KANGKANG SUN Ph.D.

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Google Scholar: https://scholar.google.com/citations?user=xB_tkPIAAAAJ&hl=en
Google Scholar: Citations: 217 | h-index: 8 | i10-index: 7 (as of Jan 2026)

RESEARCH INTERESTS

Edge intelligence and edge computing, with emphasis on:

- ⋆ *Cooperative Autonomous Driving with Edge Intelligence and Digital Twins.*
- ⋆ *Federated learning and deep reinforcement learning at the network edge.*

Key Words: *Edge Computing, Information Theory, Game Theory, Deep Reinforcement Learning (DRL), Federated Learning (FL).*

EDUCATION

Shanghai Jiao Tong University (SJTU)

Ph.D. in Electronic Information 2020 - 2024

Dissertation: *Research on Resource Scheduling Optimization and Security Protection for Vehicle-Road-Cloud Collaboration in the Internet of Vehicles (IoV).*

Focus: *Internet of Vehicle (IoV), Machine Learning (e.g. Federated Learning, Reinforcement Learning), Security & Privacy, Game Theory and Privacy-preserving Computing.*

Jilin University (JLU)

M.S. in Mechanical Engineering 2017 - 2020

Dissertation: *Research on Path Planning and Target Recognition Technology of Unmanned Aerial Vehicles*

Cumulative GPA: Ranked in Top 2%.

Focus: *Autonomous Driving, Unmanned Aerial Vehicles and Control Theory.*

National Yang Ming Chiao Tung University (NYCU)

Exchange Student in Electronic Information February 2019 - June 2019

Lab: Networked Control Robotics Lab

Focus: *Unmanned Aerial Vehicles and Control Theory.*

Shandong Agricultural University (SAU)

B.S. in Agricultural Mechanization and Automation 2012 - 2016

Dissertation: *Design and Research of Industrial Robotic Arm*

Cumulative GPA: Ranked in Top 5%.

WORK EXPERIENCE

Shanghai Jiao Tong University January 2025 - Present

Academic Researcher

Research: *Research on Secure and Efficient Collaboration of Vehicle-Road-Cloud Based on Federated Learning.*

The Chinese University of Hong Kong, Shenzhen January 2025 - August 2025

Visiting Scholar

Research: *The Tradeoffs between Utility, Fairness and Privacy in Federated Learning.*

JOURNAL ARTICLES

[1] **Kangkang Sun**, Lizheng Liu, Qianqian Pan, Jianhua Li, and Jun Wu, Large-scale mean-field federated learning for detection and defense: A byzantine robustness approach in iot, *IEEE Internet of Things Journal (IoT-J)*, vol. 11, no. 22, pp. 36 370–36 383, 2024, IF: 8.9, 6 citations. **[Link]**.

[2] **Kangkang Sun**, Jun Wu, Ali Kashif Bashir, Jianhua Li, Hansong Xu, Qianqian Pan, and Yasser D Al-Otaibi, Personalized privacy-preserving distributed artificial intelligence for digital-twin-driven vehicle road cooperation, *IEEE Internet of Things Journal (IoT-J)*, vol. 11, no. 22, pp. 35 902–35 916, 2024, IF: 8.9, 11 citations. **[Link]**.

[3] **Kangkang Sun**, Hansong Xu, Kun Hua, Xi Lin, Gaolei Li, Tigang Jiang, and Jianhua Li, Joint top-k sparsification and shuffle model for communication-privacy-accuracy tradeoffs in federated-learning-based iov, *IEEE Internet of Things Journal (IoT-J)*, vol. 11, no. 11, pp. 19 721–19 735, 2024, IF: 8.9, 25 citations. **[Link]**.

[4] **Kangkang Sun**, Jun Wu, Qianqian Pan, Xi Zheng, Jianhua Li, and Shui Yu, Leveraging digital twin and drl for collaborative context offloading in c-v2x autonomous driving, *IEEE Transactions on Vehicular Technology (TVT)*, vol. 73, no. 4, pp. 5020–5035, 2023, IF: 7.1, 32 citations. **[Link]**.

[5] Da Cui, Guoqiang Wang, Yanpeng Lu, and **Kangkang Sun**, Reliability design and optimization of the planetary gear by a ga based on the dem and kriging model, *Reliability Engineering & System Safety*, vol. 203, p. 107 074, 2020, IF:11.0, 69 citations, Corresponding Author. **[Link]**.

CONFERENCE PAPERS

[1] **Kangkang Sun**, Jun Wu, Minyi Guo, Jianhua Li, and Jianwei Huang, "Accurate target privacy preserving federated learning balancing fairness and utility," in *IEEE International Conference on Distributed Computing Systems (ICDCS)*, (Under Review), 2025.

[2] **Kangkang Sun**, Jun Wu, Minyi Guo, Jianhua Li, and Jianwei Huang, "Coe: Collaborative-entropy-based multi-llm inference framework for edge ai systems," in *International Conference on Learning Representations (ICLR) Workshop*, (Under Review), 2025.

[3] **Kangkang Sun**, Jun Wu, and Jianhua Li, "Reputation-aware incentive mechanism of federated learning: A mean field game approach," in *2024 IEEE 9th International Conference on Smart Cloud (SmartCloud)*, IEEE Computer Society, 2024, pp. 48–53. **[Link]**.

[4] **Kangkang Sun**, Hansong Xu, Xiaojin Zhang, Kun Hua, and Jianhua Li, "Time-sensitive local differential privacy-based federated learning for vehicular digital twin networks," in *International Symposium on Intelligent Computing and Networking*, Springer Nature Switzerland Cham, 2024, pp. 105–118. **[Link]**.

[5] **Kangkang Sun**, Xiaojin Zhang, Xi Lin, Gaolei Li, Jing Wang, and Jianhua Li, "Toward the tradeoffs between privacy, fairness and utility in federated learning," in *International Symposium on Emerging Information Security and Applications*, Springer Nature Singapore Singapore, 2023, pp. 118–132. **[Link]**.

GRANTS AND AWARDS

Shanghai Super Postdoctoral Incentive Program (RMB 300,000) 2025
Campus-level Outstanding Graduation Paper **Top: 5%** 2022
Provincial Outstanding Graduates **Top: 3%** 2021
Academic scholarships (RMB 50,000) **Top: 3%** . . . . . 2017 - 2020
Postgraduate National Scholarships (RMB 20,000) **Top: 0.2%** 2020
Student Scholarship (three times) (RMB 8,000) **Top: 10%** . . . . . 2017 - 2020
Outstanding Graduates **Top: 10%** 2016
Campus-level Outstanding Graduation Paper **Top: 5%** 2016
Student Scholarship (three times) (RMB 24,000) **Top: 5%** . . . . . 2012 - 2016
Freshman Innovation and Entrepreneurship Mentor **Top: 5%** 2016

Shandong Province Student Electronic Design Competition, Second Prize**Top: 10%** 2015
School-level Science and Technology Innovation Single Award (RMB 5,000) **Top: 10%** 2015
Electronic Design Competition, First Prize **Top: 1%** 2014
Shandong Hengnuo Innovation Practice Advanced Individual Award **Top: 10%** 2013

RESEARCH EXPERIENCE

Research on Secure and Efficient Collaboration of Vehicle-Road-Cloud Based on Federated Learning
Shanghai Jiao Tong University December 2024 - Present

Responsibility: This project develops federated learning-based mechanisms to enable efficient, privacy-preserving collaboration in vehicle-road-cloud systems. It focuses on: (1) federated reinforcement learning for improved efficiency in dynamic, large-scale IoV environments; (2) gradient divergence-based detection of malicious vehicle poisoning attacks; and (3) personalized, lightweight differential privacy to mitigate gradient leakage risks. *Contributed to 4 publications in related areas.*

Research on the Application of Key Technologies for Network Security Management System Construction and Intelligent Connected Vehicle
Shanghai Jiao Tong University December 2021 - December 2024

Responsibility: This project focused on IoV security in cloud, RSU, and vehicle layers, including compliance testing against national standards and data security laws, OTA security, automotive mobility, privacy data protection, cryptographic algorithm validation, code compliance, and platform network security certification.

Manage Smart Transducers with Simple Network Management Protocol (IEEE P-21451-1-5)
Internet of Things Standard Protocol, Leader: NIST, USA September 2020 - September 2021

Responsibility: The standard consists of five standard groups located in the United States, Japan, Portugal, China, and Hong Kong, China. Responsible for: building two sets of test platforms based on international IoT standards, the test platform contains several NCAP and TIM, to realize the interconnection, plug-and-play and other functions in IoT scenarios. At the same time, based on the trap function of the protocol, we developed a real-time alarm function to alert abnormal devices.
Introduction Link, **Github Link**, **IEEE Link**.

Research on UAV Path Planning and Image Recognition Technology
Taiwan Chiao Tung University Exchange Program September 2018 - July 2019

Responsibility: This M.S. project focused on UAV path planning and target recognition using ROS. Path planning improved a University of Pennsylvania algorithm with LiDAR-based 3D point cloud modeling, spatial reconstruction, and gradient descent optimization for time-efficient, smooth trajectories. Target recognition employed YOLO. Awarded Excellent Thesis in Jilin Province.

SKILLS

Programming: Python, C++, Matlab, ROS, TensorFlow, PyTorch, LLM Agent, etc.

TEACHING EXPERIENCE

Teaching Assistant, "Federated Learning and Privacy-Preserving Computing", SJTU. . . . . 2023-2024.
Teaching Assistant, "IoV Security and Privacy", SJTU. . . . . 2021-2022.
I assisted the team in mentoring 5 PhD, 8 master's and 4 undergraduate students.

REVIEWER EXPERIENCE

Reviewer for Journals: IEEE IoT-J, TVT, T-ITS, TMC, ToN, TIFS, Vehicular Technology Magazine, Wireless Communication Magazine, Communication Society, Networking Letters, et al.
Reviewer for Conferences: IEEE INFOCOM, IEEE GLOBECOM, IEEE ICC, IEEE VTC, ICLR, ICML, et al.

Full list of publications available upon request or on Google Scholar.