# Yujie HE

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## EDUCATION

**École polytechnique fédérale de Lausanne (EPFL), Switzerland**  *Sep. 2020 - Jul. 2022 (expected)*

- Incoming MSc in Robotics from 2020 Fall

**Tongji University, China**  *Sep. 2015 - Jul. 2020*

- BEng in Mechanical Engineering; GPA: 4.57/5 ; Ranking: 4/113
- Awarded Tongji University Outstanding Scholarship for three consecutive years
- Main Courses: Industrial Robotics, Deep learning, An Introduction to Matlab and Its Application in Engineering, Computational Methods, Mathematical Modeling

## RESEARCH INTERESTS

Robotic Vision, Visual Object Tracking, Place Recognition, Autonomous Driving, Machine Learning, Unmanned Aerial Vehicle (UAV)

## PUBLICATIONS

[1] **Yujie He**, Changhong Fu*, Fuling Lin, Yiming Li, and Peng Lu. "Towards Robust Visual Tracking for Unmanned Aerial Vehicle with Tri-Attentional Correlation Filters" accepted by *IEEE International Conference on Intelligent Robots and Systems (IROS), Las Vegas, USA, 2020.* [code] [video] [project]

[2] Changhong Fu*, **Yujie He**, Fuling Lin, and Weijiang Xiong. "Robust Multi-Kernelized Correlators for UAV Tracking with Adaptive Context Analysis and Dynamic Weighted Filters" accepted by *Neural Computing and Applications.* [code] [video] [project] (JCR Q1, IF=4.664)

[3] Fuling Lin, Changhong Fu*, **Yujie He**, Fuyu Guo, and Qian Tang. "Learning Bidirectional Incongruity-Aware Correlation Filter for Efficient UAV Object Tracking" accepted by *IEEE International Conference on Robotics and Automation (ICRA), Paris, France, 2020.* [code] [video] [project]

[4] Changhong Fu*, Fuling Lin, Fan Li, and **Yujie He**. "Sample Purification-Aware Correlation Filters for UAV Tracking with Cooperative Deep Features" accepted by *IROS Workshop on Fast Neural Perception and Learning for Intelligent Vehicles and Robotics, 2019.* [code] [poster] [project] (*Best Poster Award*)

## PROJECTS AND EXPERIENCE

**Online Collaborative Learning for Multiple UAVs in Complex Environment**  *Sep. 2018 - Present*
Research Assistant at Vision4Robotics Group supervised by Prof. Changhong Fu

- Investigated correlation filter (CF)-based **visual object tracking** for unmanned aerial vehicles. By applying **machine learning & deep learning** techniques, we have improved the existing trackers on overall tracking performance in challenging scenarios with real-time operational capability. Related work has been published in journals and conferences.

- Proposed a lightweight and generalizable **triple attention strategy** on CF-based framework by exploiting mutual independence of the appearance model and feature responses to implement real-time tracking for UAV (accepted by *IROS 2020* as **first author**).

- Employed the adaptive **GMSD-based context analysis** and **dynamic weighted filters** for utilizing both contextual and historical information, and leveraged **lightweight convolution features** to efficiently raise the tracking robustness (accepted by *Neural Computing and Applications* as **first student author**).

- Exploited the inter-frame information between prediction and backtracking phases for further incorporating the **bidirectional incongruity error** into the CF learning (accepted by *ICRA 2020*).

- Proposed the adaptive **sample purification strategy** integrating with multiple convolutional features to tackle the issue of invalid samples (published in *IROS Workshop 2019*).

- Realized **nonsingleton fuzzy logic controllers** for unmanned aerial manipulators using MATLAB and ROS, reducing error rate by 20% compared to PID controllers in designed trajectories.

**3D Semantic Segmentation for Medical Image Processing**　　　　　　　　*Sep. 2019 - Jan. 2020*
Deep Learning Final Project (top 5 students)

- Utilized the latest **Weight Standardization** (WS) as well as **GroupNorm** to accelerate neural networks training from scratch for 3D Zonal Segmentation of the **Prostate MRI images**.  [project]

- Conducted extensive evaluation between the proposed UWG-Net with the baseline with **small batch sizes**, achieving 2-3% accuracy improvement in **multi-class segmentation**.

**Tongji University Design & Innovation College**　　　　　　　　　　　　*Sep. 2018 - Jan. 2019*
Teaching Assistant in Open Source Hardware and Programming

- Designed three sets of **serial electromechanical modules** for Industrial Design first-year students

- Delivered lectures on basic mechanical theory cooperating with Arduino hardware and programming and advanced RGBD sensors for the semester project  [video]

**Tongji University DIAN Racing Formula Student Electric Team**　　　　*Sep. 2016 - Dec. 2018*
Powertrain Group Leader

- Designed and optimized the overall powertrain system for **China's first leading four-wheel-drive Formula Student Racecar**, achieving 8% higher efficiency and 10% more lightweight.

- Participated FSEC 2017 - 2018 and SFJ 2018 as **Chief Powertrain Engineer** and reported at open-house Design Final Event, contributing to DIAN Racing's win in First Place in Engineering Design and Efficiency Prize, and Best Powertrain Award.  [video]

**Autonomous Mobile Robot for Indoor Navigation and Outdoor Mapping**　　*Jul. 2018 - Aug. 2018*
Robotics Algorithm Development Intern at Hesai Technology

- Implemented sensor fusion between **40-channel LiDAR** and **gyroscope**, achieving a 5% accuracy improvements on advanced SLAM framework and 3D point cloud **mapping of Tongji University Jiading Campus**.

- Deployed control, decision, and communication **ROS** nodes for the self-developed **skid steer wheel robot**, realizing autonomous navigation and obstacle avoidance in a $300m^2$ workspace.

**Tongji University Super Power Robot Team**                      *Oct. 2016 - Jun. 2018*
Project Manager & Mechanical Development Leader

- Led main robots design for national mobile robot competition, RoboMaster, achieving lightweight and stability of the **chassis** and **3DOF pan-tilt mechanism** for **multi-robot interaction**.

## SELECTED HONORS

**Excellent Graduates of Shanghai** (top 2% students from all majors, provincial)     *Jun. 2020*

**Best Poster Award** of IROS Workshop (top 3 papers)     *Nov. 2019*

**Tongji Scholarship of Excellence** (top 5%, departmental)     *Dec. 2016 - Dec. 2018*

**Best Powertrain Award & First Prize** in Formula Student China (top 5%)     *Nov. 2017 - Nov. 2018*

**Overall Runner-up of EV class** in Student Formula Japan (highest level in Asia)     *Sep. 2018*

**Second Prize** in RoboMaster National College Student Robot Contest (top 10%)     *Jun. 2018*

## SERVICE

**Reviewer**

- **IROS** (IEEE/RSJ International Conference on Intelligent Robots and Systems) 2020.

- **ARM** (IEEE International Conference on Advanced Robotics and Mechatronics) 2019.

**Teaching Assistant**

- D&I-550069: Open-Source Hardware and Programming, Fall 2018 @ Tongji University.

## SKILLS

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|---|---|
| **Hardware** | Arduino, Raspberry Pi |
| **Programming** | MATLAB, Python, LaTeX |
| **Software** | Simulink, ROS, OpenCV, AutoCAD, SolidWorks |
| **Language** | Chinese (native), English (C1), Deutsch (B1) |