Junkai Wang

E-mail: wangjk@gatech.edu | **Tel**: +1-(404)8938947
Address: Rm 404, Tech Square Research Bldg, 85 Fifth Street NW, Atlanta, Georgia, U.S.

EDUCATION

Georgia Institute of Technology   May.2021 - Present
Ph.D. in Electrical and Computer Engineering
Advisor: Prof. Fumin Zhang (Co-Chair of IEEE Marine Robots Tech Committee)

Georgia Institute of Technology   Jan.2020 - May.2021
M.S. in Electrical and Computer Engineering
GPA: 4.0/4.0

Beihang University (BUAA)   Sep.2015 - Jul.2019
B.Eng. in Automation (Shenyuan Honors College of Beihang University)
GPA: 3.66/4.0
Honor: First-class Scholarship for Academic Excellent (Top 8%)

RESERCH EXPERIENCE

Georgia Tech System Research Lab, Georgia Tech
Ph.D. Student and Research Assistant, Advisor: Prof. Fumin Zhang
FNN-based Framework for Robust Forward Invariant Set   Aug.2023 – Present
--Used forward neural network to shape the boundary of RFIS
--Trained the FNN with data sampled in state space.

Control System for Indoor Miniature Autonomous Blimps   May.2020 – May.2021
--Analyzed the motion model of saucer-shaped miniature blimps
--Designed a nested-loop controller for keeping the blimp at the desired velocity while effectively stabilizing its swing oscillation
--Realized the controller on indoor miniature blimps platform.

Stunt flight Control for Indoor Miniature Autonomous Blimps   Aug.2021 – May.2023
--Designed an energy shaping controller to achieve swing-up motion for the MAB to reach proximity of the inverted pose
--Designed a stabilizing controller to maintain the inverted pose.

Underwater Vehicle Formation Control and Simulation   Oct.2022 - Apr.2023
--Designed a two-level formation and tracking controller for a type of AUV
--Integrated the AUV dynamics into HoloOcean simulation environment
--Simulated and validated the proposed controller.

Omnidirectional Surface Vehicle   Feb.2021 – Jun.2021
--Designed the localization system for OSV by data fusion with GPS and IMU
--Designed the control system for different maneuvers.

TEACHING EXPERIENCE

Engineering Design Graphics Communication (BUAA) - Teaching Assistant Mar.2019 - Jun.2019
Held office hours, graded homework and guided final projects.

Vertically Integrated Projects - Teaching Assistant   Jan.2022 - May.2022
Held group meeting, guided and graded final projects.

PATENTS

[1] Q. Tao, F. Zhang, Z. Xu, T. Lin, **J. Wang**, "Lightweight Flight Control System for Miniature Indoor Aerial Robots," U.S. Provisional Patent App., 63/112,467, 2020.

PUBLICATIONS

[1] Q. Tao, **J. Wang**, Z. Xu, T. X. Lin, Y. Yuan and F. Zhang, "Swing-Reducing Flight Control System for an Underactuated Indoor Miniature Autonomous Blimp," in IEEE/ASME Transactions on Mechatronics, vol. 26, no. 4, pp. 1895-1904, Aug. 2021, doi: 10.1109/TMECH.2021.3073966.
[2] S. Mayberry, **J. Wang**, Q. Tao, F. Zhang, A. Song, X. Hong, S. Dong, C. Webb, D. Dugaev and Z. Peng, "First step towards μ-net: Open-access aquatic testbeds and robotic ecosystem," in WUWNet'21: The 15th International Conference on Underwater Networks & Systems, Shenzhen, Guangdong, China, November 22 - 24, 2021. ACM, 2021, pp. 10:1–10:8., doi: 10.1145/3491315.3491322.
[3] **J. Wang**, F. Zhang, J. Kleider and C. Steenhoek, "Underwater swarm formation control with distributed beamforming," Proc. SPIE 12544, Open Architecture/Open Business Model Net-Centric Systems and Defense Transformation 2023, 1254405 (12 June 2023), doi: 10.1117/12.2664692.
[4] Y. Li, Z. Zhang, **J. Wang**, H. Zhang and F. Zhang, "Cognition Difference-based Dynamic Trust Network for Distributed Bayesian Data Fusion," IROS 2024, accepted.
[5] **J. Wang** and F. Zhang, "Achieving and Maintaining Inverted Pose for Miniature Autonomous Blimps," American Control Conference 2024, submitted.

COURSES

Major Courses: Nonlinear Systems, Stochastic Systems, Control Robotic Systems, Optimal Control, Electric Machine Drives, Digital Image Processing, Sensor Networks, Wireless Networks, Fund. of Digital Signal Processing, Intro. to Automation and Robotics.