

# Wenhan Wu

**Date of birth:** May 11, 1998

**Nationality:** Chinese

**Current position:** Fifth-year Ph.D. student

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## Education Background

2015/09-2019/06	<b>Central South University (CSU), School of Automation</b> <i>Bachelor Degree in Engineering</i> Average score: 92.97/100 (TOP 0.5%) Supervisor: <b>Prof. Keke Huang</b>	Changsha, China
Since 2019/08	<b>Tsinghua University (THU), Department of Automation</b> <i>Ph.D. student in Control Science and Engineering</i> GPA: 3.85/4.00 (TOP 10%) Supervisor: <b>Prof. Xiaoping Zheng</b>	Beijing, China
2023/04-2024/04	<b>Humboldt-Universität zu Berlin (HUB), Department of Biology</b> <i>Joint Ph.D. student in Theoretical Biology</i> Supervisor: <b>Prof. Pawel Romanczuk</b>	Berlin, Germany

## Research Interests

- Network Science:** Reconstructing the potential structure of complex networks.  
(2018-2019, *Bachelor Thesis*, under the supervision of **Prof. Keke Huang**)
- Crowd Behavior:** Simulating the evacuation process of heterogenous individuals, developing a method to identify subgroups automatically, modeling the movement behavior of pedestrian subgroups, and exploring the decision making of subgroups when facing a static obstacle.  
(2019-2024, *Ph.D. Project*, under the supervision of **Prof. Xiaoping Zheng**)
- Behavioral Contagion:** Studying the behavioral contagion of fish groups during startle cascades.  
(Since 2023, *Joint Ph.D. research*, under the supervision of **Prof. Pawel Romanczuk**)
- Collective Motion:** Analyzing the self-organization of pedestrian random walk in corridors.  
(Since 2022, *Collaborative research*, under the supervision of **Prof. Guy Theraulaz** and **Prof. Clément Sire**)

## Research Publications

- Wenhan Wu<sup>#</sup>**, Xiaoping Zheng<sup>\*</sup>, Pawel Romanczuk<sup>\*</sup>. Escape cascades as a behavioral contagion process with adaptive network dynamics. *Available: <https://arxiv.org/abs/2408.05096>*, 2024.
- Wenhan Wu<sup>#</sup>**, Wenfeng Yi, Erhui Wang, Xiaolu Wang, Xiaoping Zheng<sup>\*</sup>. How Social Attributes Affect the Movement Process of Subgroups When Facing a Static Obstacle. *Under review*, 2024.
- Wenhan Wu<sup>#</sup>**, Wenfeng Yi, Xiaolu Wang, Erhui Wang, Xiaoping Zheng<sup>\*</sup>. A Vision-driven Model Based on Cognitive Heuristics for Simulating Subgroup Behaviors During Evacuation. *IEEE Transactions on Intelligent Transportation Systems*, 2024, 1-11, Early Access Article.
- Wenhan Wu<sup>#</sup>**, Maoyin Chen, Jinghai Li, Binglu Liu, Xiaoping Zheng<sup>\*</sup>. An Extended Social Force Model via Pedestrian Heterogeneity Affecting the Self-driven Force. *IEEE Transactions on Intelligent Transportation Systems*, 2021, 23(7): 7974-7986.
- Wenhan Wu<sup>#</sup>**, Jinghai Li, Wenfeng Yi, Xiaoping Zheng<sup>\*</sup>. Modeling Crowd Evacuation via Behavioral Heterogeneity-

Based Social Force Model. *IEEE Transactions on Intelligent Transportation Systems*, 2022, 23(9): 15476-15486.

6. **Wenhan Wu**<sup>#</sup>, Xiaoping Zheng<sup>\*</sup>. A Systematic Analysis of Subgroup Research in Pedestrian and Evacuation Dynamics. *IEEE Transactions on Intelligent Transportation Systems*, 2023, 25(2): 1225-1246.
7. **Wenhan Wu**<sup>#</sup>, Wenfeng Yi, Xiaolu Wang, Erhui Wang, Xiaoping Zheng<sup>\*</sup>. Experimental study on the decision-making and motion behavior of subgroups when facing a static obstacle during movement. *Expert Systems with Applications*, 2023, 242: 122761.
8. **Wenhan Wu**<sup>#</sup>, Wenfeng Yi, Xiaolu Wang, Xiaoping Zheng<sup>\*</sup>. A Force-based Model for Adaptively Controlling the Spatial Configuration of Pedestrian Subgroups at Non-extreme Densities. *Transportation Research Part C: Emerging Technologies*, 2023, 152: 104154.
9. **Wenhan Wu**<sup>#</sup>, Wenfeng Yi, Jinghai Li, Maoyin Chen, Xiaoping Zheng<sup>\*</sup>. Automatic Identification of Human Subgroups in Time-Dependent Pedestrian Flow Networks. *IEEE Transactions on Multimedia*, 2023, 26: 166-177.
10. Xiaoping Zheng<sup>#</sup>, **Wenhan Wu**<sup>#</sup>, Wenfeng Deng, Chunhua Yang, Keke Huang<sup>\*</sup>. Reconstruction of Tree Network via Evolutionary Game Data Analysis. *IEEE Transactions on Cybernetics*, 2020, 52(7): 6083-6094.
11. **Wenhan Wu**<sup>#</sup>, Wenfeng Yi, Jinghai Li, Maoyin Chen, Xiaoping Zheng<sup>\*</sup>. Simulating the Evacuation Process Involving Multitype Disabled Pedestrians. *IEEE Transactions on Computational Social Systems*, 2022, 10(5): 2400-2410.
12. **Wenhan Wu**<sup>#</sup>, Maoyin Chen, Jinghai Li, Binglu Liu, Xiaolu Wang, Xiaoping Zheng<sup>\*</sup>. Visual Information-Based Social Force Model for Crowd Evacuation. *Tsinghua Science and Technology*, 2021, 27(3): 619-629.
13. Wenfeng Yi<sup>#</sup>, **Wenhan Wu**, Xiaolu Wang, Xiaoping Zheng<sup>\*</sup>. Phase Transitions in Pedestrian Evacuation: A Dynamic Modeling With Small-World Networks. *IEEE Transactions on Intelligent Transportation Systems*, 2024, 1-13, Early Access Article.
14. Wenfeng Yi<sup>#</sup>, **Wenhan Wu**, Xiaolu Wang, Erhui Wang, Xiaoping Zheng<sup>\*</sup>. Order-disorder phase transitions in front of the exit during human crowd evacuations. *Transportation Research Part C: Emerging Technologies*, 2024, 163: 104649.
15. Wenfeng Yi<sup>#</sup>, **Wenhan Wu**, Xiaolu Wang, Xiaoping Zheng<sup>\*</sup>. Modeling the Mutual Anticipation in Human Crowds With Attention Distractions. *IEEE Transactions on Intelligent Transportation Systems*, 2023, 24(9): 10108-10117.
16. Wenfeng Yi<sup>#</sup>, **Wenhan Wu**, Jinghai Li, Xiaolu Wang, Xiaoping Zheng<sup>\*</sup>. An extended queueing model based on vision and morality for crowd evacuation. *Physica A: Statistical Mechanics and its Applications*, 2022, 604: 127658.
17. Jinghai Li<sup>#</sup>, Maoyin Chen, **Wenhan Wu**, Binglu Liu, Xiaoping Zheng<sup>\*</sup>. Height map-based social force model for stairway evacuation. *Safety Science*, 2021, 133: 105027.
18. Wenfeng Deng<sup>#</sup>, Chunhua Yang, Keke Huang<sup>\*</sup>, **Wenhan Wu**. A two-stage reconstruction method for complex networked system with hidden nodes. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 2022, 32(5): 053105.

### Award and Honors

1.	2016/12 & 2018/12	<b>National Scholarship</b> for Undergraduate Students (×2)
2.	2016/10 & 2017/10 & 2018/10	<b>Premium Scholarship</b> for Academic Year (×3)
3.	2022/12	<b>National Scholarship</b> for Doctoral Students (×1)
4.	2021/10 & 2023/10	Comprehensive <b>First Prize Scholarship</b> (×2)

### Conference and Workshop

1.	2024/02/15–2024/02/17: <b>25th Seminar “Pattern formation in Biophysics and Chemistry”</b> , Berlin Center for Studies of Complex Chemical Systems, Erfurt, Germany. ( <b>Workshop</b> )
2.	2024/05/27–2024/05/31: “ <b>Collective Motions of Animals and Robots</b> ”, Research Institute Scientists De Cargèse, Cargèse, Corsica Island, France. ( <b>Poster Presentation</b> )

## Research Skills

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| 1. | Research Software     | <b>MATLAB/Simulink</b> , Eclipse, PyCharm, <b>VS Code</b> |
| 2. | Programming Code      | <b>MATLAB</b> , <b>Python</b> , C/C++, R, <b>LaTeX</b>    |
| 3. | Operating System (OS) | <b>Windows</b> , Linux                                    |
| 4. | Language Skill        | Chinese (Native language), <b>English</b>                 |