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, Neuromorphic systems, Unmanned Aerial Vehicle (UAV)

PUBLICATIONS

[1] Fuling Lin, Changhong Fu*, **Yujie He**, and Fan Li. "TOT: Target-oriented UAV Tracking via Multi-feature Inconsistency Mining." recently submitted to *IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2020.*

[2] **Yujie He**, Changhong Fu*, Fuling Lin, Yiming Li, and Peng Lu. "Tri-Attention Correlation Filter for Effective UAV Object Tracking." submitted to *IEEE/RSJ International Conference on Robotics and Automation (ICRA), 2020.* [video]

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

[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] (*Best Poster Award*)

[5] Changhong Fu*, **Yujie He**, Fuling Lin, and Weijiang Xiong. "Robust Multi-Kernelized Correlators for UAV Tracking with Adaptive Context Analysis and Dynamic Weighted Filters." published in *Neural Computing and Applications.* [pdf] [code] [video] (*Accepted on Jan. 6, 2020*)

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** and **fuzzy logic control** algorithms combining **machine/deep learning** techniques for UAV in complex environments.
- Explored **inter-feature inconsistency** with **target-oriented regularization** to repress the arbitrary inference for robust and long-term tracking for UAV (submitted in *CVPR 2020*).
- 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 in *ICRA 2020*).
- Collaborating with Prof. Peng Lu (Former Postdoc at Institute of Neuroinformatics, UZH), 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 (submitted in *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*).
- 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 (submitted to *Neural Computing and Applications*).
- 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**.
- Extensively evaluated the proposed UWG-Net with the baseline U-Net with **small batch sizes**, achieving 2-3% increase in the accuracy of **multi-class segmentation**. [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 *Sep. 2016 - Dec. 2018*
Powertrain Group Leader

- Designed and optimized the overall powertrain system to ensure **China's first leading four-wheel-drive Formula Student Racecar**, achieving an 8% efficiency and 10% lightweight improvement. [video]

- 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.

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**.

SELECTED HONORS

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*

SERVICE

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

SKILLS

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