

# Jianhao ZHENG

FMEL Triaudes 13/241, Chambre 3241, Ecublens 1024, Vaud, Switzerland

✉ [jianhao.zheng@epfl.ch](mailto:jianhao.zheng@epfl.ch) ☎ (+44) 757-994-5675 🏠 [jianhao-zheng.github.io](https://github.com/jianhao-zheng)

## EDUCATION

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**École polytechnique fédérale de Lausanne (EPFL), Switzerland**

*Sep. 2020 - Present*

- MSc in Robotics; GPA: **5.43/6.0**
- 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

**National University of Singapore (NUS), Singapore**

*Jun. 2019–Sept, 2019*

- Summer Research Intern

## PROJECTS

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**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

- Aimed at developing 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 **DDL**oc, 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](#)]

## An Inverted Pendulum Controlled by UR Robot

Design and Practice of Mechatronic Systems Final Project (top 4 students)

*Feb. 2019 - Jun. 2019*

- Designed and manufactured an inverted pendulum installed with a **potentiometer** to match the **UR5e Robot**.
- Programed through **MoveIt Motion Planning Framework** in ROS to control the movement of **UR5e Robot** according to the situation of inverted pendulum.
- Managed to keep the inverted pendulum unfallen and stable under disturbance through our controller.

## PUBLICATIONS & SUBMISSIONS

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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*, submitted.

## SELECTED HONORS

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|   |                              |
|---|------------------------------|
| <b>Excellent Graduates of Shanghai Jiao Tong University (5%)</b>                    | <i>Jun. 2020</i>             |
| <b>Meritorious winner in Mathematical Contest in Modeling (13%)</b>                 | <i>Feb. 2018</i>             |
| <b>Academic Excellent Scholarship (Second-Class) of SJTU (40 out of 420)</b>        | <i>Oct. 2017 - Oct. 2019</i> |
| <b>The Most Popular Award at the Spring Works Exhibition (top 5%, departmental)</b> | <i>Jun. 2018</i>             |
| <b>Merit Student of Shanghai Jiao Tong University (3 out of 40)</b>                 | <i>Oct. 2017</i>             |

## SERVICE

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### Reviewer

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

### Teaching Assistant

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

## SKILLS

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