Systems (LIS), EPFL

- Programmed based on Crazyflie 2.1 to auto-navigate through a broad region and avoid obstacle with sensor readings from multi-ranger deck.

- Implemented A* algorithm to control the Crazyflie to search an unknown landing pad with a z-range sensor and designed a robust algorithm to control the drone to fly back to the take-off pad after landing. [code] [video]

SELECTED HONORS

Meritorious winner in Mathematical Contest in Modeling (13%)	*Feb. 2018*
Academic Excellent Scholarship (Second-Class) of SJTU (40 out of 420)	*Oct. 2017 - Oct. 2019*
The Most Popular Award at the Spring Works Exhibition (top 5%, departmental)	*Jun.2018*
Merit Student of Shanghai Jiao Tong University (3 out of 40)	*Oct. 2017*

SERVICE

Reviewer

- IEEE International Conference on Robotics and Automation (ICRA), 2022.

Teaching Assistant

- EE-477: Multivariable control and coordination systems (Fall 2021) @ EPFL.

SKILLS

Programming	proficient: MATLAB, Python; intermediate: C++
Technical Tools	Linux, Git, PyTorch, ROS, Latex, Webots
	Arduino, Raspberry Pi, UG, SolidWorks
Language	English: TOEFL-105(R30,L28,S23,W24), GRE-322(V158,Q170,AW3.5)