Bin-Bin Hu (Male)
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Education

Huazhong University of Science and Technology, Wuhan, P.R China Sep. 2017–Jun. 2022 (expected)
Ph.D., Control Science and Technology Grades: 89.52/100 (2/13)
Advisor: Prof. Hai-Tao Zhang

Jiangnan University, Wuxi, P.R China Sep. 2013–Jun. 2017
B.Sc., Electrical Engineering and Automation GPA: 3.82/4 (1/75)

Professional Experience

University of Groningen, Groningen, The Netherland May. 2021-May. 2022
Visiting *Ph.D.*, Advisor: Prof. Ming Cao

Profile

Research Interests: Networked control system, Control theory, Unmanned surface vessels (USVs).
Extensive (4+ years) theoretical research experience in collective control, path following for unmanned surface systems (USVs), unmanned aerial vehicle (UAVs) and multi-agent systems, with research papers (4 first-autho -red) in professional venues (e.g., TCST, TCNS, TIE) and real-world applications with our platform such as HUSTER-0.3, HUSTER-16, HUSTER-30 USVs).

Awards/Hornors:

National Scholarship (PhD.)	2021
The Outstanding Reviewers of 2020, Asian Journal of Control	2020
China Scholarship Council	2020
National Scholarship (Master)	2018
Gold medal (5/8), the 46th International inventions of Geneve	2018
PhD First-Class Scholarship	2018-2020
First-Class Scholarship of Jiangnan University	2014, 2016
Merit Student, Government of Wuxi	2016
First prize of East China, the 10th National Freescale Cup Smart-Car Competition for College Students	2015
National Scholarship (Undergraduate)	2015
Third prize, National English Competition for College Students (Class C)	2015

Publications

Journals:

1. **B.-B. Hu**, H.-T. Zhang, Y. Shi, "Distributed Fencing Control of Second-Order Multi-Agent Systems for a Variation -al-Velocity Target in Rigid and Flexible Patterns," submitted, 2021.
2. H. Cao, **B.-B. Hu**, X. Mo, D. Chen, J. Gao, Y. Yuan, G. Chen, T. Vicsek, H.-T. Zhang, "The immense impact of re -verse edges on large hierarchical networks," submitted, 2021.
3. **B.-B. Hu**, H.-T. Zhang, B. Liu, H. Meng, G. Chen, "Distributed Surrounding Control of Multiple Unmanned Surfa -ce Vessels with Varying Interconnection Topologies," IEEE Transactions on Control System Technology (TCST), ac -cepted, doi: 10.1109/TCST.2021.3057640, 2021.
4. **B.-B. Hu**, Z. Chen, H.-T. Zhang, "Distributed Moving Target Fencing in a Regular Polygon Formation," IEEE Tra -nsactions on Control of Network System (TCNS), accepted, doi: 10.1109/TCNS.2021.3094784, 2021.
5. **B.-B. Hu**, H.-T. Zhang, "Bearing-only Motional Target-Surrounding Control for Multiple Unmanned Surface Vesse -ls," IEEE Transactions on Industrial Electronics (TIE), accepted, doi: 10.1109/TIE.2021.3076719, 2021.
6. **B.-B. Hu**, H.-T. Zhang, J. Wang, "Multiple-Target Surrounding and Collision Avoidance of A Second-Order Nonli -near Multi-Agent System," IEEE Transactions on Industrial Electronics (TIE), vol. 68, no. 8, pp. 7454-7463, 2020.

7. H.-T. Zhang, **B.-B. Hu**, Z. Xu, Z. Cai, B. Liu, X. Wang, T. Geng, S. Zhong, J. Zhao "Visual Navigation and Landi -ng Control of a Unmanned Aerial Vehicle on a Moving Autonomous Surface Vehicle via Adaptive Learning," IEEE Transactions on Neural Networks and Learning Systems (TNNLS), accepted, doi: 10.1109/TNNLS.2021.3080980.
8. B. Xu, H.-T. Zhang, F. Meng, **B.-B. Hu**, D. Chen, G. Chen, "Moving Target Surrounding Control of Linear Multi -agent Systems With Input Saturation," IEEE Transactions on Systems, Man, and Cybernetics (TSMC), accepted, doi: 10.1109/TSMC.2020.3030706, 2020.

Conferences:

1. **B.-B. Hu**, B. Liu, H.-T. Zhang, "Cooperative Hunting Control for Multi-Underactuated Surface Vehicle, The 37th Chinese Control Conference (CCC), 2018, pp. 1934-1768.
2. **B.-B. Hu**, B. Liu, Z. Xu, T. Geng, Y. Yuan, H.-T. Zhang, "Distributed Hunting for Multi USVs Based on Cyclic Estimation and Pursuit, The 11th International Conference on Intelligent Robotics and Applications (ICIRA), 2018, pp. 101-112.
3. J.-T. Ye, **B.-B. Hu**, Z.-C. Xu, B. Liu, H.-T. Zhang, "Autonomous Landing Allocation of Multiple Unmanned Aerial Vehicles on Multiple Unmanned Surface Vessels Subject to Energy Consumption, The 14th International Conference on Intelligent Robotics and Applications (ICIRA), 2021, pp. 611-621.
4. M.-Y. Gao, **B.-B. Hu**, B. Liu, N. Qiu, H.-T. Zhang, "Constrained Path-Planning Control of Unmanned Surface Vessels via Ant-Colony Optimization, The 40th Chinese Control Conference (CCC), 2021, pp. 1-6.
5. Z.-C Xu, **B.-B. Hu**, B. Liu, X. Wang, H.-T. Zhang, "Vision-based Autonomous Landing of Unmanned Aerial Vehi -cle on a Motional Unmanned Surface Vessel, The 39th Chinese Control Conference (CCC), 2020, pp. 6845-6850.

Patents:

1. H.-T. Zhang, **B.-B. Hu**, B. Liu, et. al, "A self-balancing grabbing device and grabbing method for unmanned aerial vehicle", Invention patent, authorized, NO. 109501969, 2020.
2. H.-T. Zhang, B. Liu, **B.-B. Hu**, et. al, "A kind of micro unmanned ship based on indoor research", Invention patent, authorized, NO. 108100199, 2020.
3. H.-T. Zhang, B. Liu, **B.-B. Hu**, et. al, "A method for cooperative surrounding of multiple unmanned vessels", Inven -tion patent, authorized, NO. 108037755, 2020.

Conference Activity

1. The 11th International Conference on Intelligent Robotics and Applications Aug. 9–11, 2018
   Oral report: Distributed Hunting for Multi USVs Based on Cyclic Estimation, Newcastle, Australia.
2. The 37th Chinese Control Conference Jul. 25-27, 2018
   Oral report: Cooperative Hunting Control for Multiple USVs, Wuhan, China.

Research Project

1. **Ordering-Free Platooning Path Following for Multi-Robot System:** Proposed a coordinated guiding vector field to guide robots to form an ordering-free platooning formation while moving along the desired paths. Potential applications of arbitrary-dimension desired paths including self-intersected, non-convex, closed and non-closed one.
2. **Target Surrounding / Fencing for Multi-USV System:**
   - **Target Fencing in Rigid and Flexible Patterns:** Proposed a distributed unlabelled controller to attain rigid-formation or flexible-formation fencing in a unified framework. Analysis of a complicated nonlinear networked sys -tem with the inter-agent repulsive term.
   - **Target Surrounding with Varying Topologies:** Proposed a distributed estimation-and-control hierarchical framework with jointly dwellingly connected topologies. Conducted lake experiments with three 1.6 meters-long HUSTER-16 USV vessels and a differential GPS station.
   - **Target Fencing in Regular Polygon Formation:** Proposed a distributed unlabelled controller for second-order networked system to fence a moving target of unknown velocity within the convex hull and guarantee collision avoidance. Analysis of a nonlinear closed-loop system especially subject to the velocity estimation error.
   - **Bearing-only Motional Target Surrounding:** Proposed a distributed bearing-only controller for multiple unmanned surface vessels (USVs) to encircle and rotate evenly around a motional target. Conducted real experimental with three HUSTER-0.3 USVs and a target vessel.

- **Multiple-Target Surrounding and Collision Avoidance:** Proposed an equal-distance surrounding framework to encircle multiple moving targets with guaranteed collision avoidance. Conducted experiments with four HUSTE -R-0.3 USVs and two target vessels.

3. **Navigation and Landing for UAV-USV System:** Proposed a visual navigation and landing control paradigm for an unmanned aerial vehicle (UAV) to land on a moving autonomous surface vehicle (ASV). Conducted landing experiments with our HUSTER-30 ASV and the M-100 UAV.

Research Projects

1. **Chief Investigator**, Theory and application for cooperative surrounding of multiple unmanned surface vessels, Fundamental Research Funds for Central Universities: HUST, 2020–2021.

Selected Extracurricular

Reviewer: IEEE Transactions on Automatic Control (TAC), IEEE Transactions on Intelligent Transportation Systems (TITS), IEEE Transactions on Industrial Electronics (TIE), Asian Journal of Control (AJC), Control Theory and Technology (CTT), IEEE Conference on Decision and Control (CDC), American Control Conference (ACC), Chinese Control Conference (CCC), Chinese Control and Decision Conference (CCDC).

Skills: Practical experience in Matlab, Python, C++, C, Altium Designer.

Referees

1. **PhD. Supervisor**, Hai-Tao Zhang, Professor, Huazhong University of Science and Technology, P.R. China, zht@mail.hust.edu.cn
2. **Supervisor**, Zhiyong Chen, Professor, The University of Newcastle, Australia, zhiyong.chen@newcastle.edu.au
3. **Supervisor**, Dr. Haofei Meng, Associates Professor, Southeast University, P.R. China, hfmeng@seu.edu.cn