Yujie HE

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EDUCATION

Tongji University, Shanghai, China *Sep. 2015 - Jul. 2020 (expected)*

- B.E. in Mechanical Engineering. GPA: 4.53/5 (ranking top 5%)
- 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

Intelligent Robots/Vehicles, Computer Vision, Machine Learning, Deep Learning, Visual Object Tracking, 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.* [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/RSJ 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

[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.* [code] [video] [project]

[2] Fuling Lin, Changhong Fu*, **Yujie He**, and Weijiang Xiong. ReCF: Exploiting Response Reasoning for Correlation Filters in Real-Time UAV Tracking" submitted to *the European Conference on Computer Vision (ECCV), 2020.*

[3] 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.*

[4] 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.*

PREPRINT

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

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.
- 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 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**. [project]
- 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.

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 than previous.
- 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**.

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

- **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

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