

# QI YAN

Research interests: robotic perception and planning, autonomous driving.

✉ qi.yan@epfl.ch    📧 live:yanqi2010ok    ☎ (+41) 078-353-4900    🏠 [qiyan98.github.io](https://github.com/qiyan98)

## EDUCATION

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**Swiss Federal Institute of Technology, Lausanne (EPFL)** Sep. 2019 - Present

*MSc in Mechanical Engineering*, focusing on robotic perception, planning and control

GPA: **5.37/6.0** (Swiss grading system, higher is better)

Selected courses: Applied machine learning, Artificial neural network, Computer vision, Convex optimization, Deep learning for autonomous vehicles, Image analysis and pattern recognition.

**Shanghai Jiao Tong University (SJTU), China** Sep. 2015 - June 2019

*B.E. in Nuclear Engineering*, School of Mechanical Engineering (Honors Degree)

GPA: **3.76/4.0** (88.45/100), Ranking: **2/33**

## PUBLICATIONS & SUBMISSIONS

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Y. Liu, **Q. Yan**, A. Alahi. “Social NCE: Contrastive Learning of Socially-aware Motion Representations”, **under review**, also presented in *NeurIPS 2020 Workshop*. [[arXiv](#)] [[code](#)]

**Q. Yan**, L. Jiang and S. S. Kia, “Measurement Scheduling for Cooperative Localization in Resource-Constrained Conditions,” in *IEEE Robotics and Automation Letters*, vol. 5, no. 2, April 2020 (also selected for ICRA’20 conference presentation). [[arXiv](#)] [[code](#)] [[video](#)]

**Q. Yan**, R. Li, and X. Meng. “Tribo-Dynamic Simulation and Motion Control of a Rotating Manipulator Based on the Load and Temperature Dependent Friction”, *Proceedings of the Institution of Mechanical Engineers, Part J: Journal of Engineering Tribology*, September 2020. [[paper](#)] [[code](#)]

## PROJECT EXPERIENCES

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### Contrastive Learning for Socially-aware Robot Navigation

Project student, EPFL, Switzerland July. 2020 - Mar. 2021

Advisor: *Prof. Alexandre Alahi*, Lab of Visual Intelligence for Transportation, EPFL

- Aimed to address the distributional shift between training and testing domains for DRL-based robotic navigation policy in multi-agent social scenarios, which is crucial to improve model robustness.
- Employed contrastive learning to formulate an auxiliary task to learn socially-aware motion representations, and used prior knowledge on unfavorable events to create negative samples.
- The proposed method considerably boosts off-policy RL sample efficiency and offline RL performance, and is also proven effective in trajectory forecasting and imitation learning tasks.

### Visual Absolute Localization in a priori Known Environments

Project student, EPFL, Switzerland Feb. 2020 - Present

Advisor: *Dr. Iordan Doytchinov*, Laboratory of Geodetic Engineering, EPFL

- Intended to develop a vision-only 6D pose estimation scheme for flying systems w/o GNSS signals, in large a priori known environments with available aerial photogrammetry data.
- Adopted Cesium Ion to synthesize point cloud and RGB data from the terrain LiDAR model and the satellite orthophotos. Also collected real-world equivalent images by drones.
- Proposed a 3D structure learning method based on scene coordinate regression. The proposed pipeline achieves an accuracy of  $\sim 10$  m and  $\sim 5$  deg in synthetic domain, comparable to real-life GNSS solution.
- Utilized supervised contrastive learning in the latent space to alleviate sim-to-real challenge.

# Application of Computer Vision Algorithm for Elevators

Intern, Schindler Aufzüge AG, Switzerland

Feb. 2021 - Present

- Aimed to leverage eye gaze tracking algorithm so that users can call elevator without touch. Developed a PyQt GUI program to integrate gaze estimation, elevator-call API and user face recognition.

# Droplet Size Estimation Using Deep Learning Method

Undergraduate thesis, Shanghai Jiao Tong University, China

Mar. 2019 - June 2019

Advisor: *Prof. Xiang Chai*, School of Mechanical Engineering, Shanghai Jiao Tong University

- Employed U-Net for semantic segmentation on droplet images from high-speed camera and obtained a size estimation of  $\sim 10\%$  error, comparable to manual work results.

# Cost-effective Cooperative Localization Algorithm Design

Research student, UC Irvine, USA

Jul. 2018 - Sep. 2019

Advisor: *Prof. Solmaz S. Kia*, Dept. of Mechanical and Aerospace Engineering, UC Irvine

- Investigated into optimization strategy to reduce cost for multi-robot cooperative localization (CL) algorithms in terms of communication and computation overhead.
- Proposed a sub-optimal communication free algorithm for the NP-hard multi-robot measurement selection problem, by minimizing the upper bound of a posterior uncertainty.
- Relaxed further the full-observability requirement to make it practical for CL systems with pure relative measurements. Paper accepted by *IEEE RA-L* (also presented at ICRA'20).

# Friction Dynamics Analysis and Control of Manipulator

Research student, Shanghai Jiao Tong University, China

Dec. 2017 - Dec. 2018

Advisor: *Prof. Xianghui Meng*, School of Mechanical Engineering, Shanghai Jiao Tong University

- Carried out tribo-dynamic modeling of a single manipulator joint considering the effects of motor load and temperature on joint friction, which were dismissed in previous studies.
- Proposed a new adaptive fast non-singular terminal sliding mode (AFNTSM) controller to compensate for the varying joint friction, which does not require prior knowledge of system uncertainties and disturbances. Paper accepted by *Journal of Engineering Tribology*.

## SKILLS

**Programming**    proficient: Python, MATLAB; intermediate: C/C++, Java

**Technical Tools** PyTorch, Git, Linux, PyQt, L<sup>A</sup>T<sub>E</sub>X, Solidworks, 3D-printing  
Microcontrollers: Intel MSC-51 (8051), STM32

**Languages** Chinese: native; English: TOEFL-109(S24), GRE-322(V154,Q168,AW3.0)

## HONORS & AWARDS

Outstanding Graduate of Shanghai Jiao Tong University 2019

Excellent Design Award for Undergraduate Thesis (12 out of 133) 2019

Scholarship of Nuclear Power Institute of China (2 out of 33)	2017, 2018
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Scholarship of Shanghai Nuclear R&amp;D Institute (2 out of 33) 2016

## OTHERS

**Reviewer:** IEEE Sensors Letters, 2020.