

# Yujie HE

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## EDUCATION

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

- Incoming MSc Student in Robotics from 2020 Fall

Tongji University, China Sep. 2015 - Jul. 2020

- B.E. in Mechanical Engineering. GPA: 4.57/5 ; Ranking: 2/113
- 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

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

## PUBLICATIONS

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- [1] 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)
- [2] 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)*, 2020. [[code](#)] [[video](#)] [[project](#)]
- [3] 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)

## WORKING PAPERS

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- [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" submitted to *the IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2020.

## PROJECTS AND EXPERIENCE

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**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.

- 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*).
- 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 (submitted to *IROS 2020*).
- 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**  
Project Manager & Mechanical Development Leader

*Oct. 2016 - Jun. 2018*

- 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

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<b>Excellent Graduates in Shanghai (top 2% students from all majors)</b>	<i>Jun. 2020</i>
<b>Best Poster Award</b> of IROS Workshop ( <b>top 3 papers</b> )	<i>Nov. 2019</i>
<b>Tongji Scholarship of Excellence (top 5%, departmental)</b>	<i>Dec. 2016 - Dec. 2018</i>
<b>Best Powertrain Award &amp; First Prize</b> in Formula Student China ( <b>top 5%</b> )	<i>Nov. 2017 - Nov. 2018</i>
<b>Overall Runner-up of EV class</b> in Student Formula Japan ( <b>highest level in Asia</b> )	<i>Sep. 2018</i>
<b>Second Prize</b> in RoboMaster National College Student Robot Contest ( <b>top 20%</b> )	<i>Jun. 2018</i>

## SERVICE

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### 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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<b>Hardware</b>	Arduino, Raspberry Pi
<b>Programming</b>	MATLAB, Python, $\text{\LaTeX}$
<b>Software</b>	Simulink, ROS, OpenCV, AutoCAD, SolidWorks
<b>Language</b>	Chinese (native), English (C1), Deutsch (B1)