YANRAN WANG

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EDUCATION

Imperial College London *May 2021-Now*
Status: Ph.D. Candidate.
Research Interests: Aerial Robotics, Reliable Reinforcement Learning.

Shanghai Jiao Tong University (SJTU, with honor) *September 2017-March 2020*
Degree: Master of Engineering
Major: Aeronautical and Astronautical Science and Technology----Information and Control
Comprehensive Ranking: 1/71
Core Courses: Numerical Estimation, Optimal Estimation and Information fusion, Optimal Control Principle and Application, Matrix Theory.
Research Interests: Machine Learning, Muti-Sensor Fusion.

Southeast University (SEU, with honor) *September 2013-June 2017*
Degree: Bachelor of Engineering Overall GPA: 3.84/5.0
Major: Automation, School of Automation
Comprehensive Ranking: 3/144
Core Courses (Full score is 100 points): Probability Theory and Mathematical Statistics (94), Electronic Circuit Foundation (95), Computer Composition and Structure (92), Communication Principle (97).
Research Interests: Automatic Control, Machine Learning.

HONOURS AND AWARDS

- Outstanding graduate honor in Shanghai City *2020*

Awarded for outstanding comprehensive evaluation including scientific research and course grade (ranking 2/71).

- National Scholarship *2018*

Awarded for outstanding comprehensive evaluation for the first year of master study (ranking 1/71).

- Graduate First-class Academic Scholarship *2017*

Awarded for outstanding course grade. The top 30 percent of students can get this scholarship in SJTU.

- Exam-exempted postgraduate student recommended to SJTU *2017*

In China, outstanding undergraduate students can study for a master degree directly and I got this qualification (ranking 3/144).

- The last eight teams of RoboCup of World (In Leipzig, Germany) *2016*

RoboCup is a professional robot competition in the world and my work is described in RESEARCH EXPERIENCES.

- The first prize of Mathematical Contest in Modeling (MCM) *2015*

Awarded for theoretical model design, programming implementation and result analysis. MCM is the largest basic discipline competition in China.

- President Scholarship *2015*

Awarded for outstanding course grade and competition results for my postgraduate study in SEU.

RESEARCH EXPERIENCES

- **Novel Trajectory Generation and Tracking Framework for Autonomous Navigation**

  Source: National Science Foundation (NSF) – United Kingdom *January 2021-Now*

  A novel systematic framework is developed for quadrotor autonomous navigation in dynamic environments. Encountering aerodynamic effects such as strong winds, the proposed framework demonstrates safe, efficient and accurate trajectory generation and tracking respectively. The ongoing work guarantees the safety and robustness of the whole framework from both theoretic analysis and practical engineering. The accuracy of external forces estimation will

also be improved.

- **Perception-to-decision Reinforced Imitation: An Intelligent Flight Control System**
  Source: Shanghai Industrial Strengthening Project *January 2017-December 2019*
  An Intelligent Flight Control System (IFCS) is built for autopilot. The underlying IFCS combines a Convolution Neural Network, Deep Reinforcement Learning and Imitation Learning processes. The developed approach is proved to be more efficient and robust for the complicated flight situation than the existing autopilot system.
- **Theoretical Model Design and Safety Analysis for Muti-Sensor Fusion System**
  Source: National Program on Key Basic Research Project *September 2013-August 2018*
  A fusion model was established with a variable sampling Variational Bayesian-Interacting Multiple Model algorithm for integrated display in a cockpit simulator platform. My work was responsible for the overall implementation of the fusion system including theoretical model design, experimental simulation verification, engineering implementation and results analysis.
- **A Robot Self-Localization System Based on Computer Vision**
  Source: Robot World Cup (RoboCup) *October 2014-October 2016*
  Robocup is a professional robot competition with a large influence, a high level of comprehensive technology and a wide range participation across the world. In this work, a vision-based self-localization system is developed using computer vision.

PUBLICATIONS

See my personal website (https://www.imperial.ac.uk/people/yanran.wang20) and Google Scholar (https://scholar.google.com/citations?user=IN9B5GcAAAAJ&hl=en) for details please.

1. **Wang, Yanran**, and David Boyle. "Safe Reinforcement Learning as Wasserstein Variational Inference: Formal Methods for Interpretability." arXiv preprint arXiv:2307.07084 (2023).
2. **Wang, Yanran**, and David Boyle. "Trustworthy Reinforcement Learning for Quadrotor UAV Tracking Control Systems." arXiv preprint arXiv:2302.11694 (2023).
3. **Wang, Yanran**, James O'Keeffe, Qiuchen Qian, and David Boyle. "QuaDUE-CCM: Interpretable Distributional Reinforcement Learning using Uncertain Contraction Metrics for Precise Quadrotor Trajectory Tracking." In Conference on Robot Learning, pp. 2306-2316. PMLR, 2023.
4. **Wang, Yanran**, James O'Keeffe, Qiuchen Qian, and David Boyle. "Interpretable stochastic model predictive control using distributional reinforced estimation for quadrotor tracking systems." In 2022 IEEE 61st Conference on Decision and Control (CDC), pp. 3335-3342. IEEE, 2022.
5. **Wang, Yanran**, James O'Keeffe, Qiuchen Qian, and David Boyle. "KinoJGM: A framework for efficient and accurate quadrotor trajectory generation and tracking in dynamic environments." In 2022 International Conference on Robotics and Automation (ICRA), pp. 11036-11043. IEEE, 2022.
6. Gang Xiao, **Yanran Wang**, and Fang He. "Research on safety modeling and analysis in information fusion system." Aerospace Systems 2.1 (2019): 51-60. (DOI: 10.1007/s42401-018-0011-2)
7. **Yanran Wang**, Gang Xiao, and Zhouyun Dai. "Integrated Display and Simulation for Automatic Dependent Surveillance–Broadcast and Traffic Collision Avoidance System Data Fusion." Sensors 17.11 (2017): 2611. (DOI: 10.3390/s17112611)

INTERNSHIP

- **Internship in Ant Financial Services Group (Alipay)**
  Machine Learning Algorithm Intern *June 2019-September 2019*
  A Deep Neural Network and Deep Reinforcement Learning model was built for a recommender system which is used to estimate Internet user's Click-Through-Rate.
- **Intel Asia Pacific R&D Center**
  Deep Learning Software Intern *March 2019-May 2019*
  Responsible for machine learning framework (BigDL) development and test preprocessing.