Junkai Tan

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Xi'an, Shaanxi - 710049, China

Objective

Pursuing advanced research and development opportunities in autonomous systems and control theory, leveraging expertise in reinforcement learning, game theory, and optimal control. Seeking to contribute to innovative projects at the intersection of human-machine interaction, autonomous systems, and intelligent control, with a focus on safety-critical applications and performance optimization.

Education

- **Xi'an Jiaotong University (C9 & 985 Project University)** *Sep 2023 - Jun 2026*
  M.S. in Electrical Engineering Xi'an, China
  - GPA: 91.59/100 (Ranked 3/45, Top 7%)
  - School of Electrical Engineering - Industrial Enterprise Direction
- **Xi'an Jiaotong University (C9 & 985 Project University)** *Sep 2019 - Jun 2023*
  B.E. in Electrical Engineering and Automation Xi'an, China
  - GPA: 90.58/100 (Ranked 29/356, Top 8%)
  - School of Electrical Engineering

Projects

- **Finite-Time Tracking Control Research for Unmanned Systems with Prescribed Performance** *Aug 2023 - Present*
  Tools: Optimal Control, Game Theory, Reinforcement Learning, MATLAB, Unmanned Aerial & Ground Vehicles [| |]
  - Developed Stackelberg game-based reinforcement learning framework for robust optimal control
  - Implemented prescribed performance constraints for efficient tracking control in nonlinear systems
  - Created novel game-theoretic optimization method for high-dimensional nonlinear systems
  - Published 4 first-author papers in ***IEEE TASE***, ***Information Science***, ***Nonlinear Dynamics***, ***IJRNC*** and presented at ASCC, ICARM, ICDL
- **Human-Machine Hybrid Enhancement Research for Data-Driven Shared Optimal Performance** *May 2022 - Dec 2024*
  Tools: Optimal Control, Reinforcement Learning, Game Theory, MATLAB, Unmanned Aerial Vehicles [ ]
  - Developed safety-guarding RL method for optimal shared control in pilot-UAV interactive systems
  - Implemented Nash equilibrium and level-k rationality model to enhance human-machine collaboration stability
  - Created data-driven interaction modeling approach to optimize human-machine cooperative strategies
  - Published 3 first-author journal papers in ***Neurocomputing***, ***JAI***, ***IJICS*** and obtained 3 national patents

Patents and Publications

C=Conference, J=Journal, P=Patent, S=In Submission, T=Thesis

[J.1] **J. Tan**, S. Xue, H. Li, et al. (2025). **Prescribed performance robust approximate optimal tracking control via stackelberg game**. ***IEEE Trans. Autom. Sci. Eng.***, Mar. 2025. (**IF: 5.9, JCR Q1**)

[J.2] **J. Tan**, S. Xue, Q. Guan, et al. **Finite-time safe reinforcement learning control of multi-player nonzero-sum game for quadcopter systems**. ***Inf. Sci.***, p. 122117, Mar. 2025. (**IF: 8.1, JCR Q1**)

[J.3] **J. Tan**, S. Xue, Q. Guan, et al. (2025). **Unmanned aerial-ground vehicle finite-time docking control via pursuit-evasion games**. ***Nonlinear Dyn.***, Mar. 2025. (**IF: 5.2, JCR Q1**)

[J.4] **J. Tan**, S. Xue, Z. Guo, et al. (2025). **Data-driven optimal shared control of unmanned aerial vehicles**. ***Neurocomputing***, vol. 622, pp. 129428-129440. (**IF: 5.5, JCR Q1**)

[J.5] **J. Tan**, J. Wang, S. Xue, et al. (2025). **Human-machine shared stabilization control based on safe adaptive dynamic programming with bounded rationality**. ***Int. J. Robust Nonlinear Control***, Mar. 2025. (**IF: 3.2, JCR Q1**)

[J.6] **J. Tan**, S. Xue, H. Cao, and S. S. Ge. (2025). **Human–AI interactive optimized shared control**. ***J. Autom. Intell.***

[J.7] **J. Tan**, S. Xue, and H. Cao. (2025). **Stackelberg game-based robust optimal control of cyber-physical system under hybrid attacks**. ***Int. J. Intell. Control Syst.***, pp. 1-9. (**Accepted**)

[J.8] S. Xue, **J. Tan**, Z. Guo, et al. (2024). **Cooperative game-based optimal shared control of unmanned aerial vehicle**. ***Unmanned Syst.*** (**Accepted, IF: 3.0, JCR Q1**)

[S.1] **J. Tan**, S. Xue, H. Li, et al. (2024). **Hierarchical safe reinforcement learning control for leader-follower systems with prescribed performance**. ***IEEE Trans. Autom. Sci. Eng.*** (**Major Revision, IF: 5.9, JCR Q1**)

[S.2] **J. Tan**, S. Xue, T. S. Niu, et al. (2025). **Fixed-time concurrent learning-based robust approximate optimal control**. ***Nonlinear Dyn.*** (**Major Revision, IF: 5.2, JCR Q1**)

[S.3] **J. Tan**, S. Xue, Z. Guo, et al. (2024). **Adaptive safe control of quadcopter: a hierarchical safe reinforcement learning approach**. ***Eng. Appl. Artif. Intell.*** (Under Review)

[S.4] S. Xue, **J. Tan**, Z. Guo, et al. (2024). **Finite-time dynamic event-triggered actor-critic-identifier for optimal control of nonlinear drifted system**. ***Nonlinear Dyn.*** (Under Review)

[S.5] **J. Tan**, S. Xue, H. Cao, et al. (2025). **Finite-Time Stackelberg Game-Based Hybrid Attack-Defense Control for Cyber-Physical Systems**. ***IEEE/CAA J. Autom. Sinica*** (Under Review)

[S.6] **J. Tan**, S. Xue, Z. Guo, et al. (2025). **Composite learning-based fixed-time optimized shared prescribed-performance control for human-robotics cooperative game**. ***Inf. Sci.*** (Under Review)

[S.7] **J. Tan**, S. Xue, H. Cao, et al. (2025). **Data-driven Fixed-time Inverse Optimal Shared Control for Human-UAV Interaction**. ***IEEE Trans. Artif. Intell.*** (Under Review)

[S.8] **J. Tan**, S. Xue, Z. Guo, et al. (2025). **Fixed-Time Hierarchical Game-Based Unmanned Aerial-Ground Vehicle Docking Control**. ***IEEE/CAA J. Autom. Sinica*** (Under Review)

[S.9] S. Xue, **J. Tan**, T. S. Niu, et al. (2025). **Prescribed performance optimized control of UAV with robust approximate dynamic programming under disturbance**. ***IEEE Trans. Ind. Electron.*** (Under Review)

[C.1] **J. Tan**, S. Xue, H. Li, et al. (2024). **Safe stabilization control for interconnected virtual-real systems via model-based reinforcement learning**. In ***2024 14th Asian Control Conference (ASCC)***, pp. 605-610.

[C.2] **J. Tan**, S. Xue, H. Cao, et al. (2023). **Safe human-machine cooperative game with level-k rationality modeled human impact**. In ***2023 IEEE International Conference on Development and Learning (ICDL)***, pp. 188-193.

[C.3] **J. Tan**, S. Xue, H. Cao, et al. (2023). **Nash equilibrium solution based on safety-guarding reinforcement learning in nonzero-sum game**. In ***2023 International Conference on Advanced Robotics and Mechatronics (ICARM)***, pp. 630-635.

[T.1] **J. Tan**. (2023). **Research on Safety-Guarding Control of Interconnected Systems Based on Adaptive Dynamic Programming**. Bachelor's Thesis, Xi'an Jiaotong University.

[P.1] S. Xue, **J. Tan**, H. Cao, et al. (2024). **A pilot-UAV hierarchical reinforcement learning tracking control method**. Patent CN202410717333.X

[P.2] S. Xue, **J. Tan**, H. Cao, et al. (2024). **An optimal control method for suppressing chaotic phenomena in nonlinear permanent magnet synchronous motors**. Patent CN202410856259.X

[P.3] S. Xue, **J. Tan**, X. D. Zheng, et al. (2024). **A UAV reinforcement learning tracking control method with prescribed performance under disturbance**. Patent CN202411079828.0

Journal Review Activity

Reviewer for international journals/conferences including **IEEE CDC** (IEEE), **Engineering Applications of Artificial Intelligence** (Elsevier), **Acta Astronautica** (Elsevier), and **Measurement** (Elsevier).

Skills

- **Programming Languages:** MATLAB/Simulink, Python, C++, LaTeX, Git, ROS
- **Control & Simulation:** Gazebo, V-REP, AirSim, PX4, ArduPilot, QGroundControl
- **Hardware Experience:** Nvidia Jetson, Raspberry Pi, Pixhawk, UAV/UGV Platforms
- **Specialized Knowledge:** Optimal Control, Game Theory, System Identification, Nonlinear Control
- **Soft Skills:** Teamwork, Communication, Leadership, Problem-Solving
- **Languages:** English (CET-6 579), Chinese (Native)

Honors and Awards (Timeline)

- **State Grid UHV Scholarship** *Sep 2020*
  State Grid Corporation of China
  ◦ Merit-based scholarship awarded for academic excellence
- **Outstanding Student Award** *Sep 2020*
  Xi'an Jiaotong University
  ◦ Recognized for exceptional academic performance in 2019-2020
- **Second Prize, Shaanxi Province** *Oct 2020*
  12th National College Students Mathematics Competition
  ◦ Demonstrated advanced mathematical problem-solving abilities
- **First Prize, Shaanxi Province** *Oct 2021*
  National College Student Mathematical Modeling Competition

◦ Led team to develop innovative mathematical models for real-world problems

- **Second-Class University Scholarship** *Oct 2021 & Oct 2022*
  Xi'an Jiaotong University
  ◦ Awarded for consistent academic excellence
- **Second Prize, Shaanxi Province** *Nov 2021 & Aug 2022*
  National College Students' Electronic Design Competition
  ◦ Developed innovative electronic systems and solutions
- **Honorable Mention** *Apr 2021*
  Mathematical Contest in Modeling (MCM/ICM)
  ◦ International recognition for mathematical modeling capabilities
- **Bronze Award** *Jul 2021*
  7th China International College Students' "Internet+" Innovation and Entrepreneurship Competition
  ◦ Developed innovative internet-based entrepreneurial project
- **Second Prize** *Nov 2023*
  National Graduate Mathematical Modeling Competition
  ◦ Advanced mathematical modeling and problem-solving at graduate level
- **Outstanding Graduate** *Jun 2023*
  Xi'an Jiaotong University
  ◦ Recognized for overall excellence in academic performance and contributions
- **Outstanding Fitness Team Leader** *Jul 2024*
  Xi'an Jiaotong University
  ◦ Led and organized student fitness activities and programs

Leadership Experience

- **Party Branch Secretary** *Jul 2022 - Jun 2023*
  School of Electrical Engineering - Zhongying College Joint Third Party Branch, Xi'an Jiaotong University
  ◦ Managed overall party branch work and supervised other committee members' responsibilities
  ◦ Reported to branch committee, party member assembly and higher party organizations
  ◦ Organized party member activities and educational programs
- **Session Chair** *Jul 2023*
  2023 International Conference on Advanced Robotics and Mechatronics (ICARM)
  ◦ Chaired technical session at Class A conference of Chinese Association of Automation
  ◦ Organized and moderated academic presentations and discussions
- **Fitness Team Leader** *Sep 2023 - Present*
  School of Electrical Engineering, Xi'an Jiaotong University
  ◦ Manage gym facilities and equipment maintenance
  ◦ Provide scientific fitness guidance and instruction to students
  ◦ Organize fitness activities and training programs

Certifications

- **English Proficiency:** CET-6 (College English Test Band 6) - Score: 579 *Dec 2021*
- **Computer Skills:** National Computer Rank Examination (Level 3) *Nov 2024*
- **Music:** Grade 10 Music Performance Certification *Jan 2018*

Additional Information

Languages: English (Professional working proficiency), Chinese (Native)
Interests: Robotics and Control Systems, Machine Learning, Fitness and Sports, Travel and Photography

References

1. **Prof. Hui Cao**
   Professor, School of Electrical Engineering
   Xi'an Jiaotong University
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   Relationship: Thesis Advisor & Research Supervisor
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