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Formal Education

PhD in Mechanical Engineering (ME) - Dec. 2011
University of Florida, Gainesville, FL, USA

Master of Engineering in Mechanical Engineering (ME) - Aug. 2007
Hefei University of Technology, Hefei, China

Bachelor of Engineering in Mechanical Engineering (ME) - Aug. 2005
Hefei University of Technology, Hefei, China

Professional Experience

- *Professor* (Aug. 2019 - present)
  Department of Automation, *University of Science and Technology of China,* Hefei, Anhui, China
- *Assistant Professor* (Aug. 2016 – Aug. 2019)
  Department of Mechanical Engineering, *The University of Iowa*, Iowa City, IA
- *Postdoctoral Research Associate* (Jan. 2012 - Aug. 2016)
  University of Florida-REEF/AFRL(Air Force Research Laboratory, Eglin Air Force Base, USA)
- *Graduate Research/Teaching Assistant* (Aug. 2007 – Dec. 2011)
  Department of Mechanical and Aerospace Engineering, *University of Florida*, Gainesville, FL

Research Interests

- Nonlinear Control
- Robotics
- Formal Methods
- Networked Control Systems

Publications

Book Chapters

2. Zhen Kan, John M. Shea, and Warren E. Dixon, "Navigation Function Based Decentralized Control of A Multi-agent System with Network Connectivity Constraints," *in Examining Robustness and Vulnerability of Critical Infrastructure Networks*, Edited by S. Butenko, E. L. Pasiliao, V. Shylo, NATO Science for Peace and Security Series - D:Information and Communication Security, Vol 35, pp. 104-119, 2014.
1. A. Dani, Z. Kan, N. Fischer, and W. E. Dixon, "Real-time Structure and Motion Estimation in Dynamic Scenes using a Single Camera," *in Robotic Vision: Technologies for Machine Learning and Vision Applications,* Edited by Jose Garcia and Miguel Cazorla, IGI Global Publication, pp. 173-191, July 12, 2012

Journal Papers

66. Z. Chen, M. Cai, Z. Zhou, L. Li, and Z. Kan, "Fast Motion Planning in Dynamic Environments with Extended Predicate-based Temporal Logic," *IEEE Transactions on Automation Science and Engineering*, to appear
65. H. Wang, J. Qin, and Z. Kan, "Shielded Planning Guided Data-Efficient and Safe Reinforcement Learning," *IEEE Transactions on Neural Networks and Learning Systems*, to appear
64. Z. Zhou, S. Wang, Z. Chen, M. Cai, and Z. Kan, "A Novel Framework for Improved Grasping of Thin and Stacked Objects," *IEEE Transactions on Artificial Intelligence*, to appear

63. C. Zhang, S. Lin, H. Wang, Z. Chen, S. Wang, and Z. Kan, "Data-Driven Safe Policy Optimization for Black-Box Dynamical Systems with Temporal Logic Specifications," *IEEE Transactions on Neural Networks and Learning Systems*, to appear
62. M. Pi, Z. Li, Q. Li, Y. Kang, Z. Kan, and R. Song, "Human-in-the-loop Control of Robotic Leg Prostheses with Sensory Feedback," *IEEE/ASME Transactions on Mechatronics*, to appear
61. H. Wang, H. Zhang, L. Li, Z. Kan, and Y. Song, "Task-Driven Reinforcement Learning with Action Primitives for Long-Horizon Manipulation Skills," *IEEE Transactions on Cybernetics*, to appear
60. Z. Zhou, S. Wang, Z. Chen, M. Cai, H. Wang, Z. Li, and Z. Kan, "Local Observation Based Reactive Temporal Logic Planning of Human-Robot Systems," *IEEE Transactions on Automation Science and Engineering*, conditionally accepted
59. Z. Chen, L. Li, and Z. Kan, "Distributed Task Allocation and Planning under Temporal Logic and Communication Constraints," *IEEE Robotics and Automation Letters*, Vol. 9, No. 7, pp. 6536-6543 (2024)
58. Z. Chen, Z. Zhou, S. Wang, J. Li, and Z. Kan, "Fast Temporal Logic Mission Planning of Multiple Robots: A Planning Decision Tree Approach," *IEEE Robotics and Automation Letters*, Vol. 9, No. 7, pp. 6146-6153 (2024)
57. P. Huang, Z. Li, M. Zhou, and Z. Kan, "Divergent Component of Motion Planning and Adaptive Repetitive Control for Wearable Walking Exoskeletons," *IEEE Transactions on Cybernetics*, Vol. 54, No. 4, pp. 2244-2256 (2024)
56. Z. Zhou, Z. Chen, M. Cai, Z. Li, Z. Kan, and C. Su, "Vision-Based Reactive Temporal Logic Motion Planning for Quadruped Robots in Unstructured Dynamic Environments," *IEEE Transactions on Industrial Electronics*, Vol. 71, No. 6, pp. 5983-5992 (2024)
55. S. Wang, Z. Zhou, B. Li, Z. Li, and Z. Kan, "Multi-modal Interaction with Transformers: Bridging Robots and Human with Natural Language," *Robotica*, Vol. 42, No. 2, pp. 415-434 (2024)
54. H. Zhang, H. Wang, and Z. Kan, "Exploiting Transformer in Sparse Reward Reinforcement Learning for Interpretable Temporal Logic Motion Planning," *IEEE Robotics and Automation Letters*, Vol. 8, No. 8, pp. 4831-4838 (2023)
53. L. Li, Z. Chen, H. Wang, and Z. Kan, "Fast Task Allocation of Heterogeneous Robots with Temporal Logic and Inter-Task Constraints," *IEEE Robotics and Automation Letters*, Vol. 8, No. 8, pp. 4991-4998 (2023)
52. 李保罗，蔡明钰，阚震, "线性时序逻辑引导的安全强化学习," 《控制与决策》, Vol. 38, No. 7, pp. 1835-1844 (2023)
51. S. Wang, R. Yang, B. Li, and Z. Kan, "Structural Parameter Space Exploration for Reinforcement Learning via a Matrix Variate Distribution," *IEEE Transactions on Emerging Topics in Computational Intelligence*, Vol. 7, No. 4, pp. 1025-1035 (2023)
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49. G. Li, J. Xu, Z. Li, C. Chen, and Z. Kan, "Sensing and Navigation of Wearable Assistance Cognitive Systems for the Visually Impaired," *IEEE Transactions on Cognitive and Developmental Systems*, Vol. 15, No. 1, pp. 122-133(2023)
48. M. Cai, S. Xiao, J. Li, and Z. Kan, "Safe Reinforcement Learning under Temporal Logic with Reward Design and Quantum Action Selection," *Scientific Reports*, Vol. 13, No. 1, pp. 1925 (2023)
47. M. Cai, S. Xiao, Z. Li, and Z. Kan, "Optimal Probabilistic Motion Planning with Potential Infeasible LTL Constraints," *IEEE Transactions on Automatic Control*, Vol. 68, No. 1, pp. 301-316 (2023) [**Full Paper**]
46. Z. Li, G. Li, X. Wu, Z. Kan, H. Su, and Y. Liu, "Asymmetric Cooperation Control of Dual-Arm Exoskeletons Using Human Collaborative Manipulation Models," *IEEE Transactions on Cybernetics,* Vol. 52, No. 11, pp. 12126-12139 (2022)
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44. H. Zhang and Z. Kan, "Temporal Logic Guided Meta Q-Learning of Multiple Tasks," *IEEE Robotics and Automation Letters*, Vol. 7, No. 3, pp. 8194-8201 (2022)
43. S. Wang, Z. Zhou, and Z. Kan, "When Transformer Meets Robotic Grasping: Exploits Context for Efficient Grasp Detection," *IEEE Robotics and Automation Letters*, Vol. 7, No. 3, pp. 8170-8177 (2022)

42. H. Gao, Z. Kan, and K. Li, "Robust Lateral Trajectory Following Control of Unmanned Vehicle Based on Model Predictive Control," *IEEE/ASME Transactions on Mechatronics*, Vol. 27, No. 3, pp. 1278-1287 (2022)
41. H. Gao, F. Chen, Z. Hao, X. He, H. Su, K. Li, and Z. Kan, "Adaptive Finite-Time Trajectory Tracking Control of Autonomous Vehicles That Experience Disturbances and Actuator Saturation," *IEEE Intelligent Transportation Systems Magazine*, Vol. 14, No. 2, pp. 80-91 (2022)
40. H. Gao, J. Zhu, T. Zhang, G. Xie, Z. Kan, Z. Hao, and K. Liu, "Situational Assessment for Intelligent Vehicles based on Stochastic Model and Gaussian Distributions in Typical Traffic Scenarios," *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, Vol. 52, No. 3, pp. 1426-1436 (2022)
39. G. Li, Z. Li, and Z. Kan, "Assimilation Control of a Robotic Exoskeleton for Physical Human-Robot Interaction," *IEEE Robotics and Automation Letters*, Vol. 7, No. 2, pp. 2977-2984 (2022)
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35. S. Xiao, B. She, S. Mehta, and Z. Kan, ""Design of Controllable Leader-Follower Networks via Memetic Algorithms," *Advances in Complex System*s, pp. 2150004 (2021)
34. M. Cai, M. Hasanbeig, S. Xiao, A. Abate, and Z. Kan, "Modular Deep Reinforcement Learning for Continuous Motion Planning with Temporal Logic," *IEEE Robotics and Automation Letters*, Vol. 6, No. 4, pp. 7973-7980 (2021)
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27. M. Cai, H. Peng, Z. Li, H. Gao, and Z. Kan, "Receding Horizon Control Based Motion Planning with Partially Infeasible LTL Constrains," *IEEE Control Systems Letters*, Vol. 5, No. 4, pp. 1279-1284 (2021).
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25. Z. Li, Y. Liu, H. Liu, and Z. Kan, "Skill Transfer Learning for Autonomous Robots and Human-Robot Cooperation: A Survey," *Robotics and Autonomous Systems*, Vol. 128, 103515 (2020)
24. Y. Liu, Z. Li, H. Liu, Z. Kan, and B. Xu, "Bio-inspired Embodiment for Intelligent Sensing and Dexterity in Fine Manipulation: A Survey," *IEEE Transactions on Industrial Informatics*, Vol. 16, No. 7, pp. 4308-4321 (2020)
23. B. She and Z. Kan, "Characterizing Controllable Subspace and Herdability of Signed Weighted Networks via Graph Partition," *Automatica*, Vo1 115, 108900 (2020)
22. B. She, S. S. Mehta, C. Ton, and Z. Kan, "Controllability Ensured Leader Group Selection on Signed Multi-Agent Networks," *IEEE Transactions on Cybernetics*, Vol. 50, No. 1, pp. 222-232 (2020)

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19. S. S. Mehta, C. Ton, M. Rysz, Z. Kan, E. A. Doucette, and J. W. Curtis, "New Approach to Visual Servo Control Using Terminal Constraints," *Journal of the Franklin Institute*, Vol 356, No. 10, pp. 5001-5026 (2019)
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16. Z. Kan, S. S. Mehta, J. M. Shea, J. W. Curtis, and W. E. Dixon, "Balanced Containment Control and Cooperative Timing of A Multi-Agent System Over Random Communication Graphs," *International Journal of Robust and Nonlinear Control*, Vol. 28, No. 11, pp. 3574-3588 (2018).
15. J. Klotz, S. Obuz, Z. Kan, and W. E. Dixon, "Synchronization of Uncertain Euler-Lagrange Systems with Uncertain Time-varying Communication Delays," *IEEE Transactions on Cybernetics*, Vol 48. No. 2, pp. 807-817 (2018)
14. C. Ton, Z. Kan, and S. S. Mehta, "Obstacle Avoidance Control of a Human-in-the-loop Mobile Robot Systems Using Harmonic Potential Fields," *Robotica,* Vol. 36, No. 4, pp. 463-483 (2018)
13. C. Ton, S. S. Mehta, and Z. Kan, "Super-Twisting Control of Double Integrator System with Unknown Constant Control Direction," *IEEE Control System Letters,* Vol 1, No. 2, pp. 370-375 (2017)
12. T. Cheng, Z. Kan, J. Klotz, J. Shea, and W. E. Dixon, "Event-Triggered Control of Multi-agent Systems for Fixed and Time-varying Network Topologies," *IEEE Transactions on Automatic Control*, Vol. 62, No. 10, pp. 5365-5371 (2017).
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10. Z. Kan, J. Klotz, J. M. Shea, E. A. Doucette, and W. E. Dixon, "Decentralized Rendezvous of Nonholonomic Robots with Sensing and Connectivity Constraints," *ASME Journal of Dynamic Systems, Measurement, and Control*, Vol. 139, No. 2, pp. 0245011-0245017 (2017).
9. Z. Kan, J. M. Shea, and W. E. Dixon, "Leader-Follower Containment Control Over Directed Random Graphs," *Automatica*, Vol. 66, pp. 56-62 (2016).
8. S. S. Mehta, C. Ton, Z. Kan, J. W. Curtis, "Vision-Based Navigation and Guidance of a Sensorless Missile," *Journal of the Franklin Institute*, Vol. 352, No. 12, pp. 5569-5598 (2015).
7. Z. Kan, J. Klotz, E. L. Pasiliao, and W. E. Dixon, "Containment Control for a Social Network with State-Dependent Connectivity," *Automatica*, pp. 86-92 (2015).
6. Z. Kan, L. Navaravong, J. M. Shea, E. L. Pasiliao, and W. E. Dixon, "Graph Matching Based Formation Reconfiguration of Networked Agents with Connectivity Maintenance," *IEEE Transactions on Control of Network Systems*, Vol. 2, No. 1, pp. 24-35 (2015)
5. J. Klotz, Z. Kan, J. M. Shea, E. L. Pasiliao, and W. E. Dixon, "Asymptotic Synchronization of Leader-Follower Networks of Uncertain Euler-Lagrange Systems," *IEEE Transactions on Control of Network Systems*, Vol. 2, No. 2, pp. 174-182 (2015).
4. N. Fischer, Z. Kan, R. Kamalapurkar, and W. E. Dixon, "Saturated RISE Feedback Control for a Class of Second-Order Nonlinear Systems," *IEEE Transactions on Automatic Control*, Vol. 59, No. 4, pp. 1094-1099 (2014)
3. Z. Kan, A. P. Dani, J. M. Shea, and W. E. Dixon, "Network Connectivity Preserving Formation Stabilization and Obstacle Avoidance via A Decentralized Controller," *IEEE Transactions on Automatic Control*, Vol 57, No. 7, pp. 1827-1832 (2012).

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1. A. P. Dani, N. R. Fischer**,** Z. Kan, and W. E. Dixon, “Globally Exponentially stable observer for Vision-based Range Estimation,” *Mechatronics, Special Issue on Visual Servoing*, Vol 22, No. 4, pp. 381-389 (2012).

Peer Reviewed Conference Papers

53. Y. Hao, S. Wang, and Z. Kan, "2D Hand Pose Estimation from A Single RGB Image through Flow Model," *IEEE International Conference on Advanced Robotics and Mechatronics*, 2024, Tokyo, Japan, to appear.
52. X. Han, S. Wang, X. Huang, and Z. Kan, "PoseFusion: Multi-Scale Keypoint Correspondence for Monocular Camera-to-Robot Pose Estimation in Robotic Manipulation," *IEEE International Conference on Robotics and Automation (ICRA)*, 2024, Yokohama, Japan, to appear.
51. S. Lin, H. Wang, Z. Chen, and Z. Kan, "Projection-Based Fast and Safe Policy Optimization for Reinforcement Learning," *IEEE International Conference on Robotics and Automation (ICRA)*, 2024, Yokohama, Japan, to appear.
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49. H. Zhang, H. Wang, T. Qian, and Z. Kan, "Temporal Logic Guided Affordance Learning for Generalizable Dexterous Manipulation," *Joint International Conference on Automation-Intelligence-Safety & International Symposium on Autonomous Systems*, 2024, Chongqing, China, to appear.
48. S. Wang, Z. Zhou, W. Zhang, J. Cao, Z. Chen, K. Chen, and Z. Kan, "What You See is What You Grasp: User-Friendly Grasping Guided by Near-eye-tracking," *IEEE International Conference on Development and Learning*, 2023, Macau, China, pp. 194-199.
47. J. Li, S. Wang, Z. Chen, and Z. Kan, "Lightweight Neural Path Planning" *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023, Detroit, USA, pp. 6713-6718.
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38. S. Meng, B. She, H. Gao, and Z. Kan, "Leader Group Selection for Herdability of Structurally Balanced Signed Networks," *IEEE Conference on Decision and Control*, Jeju Island, Republic of Korea, 2020, pp. 5567-5572.
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33. C. Ton, S. S. Mehta, and Z. Kan, "Robust Continuous Finite Time Control of Double-Integrator Systems with Unknown Control Direction," *IEEE Conference on Decision and Control*, Miami Beach, FL, 2018, pp. 6748-6753.
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29. C. Ton, S. S. Mehta, and Z. Kan, "Nonsingular Terminal Sliding Mode Control with Unknown Control Direction," *American Control Conference*, Seattle, WA, 2017, pp. 3730-3734.
28. B. Cannataro, Z. Kan, and W. E. Dixon, "Followers Distribution Algorithms for Leader-Follower Networks," *IEEE Multi-Conference on Systems and Control,* Buenos Aires, Argentina, 2016, pp. 648-653.
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22. M. McCourt, S. S. Mehta, Z. Kan, and J. W. Curtis, "Multiple CLFs for Stabilization of Nonlinear Systems with Input Constraints," *IEEE International Conference on Systems, Man, and Cybernetics*, Hong Kong, 2015, pp. 38-43.
21. T. Cheng, Z. Kan, J. Klotz, J. M. Shea, and W. E. Dixon, "Decentralized Event-triggered Control of Networked Systems Part 1: Leader-follower Consensus under Switching Topologies," *American Control Conference*, Chicago, Il, 2015, pp. 5438-5443.
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19. J. Klotz, S. Obuz, Z. Kan, and W. E. Dixon, "Synchronization of Uncertain Euler-Lagrange Systems with Unknown Time-Varying Communication Delays," *American Control Conference*, Chicago, Il, 2015, pp. 683-688.
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12. Z. Kan, J. M. Shea, and W. E. Dixon, "Influencing Emotional Behavior in a Social Network," *American Control Conference*, Montréal, Canada, 2012, pp. 4072-4077.
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5. Z. Kan, A. Dani, J. M. Shea, and W. E. Dixon, "Ensuring Network Connectivity During Formation Control Using A Decentralized Navigation Function," *Military Communications Conference (MILCOM)*, San Jose, CA, 2010, pp. 954-959.
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1. "Air Force research: How to use social media to control people like drones", *Ars Technica*, 2014, (Web link: http://arstechnica.com/information-technology/2014/07/air-force-research-how-to-use-social-media-to-control-people-like-drones/)

Professional Service

- **Professional Affiliation**:
  - Senior Member, The Institute for Electrical and Electronics Engineers (IEEE), 2010-present
  - Member, IEEE Control Systems Society
  - Member, IEEE Robotics and Automation Society
- **Technical Committee:**
  - Member, *Intelligent Control,* IEEE Control Systems Society, 2017-present
  - Member, *Nonlinear Systems and Control,* IEEE Control Systems Society, 2017-present
  - Member, *Networks and Communications,* IEEE Control Systems Society, 2017-present
- **Review Panel:**
  - Member, *National Science Foundation,* Panel review, 2018
- **Journal Editorships:**
  - Associate Editor, *IEEE Transactions on Neural Networks and Learning Systems, 2023-Present*
  - Associate Editor, *IEEE Transactions on Automatic Control*, 2020-present
  - Guest Editor, *IEEE Transactions on Cybernetics,* Special Issue, 2020
- **Conference Editorships:**
  - Associate Editor, *Conference Editorial Board,* IEEE Control Systems Society, 2016-present
  - Associate Editor, IEEE Conference on Decision and Control (CDC), 2016-Present
  - Associate Editor, IEEE American Control Conference (ACC), 2016-Present
  - Associate Editor, IEEE International Conference on Robotics and Automation (ICRA), 2023-Present
  - Associate Editor, International Conference on Control, Automation, Robotics and Vision (ICARCV), 2018-present
  - Associate Editor, IEEE International Conference on Control & Automation (ICCA), 2020-present
  - Associate Editor, IEEE International Conference on Advanced Robotics and Mechatronics (ICARM), 2021-present
- **Conference Organizing Committee and Service:**
  - Publication Chair, *Chinese Control Conference (CCC)*, 2022
  - Session Co-chair, *IEEE Conference on Decision and Control (CDC),* 2019
  - Session Co-chair, *American Control Conference (ACC),* 2018
  - Session Chair, *IEEE International Conference on Systems, Man, and Cybernetics (SMC),* 2015
- **Conference Program Committee:**
  - Member, *International Conference on Robotics Systems and Vehicle Technology (RSVT),* 2018-present
  - Member, *International Conference on Control and Robots (ICCR),* 2018-present
  - Member, *Asia-Pacific Conference on Intelligent Robot Systems (ACIRS),* 2017-present
  - Member, *International Conference on Enterprise Architecture and Information Systems (EAIS),* 2016-present
  - Member, *International Conference on Cybernetics, Robotics and Control (ICCRC),* 2016-present
- **Publication Review:**
  - Textbook Proposal Reviewer for Springer UK
  - Textbook Proposal Reviewer for Elsevier
  - *Automatica;*
  - *IEEE Transaction on Automatic Control;*
  - *IEEE Transaction on Control of Network Systems;*
  - *IEEE Transaction on Human-Machine Systems;*
  - *IEEE Transactions on Cybernetics;*
  - *IEEE Transactions on Intelligent Transportation Systems;*
  - *IEEE/CAA Journal of Automatica Sinica;*
  - *ASME Journal of Dynamic Systems, Measurement, and Control*
  - *Asian Journal of Control*
  - *IET Control Theory & Applications*

- *International Journal of Robust and Nonlinear Control;*
- *Journal of the Franklin Institute;*
- *International Journal of Control*
- *Nonlinear Analysis: Hybrid Systems*
- *Robotica*
- *Sensor*

- **Reviewer for Conferences:**
  - *IEEE Conference on Decision and Control (CDC);*
  - *American Control Conference (ACC);*
  - *IEEE Multi-conference on Systems and Control (MSC);*
  - *IEEE International Conference on Robotics and Automation (ICRA)*
  - *IFAC World Congress*