

# Yujie HE

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## EDUCATION

### Tongji University, Shanghai, China

Sep. 2015 - Jul. 2020 (expected)

- B.E. in Mechanical Engineering. GPA: 4.54/5 (ranking top 3%)
- Awarded Tongji University Outstanding Scholarship for three consecutive years
- Main Courses: Industrial Robotics, Deep learning, An Introduction to Matlab and Its Application in Engineering, Digital Modelling and Design of Mechanical-electrical-hydraulic System
- Online Courses: Robotics: Perception (University of Pennsylvania), Writing in the Sciences (Stanford University), Neural Networks and Deep Learning (deeplearning.ai)

### Quanzhou No.5 High School, Fujian, China

Sep. 2012 - Jun. 2015

- Major in Sciences. Main courses: Physics, Chemistry, and Biology
- Top 5‰ student in National College Entrance Examinations (Fujian Province)

## RESEARCH INTERESTS

Intelligent Robots/Vehicles, Computer vision, Machine Learning, Deep learning, Visual tracking, Neuro-morphic systems, Unmanned Aerial Vehicle (UAV)

## PUBLICATIONS

- [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*. [[pdf](#)] [[code](#)] [[video](#)] [[project](#)] (Accepted on Jan. 7, 2020, 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/RSJ International Conference on Robotics and Automation (ICRA)*, 2020. [[code](#)] [[video](#)] [[project](#)] (Accepted on Jan. 22, 2020)
- [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)
- [4] **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. [[project](#)] [[video](#)]
- [5] Changhong Fu\*, Junjie Ye, Juntao Xu, and **Yujie He**. "Exploiting Interval-Based Response Inconsistency for Correlation Filters in Real-Time UAV Tracking" submitted to *the IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2020.

[6] Fan Li, Changhong Fu\*, Changjing Liu, **Yujie He**, and Fuling Lin. "ReSL: Rethinking Scale Learning in Correlation Filters for Real-time UAV Tracking" submitted to *the European Conference on Computer Vision (ECCV)*, 2020.

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## PREPRINT

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[1] Fuling Lin, Changhong Fu\*, **Yujie He**, and Fan Li. "TOT: Target-oriented UAV Tracking via Multi-feature Inconsistency Mining." (preprint)

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## 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** and **fuzzy logic control** algorithms combining **machine/deep learning** techniques for UAV in complex environments.
- 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, and achieved efficient and accurate tracking (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*).
- Collaborating with [Prof. Peng Lu](#), 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 (in preparation for *IROS 2020*).
- Realized **nonsingleton fuzzy logic controllers** for unmanned aerial manipulators using MATLAB and ROS, reducing in error rate by 20% compared to PID controllers in six types of 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**.
- Conducted extensive evaluation between the proposed UWG-Net with the baseline with **small batch sizes**, achieving 2-3% increase in **multi-class segmentation accuracy** for medical imaging application. [\[project\]](#)

**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**  
Powertrain Group Leader

*Sep. 2016 - Dec. 2018*

- Designed and optimized the overall powertrain system to ensure **China's first leading four-wheel-drive Formula Student Racecar**, achieving improvements with 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** with Lightweight CNN-based place recognition, 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**.

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## SELECTED HONORS

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**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*

**First Prize in RoboMaster National College Student Robot Contest (top 20%)**

*Jun. 2018*

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## SERVICE

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Reviewer for IEEE International Conference on Advanced Robotics and Mechatronics (ARM), 2019

Teaching Assistant for D&I-550069: Open-Source Hardware and Programming, Fall 2018

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## SKILLS

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<b>Hardware</b>	Arduino, Raspberry Pi
<b>Software</b>	MATLAB, $\text{\LaTeX}$ , Simulink, ROS
<b>Tools</b>	Python, PyTorch, OpenCV, AutoCAD, SolidWorks
<b>Language</b>	Chinese (native), English (C1), Deutsch (B1)
<b>English</b>	IELTS (7.0, 7.5R/7.5L/6.0W/6.0S), GRE (152V, 170Q, 3.5AW)