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, 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)

RESEARCH INTERESTS

Intelligent Robots/Vehicles, Computer vision, Machine Learning, Deep learning, Visual tracking, Neuromorphic 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*)

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.* [project] [video]

[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 (including background clutter and partial occlusion) 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*).

- 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**. [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 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**.

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)