# Jianhao ZHENG

Room 304, No. 6, Lane 125, Zhanghong Road, Shanghai, China
jianhao@stanford.edu (650) 272-4651 jianhao-zheng.github.io

## EDUCATION

**Stanford University** *Sep. 2023 - present*

- Ph.D. in Civil and Environmental Engineering
- Advisor: Prof. Iro Armeni

**Eidgenössische Technische Hochschule Zürich (ETH)** *Sep. 2022 - Mar. 2023*

- Exchange student in Computer Science, D-INFK

**École polytechnique fédérale de Lausanne (EPFL)** *Sep. 2020 - Mar. 2023*

- MSc in Robotics, GPA: **5.5/6.0**

**Shanghai Jiao Tong University** *Aug. 2016 - Jul. 2020*

- B.E. in Mechanical Engineering, School of Mechanical Engineering; GPA: **3.6/4.0**

## PUBLICATIONS & SUBMISSIONS

1. **J. Zheng**, D. Barath, M. Pollefeys, I. Armeni, "MAP-ADAPT: Real-Time Quality-Adaptive Semantic 3D Maps", *ECCV 2024*. [arXiv][website]
2. Q. Yan, **J. Zheng**, S. Reding, S. Li, I. Doytchinov, "CrossLoc: Scalable Aerial Localization Assisted by Multimodal Synthetic Data", *CVPR 2022*. [arXiv][code][website]
3. 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]
4. L. Panchetti, **J. Zheng**, M. Bouri, M. Mielle, "TEAM: a parameter-free algorithm to teach collaborative robots motions from user demonstrations", (arXiv), 2022.

## PROJECT EXPERIENCES

**MAP-ADAPT: Real-Time Quality-Adaptive Semantic 3D Maps**
Master thesis *Sep. 2022 - Mar. 2023*
Advisor: Prof. Iro Armeni, Dr. Daniel Barath and Prof. Marc Pollefeys, CVG, ETH

- Proposed the first real-time quality-adaptive 3D mapping method that creates a single map with regions of different quality levels defined by their semantic labels.
- Conducted experiments on both a simulated (HSSD) and real-world dataset (ScanNet), and showcased that the proposed system can provide a lightweight semantic 3D map that is comparable in geometric and semantic accuracy to using a fixed-sized map while requiring less computational and storage demands.

**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 *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 *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]

## ACADEMIC SERVICES

**Reviewing:** CVPR (since '23), ECCV '24, NeurIPS '24, IROS (since '23)

**Organization:** Long-Term Perception for Autonomy in Dynamic Human-shared Environments: What Do Robots Need?@*IROS '24* [web]

## SKILLS

| | |
|---|---|
| **Programming** | proficient: MATLAB, Python; intermediate: C++ |
| **Technical Tools** | Linux, Git, PyTorch, ROS, Latex, Webots |
| | Arduino, Raspberry Pi, UG, SolidWorks |
| **Language** | English: TOEFL-105, GRE-322 |