

# Fangqiang Ding

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## EDUCATION

### University of Edinburgh

PhD Student in Robotics and Autonomous Systems

Edinburgh, UK

2021/09 - 2025/07 (Expected)

- Supervisor: [Dr. Chris Xiaoxuan Lu](#) (Associate Professor @ UCL) and [Prof. Barbara Webb](#) (Professor @ UoE)
- Scholarship: [EPSRC CDT-RAS PhD Fellowship - Overseas](#) (5 people per year)

### Tongji University

BEng in Mechanical and Automation Engineering

Shanghai, China

2017/09 - 2021/07

- GPA: 4.73/5.0 (equivalent to 92.3/100, ranking: 2/130)
- Scholarship: 2 × **National Scholarship** (top 1%, Year 2017-8 & 2018-9)
- Award: **Academic Stars** in Tongji (top 10 from all undergraduates) and **Shanghai Excellent Graduate**
- Supervisor: [Dr. Changhong Fu](#) (Associate Professor @ School of Mechanical Engineering)

## RESEARCH INTERESTS

My research focuses on advancing the robustness, efficiency, and privacy-awareness of perception systems for **embodied AI**. These efforts support applications in mobile robots, autonomous vehicles, AIoT and xR-integrated systems, aiming to facilitate their **widespread, long-term and non-intrusive** deployment in the wild. My current works mainly involve the mmWave imaging radar and thermal camera, leveraging their unique sensing resilience to cope with **adverse weather and illumination** conditions in real world.

## RESEARCH EXPERIENCE

### MAPS Lab, University of Edinburgh

PhD Student, Supervisor: [Dr. Chris Xiaoxuan Lu](#)

Edinburgh, UK

2021/09 - Present

- **Robust Spatial Perception for Autonomous Driving in the Wild**
  - **Motion estimation:** realize scene flow learning on 4D radar points without human annotations. Extract and combine *self- and cross-modal* (e.g., LiDAR, camera, GPS/INS) *supervision* signals to constrain outputs from bespoke designed *multi-task* models, enabling motion estimation for *scene dynamics* (i.e., scene flow estimation, motion segmentation) and *ego-vehicle* (i.e., odometry).
  - **Object detection/tracking:** propose the first joint moving object detection and tracking end-to-end trainable framework tailored for 4D radar point clouds. Moving objects are represented as *class-agnostic point clusters* to bypass the reliance on specific object type and bounding boxes.
  - **3D occupancy prediction:** design the pioneering method for 4D imaging radar-based 3D occupancy perception. Advocate the usage of *4D radar tensor (4DRT)* to avoid the loss of negligible signal returns. Present tailored solutions to cope with the large, noisy and spherical 4DRTs.
- **Privacy-aware Fine-grained Human Motion Sensing and Reconstruction**
  - **Sensing:** enhance the performance of downstream tasks, e.g., activity recognition, human parsing and body part tracking, by learning *scene flow estimation* on imaging radar point clouds.
  - **Reconstruction:** collect a large-scale dataset consisting of *multi-level mmWave radar data*, RGB-D images, human body mesh and keypoints, and aim to build a complete benchmark.
- **Robust 3D Hand Pose Estimation against Challenging Conditions**
  - Investigate using *thermal imaging* for egocentric 3D pose estimation to overcome challenges like *varying lighting conditions and obstructions* (e.g., handwear) in xR applications. Develop a benchmark consisting of multi-view and multi-spectral data with 3D hand poses annotations, a novel transformer-based network, and cross-spectrum evaluation results under different scenarios.

### UAV Lab, Tsinghua University

Visiting Student, Advisor: [Dr. Geng Lu](#)

Beijing, China

2020/08 - 2020/09

- **Monocular UAV Indoor Self-Localization**

- Apply visual object trackers to UAV indoor self-localization under air-ground robot coordination.

### Vision4Robotics Group, Tongji University

Research Student, Supervisor: [Dr. Changhong Fu](#)

Shanghai, China

2019/05 - 2021/06

- **Efficient and Robust UAV Visual Object Tracking**

- Present novel algorithms to solve task-specific issues in UAV visual object tracking, such as background distractor, temporal discontinuity, adversarial attack, and darkness, without sacrificing the real-time performance on CPUs by using correlation filter-based approaches.

## SELECTED PUBLICATION (\* indicates corresponding author)

### ◇ Primary-author papers:

- [p1] **Fangqiang Ding**, Yunzhou Zhu, Xiangyu Wen, Chris Xiaoxuan Lu\*. "ThermoHands: A Benchmark for 3D Hand Pose Estimation from Egocentric Thermal Images" in submission to *ACM Sensys*, 2025. [\[paper\]](#)
- [p2] **Fangqiang Ding**, Xiangyu Wen, Yunzhou Zhu, Yiming Li, Chris Xiaoxuan Lu\*. "RadarOcc: Robust 3D Occupancy Prediction with 4D Imaging Radar" in *NeurIPS*, 2024. [\[paper\]](#) [\[code\]](#)
- [p3] **Fangqiang Ding**, Zhen Luo, Peijun Zhao, Chris Xiaoxuan Lu\*. "milliFlow: Scene Flow Estimation on mmWave Radar Point Cloud for Human Motion Sensing" in *ECCV*, 2024. [\[paper\]](#) [\[code\]](#)
- [p4] **Fangqiang Ding**, Zhijun Pan, Haotao Zhong, Chris Xiaoxuan Lu\*. "RaTrack: Moving Object Detection and Tracking with 4D Radar Point Cloud" in *ICRA*, 2024. [\[paper\]](#) [\[code\]](#)
- [p5] **Fangqiang Ding**, Andras Palffy, Darius M. Gavrilă, Chris Xiaoxuan Lu\*. "Hidden Gems: 4D Radar Scene Flow Learning Using Cross-Modal Supervision" in *CVPR*, 2023 (top 10% **Highlight**). [\[paper\]](#) [\[code\]](#)
- [p6] **Fangqiang Ding**, Zhijun Pan, Yimin Deng, Jianning Deng, Chris Xiaoxuan Lu\*. "Self-Supervised Scene Flow Estimation with 4-D Automotive Radar". *IEEE RA-L*, 2022. [\[paper\]](#) [\[code\]](#)
- [p7] **Fangqiang Ding**, Changhong Fu\*, Yiming Li, Jin Jin, Chen Feng. "Automatic Failure Recovery and Re-Init. for Online UAV Tracking with Joint Scale and Aspect Ratio Optim." in *IROS*, 2020. [\[paper\]](#) [\[code\]](#)

### ◇ Co-author papers:

- [p1] Bowen Li, Changhong Fu\*, **Fangqiang Ding**, Junjie Ye, Fuling Lin. "All-Day Object Tracking for Unmanned Aerial Vehicle". *IEEE TMC*, 2022. [\[paper\]](#) [\[code\]](#)
- [p2] Changhong Fu\*, **Fangqiang Ding**, Jin Jin, Yiming Li and Chen Feng. "Learning dynamic regression with automatic distractor repression for real-time UAV tracking" in *EAAI*, 2021. [\[paper\]](#) [\[code\]](#)
- [p3] Changhong Fu\*, Bowen Li, **Fangqiang Ding** et al. "Correlation Filters for Unmanned Aerial Vehicle-Based Aerial Tracking: A Review and Experimental Evaluation" in *IEEE GRSM*, 2021. [\[paper\]](#) [\[code\]](#)
- [p4] Yiming Li, Changhong Fu\*, **Fangqiang Ding** et al. "AutoTrack: Towards High-Performance Visual Tracking for UAV with Automatic Spatio-Temporal Regularization" in *CVPR*, 2020. [\[paper\]](#) [\[code\]](#)

## SELECTED AWARDS

<b>ESPRC CDT-RAS PhD Scholarship</b>	Sept. 2021
<b>Grand Prize of "Challenge Cup" in Shanghai</b>	June 2021
<b>Excellent Graduate of Shanghai (top 2%)</b>	May 2021
<b>Academic Stars in Tongji (top 10)</b>	Nov. 2020
<b>China National Scholarship (top 1%)</b>	Sept. 2019
<b>China National Scholarship (top 1%)</b>	Sept. 2018
<b>First Prize of Tongji Mathematics Competition</b>	June 2018
<b>First Prize of Shanghai Graphics Design Competition</b>	May 2018

## ACADEMIC SERVICES

- **Invited Reviewer** for RSS, ICML, ICLR, ECCV, CVPR, NeurIPS, RA-L, IROS, ICRA, TII, TIV, etc.
- **Teaching Support** for *Introduction to Mobile Robotics* (2021-2024) (University of Edinburgh)
- **Advisor/Co-supervisor of Bachelor/Master thesis** for Nout Cleef (BSc. 2022, UoE), Xuanyu Pan (MSc. 2022, UoE), Zhijun Pan (BSc., 2023, UoE), Zhen Luo (MRes., 2023, UoE), Xinyuan Cui (BEng. 2024, UoE), Lawrence Zhu (BSc. 2024, UoE), Xiangyu Wen (MRes., 2024, UoE), Yunfan Shi (MSc. 2024, UCL), Ruihong Li (MSc. 2024, UCL), Yichun Xiao (BSc., 2025, UoE), Ryan Kwok (BSc., 2025, UoE).