

# YIMING LI

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## EDUCATION

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- **Tongji University, Shanghai, China** *2015.9 - 2020.6(expected)*  
B.Eng. in Mechanical Engineering
  - GPA Overall: *3.77/4.0* (equivalent to *90/100*)
  - GPA Major: *3.91/4.0* (equivalent to *92/100*)
  - Supervisor: Prof. Changhong Fu (Director of Vision4Robotics Group)
  - Scholarship: National Scholarship (top 1%), Shanghai Scholarship (top 1%), National Endeavor Scholarship, Excellent Student Scholarship, School Practice Scholarship.
- **Tsinghua University, Beijing, China** *2019.9 - 2019.10*  
Visiting Student in Department of Automation
  - Supervisor: Prof. Geng Lu (Director of UAV Lab)
- **Taiyuan No.5 Middle School, Taiyuan, China** *2012.9 - 2015.6*

## RESEARCH INTERESTS

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- Robot Vision and Learning, Aerial Robotics, Visual Tracking, Pose Estimation
- Semantic Analytics, 3D and 4D Vision, Multi-Robot System, Multi-Model Perception

## RESEARCH EXPERIENCES

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### **Developing Robust and Real-Time Aerial Tracking Algorithms on CPU** *2018.7 - present*

- Proposed a general automatic spatio-temporal regularization method. (*submitted to CVPR 2020*)
- Incorporated memory augmentation to tackle filter corruption issues. (*preparation for IROS 2020*)
- Proposed to repress the aberrance in correlation filter framework. (*published in ICCV 2019*)
- Fused multiple features to construct robust representation. (*published in Remote Sensing*)

### **Investigating Deep Learning-based Visual Tracking for UAV** *2019.3 - present*

- Exploited the keyframe technique and proposed a keyfilter-aware tracker for mitigating filter corruptions and lowering the redundancy of context learning. Utilized lightweight convolution features to efficiently and effectively raise the tracking robustness. (*accepted by ICRA 2020*)
- Explored the multi-frame strategy and developed the multi-frame consensus verification for achieving long-term tracking. Fused features from different layers of CNN including both spatial and semantic information to achieve accurate tracking. (*published in IROS 2019*)
- Designed a collaborative multi-recommender scheme to unlock CNN's potential. (*under revision*)

## Localization by Tracking: A Monocular Pose Estimation System

2019.7 - present

- Developed fast trackers on C++ platform to track the markers observed by a moving camera.
- Developed a monocular pose estimation system with high versatility and accuracy.
- Tested the monocular localization system in ROS Gazebo and validated it on quanser platform.

## SELECTED PROJECTS

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### UAV-loaded Serpentine Manipulator for Search and Rescue

2018.5 - 2018.7

- Designed the overall structure of separable UAV-loaded Serpentine Manipulator.
- Finished writing the specification and submitted the National Patent for Invention application.

### Structure Design for Drone's Wireless Charging

2018.5 - 2018.7

- Conducted the overall structure design of a 3-DOF wireless charging facility for drones.
- Enhanced the accuracy when the drone approached the ground with imprecise poses.

### ZEAL Eco-Power Racing Vehicle Team

2016.10 - 2019.10

- Committed to designing and manufacturing Eco-Power car, specifically the control system.
- Designed velocity sensor, SD data logger and automatic throttle controller using ARM Cortex-M.

### Design of a Hiking Assistance Device

2016.7 - 2017.7

- Completed the overall structure design of the light-weight hiking assistance foldable drone.
- Applied the finite element analysis (FEA) methods to check the strength of all stressed parts.

## PUBLICATIONS

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(\* highlights my supervisor. My contributions in the third author-papers are proposing ideas, conducting experiments as well as revising papers, and in the fourth author-papers are revising papers.)

### Journals:

- Changhong Fu\*, Fuling Lin, **Yiming Li**, Guang Chen. *Correlation Filter-Based Visual Tracking for UAV with Online Multi-Feature Learning*, Remote Sensing, 11.5 (2019): 549.
- **Yiming Li**, Changhong Fu\*, Ziyuan Huang, Yinqiang Zhang, Jia Pan. *Intermittent Contextual Learning for Keyfilter-Aware UAV Object Tracking Using Deep Convolutional Feature*, IEEE Transactions on Multimedia, 2019. Under revision<sup>1</sup>.
- Changhong Fu\*, Ziyuan Huang, **Yiming Li**, Ran Duan, Peng Lu. *Online Enhanced Background Learning for Boundary Effect-Aware Visual Tracking for UAV with Consensus Verification*, IEEE Transactions on Knowledge and Data Engineering, 2019. Under preparation.

### Conferences:

- Ziyuan Huang, Changhong Fu\*, **Yiming Li**, Fulin Lin, Peng Lu. *Learning Aberrance Repressed Correlation Filters for Real-Time UAV Tracking*, in IEEE International Conference on Computer Vision (ICCV'19), Seoul, Korea, Oct. 2019.

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<sup>1</sup>Evaluations from three reviewers: novel enough for publication, technically sound and significant contribution.

- Changhong Fu\*, Ziyuan Huang, **Yiming Li**, Ran Duan, Peng Lu. *Boundary Effect-Aware Visual Tracking for UAV with Online Enhanced Background Learning and Multi-Frame Consensus Verification*, in IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS'19**), Macau, China, Nov. 2019.
- **Yiming Li**, Changhong Fu\*, Ziyuan Huang, Yinqiang Zhang, Jia Pan. *Keyfilter-Aware Real-Time UAV Object Tracking*, in IEEE International Conference on Robotics and Automation (**ICRA'20**). Accepted.
- Fan Li, Changhong Fu\*, Fuling Lin, **Yiming Li**, Peng Lu. *Training-set Distillation for Real-Time UAV Object Tracking*, in IEEE International Conference on Robotics and Automation (**ICRA'20**). Accepted.
- **Yiming Li**, etal. *Automatic Spatio-Temporal Regularization: A General Approach in Correlation Filters for Fast UAV Tracking*, in IEEE Conference on Computer Vision and Pattern Recognition (**CVPR'20**). Under review.
- **Yiming Li**, Changhong Fu\*, Fangqiang Ding, Ziyuan Huang, Jia Pan. *Augmented Memory for Correlation Filters in Real-time UAV Tracking*, in IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS'20**). Under preparation.
- Yujie He, Changhong Fu\*, Fuling Lin, **Yiming Li**, Peng Lu. *Tri-Attention Correlation Filter for Effective UAV Object Tracking*, in IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS'20**). Under preparation.

## AWARDS

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- Top 10 Undergraduate Researchers in Tongji University<sup>2</sup> 2019.12
- Model of Outstanding Students in Tongji University (0.15 %) 2019.1
- Second Prize of National Undergraduate Innovation and Entrepreneurship Competition 2018.11
- First Prize of the 3rd Shanghai Mechanics Competition 2018.6
- First Prize of the 8th Shanghai Innovation Design Competition 2018.5
- Meritorious Winner in 2018 Mathematics Contest in Modeling 2018.3
- Champion of 2017 Honda Eco Mileage Challenge (GS Group) 2017.10
- Third Prize of China Undergraduate Mathematical Competition in Modeling 2017.10
- Second Prize of Tongji Undergraduate Mathematical Competition in Modeling 2017.5
- Third Prize of Tongji Undergraduate General Physics Competition 2016.5

## SERVICE

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

## KEY SKILLS

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**Language:** English: TOEFL **105**(R29,L27,S24,W25), GRE **324**(V156+Q168+AW4.0); German(B1).

**Programming:** C/C++, Python, Matlab.

**Tools:** Robot Operating System, LaTeX, Autodesk Inventor, Adobe After Effects, Adobe Premiere.

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<sup>2</sup>10 out of 35 candidates from 18,115 undergraduate students