Wenhan Wu

Date of birth: May 11, 1998
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Education Background

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

Research Experience

1. **Reconstructing the structure of complex networks**: Based on evolutionary game dynamics, compressive sensing technology was used to recover the network structure from a small amount of observed data through sparse search or greedy algorithms in the assumption that the unknown signal is sufficiently sparse on a specific basis.
   (*2018-2019,* ***Bachelor Thesis****, under the supervision of* ***Prof. Keke Huang***)
2. **Human subgroups in pedestrian and evacuation dynamics**: Based on data collection, law exploration, modeling and simulation, and empirical analysis, a systematic study was conducted on subgroups in pedestrian and evacuation dynamics, which includes simulating the evacuation process of heterogenous individuals, developing an intelligent method to identify subgroups automatically, modeling the motion behavior of subgroups in normal and emergency situations, and exploring the decision-making and behavior of subgroups when facing a static obstacle.
   (*2019-2024,* ***Ph.D. Project****, under the supervision of* ***Prof. Xiaoping Zheng***)
3. **Behavioral contagion of escape cascades in fish groups**: Going beyond the assumption of time-scale separation principle, a spatially-explicit, agent-based model was proposed for the coupling between behavioral contagion and individual movement to explore the impact of movement parameters (startle speed, initial directionality, directional noise) on behavioral cascades.
   (*Since 2023,* ***Joint Ph.D. research****, under the supervision of* ***Prof. Pawel Romanczuk***)
4. **Random walk in human collective behavior**: The self-organization of random walk of pedestrian groups in a circular corridor was analyzed, a simplified pedestrian model was developed to generate a series of simulation data under conditions similar to the experiment, and then statistical methods were used to analyze the distribution of data generated by numerical simulations.
   (*Since 2022,* ***Collaborative research****, under the supervision of* ***Prof. Guy Theraulaz*** *and* ***Prof. Clément Sire***)

Research Publications

1. **Wenhan Wu**#, Xiaoping Zheng*, Pawel Romanczuk*. Escape cascades as a behavioral contagion process with

adaptive network dynamics. ***Physical Review Research***, 2024, Revised. ***https://arxiv.org/abs/2408.05096***.

2. **Wenhan Wu**#, Wenfeng Yi, Erhui Wang, Xiaolu Wang, Xiaoping Zheng*. How Social Attributes Affect the Movement Process of Subgroups When Facing a Static Obstacle. ***IEEE Transactions on Computational Social Systems***, 2024, Major Revision.
3. **Wenhan Wu**#, Wenfeng Yi, Xiaolu Wang, Erhui Wang, Xiaoping Zheng*. 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.
4. **Wenhan Wu**#, Maoyin Chen, Jinghai Li, Binglu Liu, Xiaoping Zheng*. An Extended Social Force Model via Pedestrian Heterogeneity Affecting the Self-driven Force. ***IEEE Transactions on Intelligent Transportation Systems***, 2021, 23(7): 7974-7986.
5. **Wenhan Wu**#, Jinghai Li, Wenfeng Yi, Xiaoping Zheng*. Modeling Crowd Evacuation via Behavioral Heterogeneity-Based Social Force Model. ***IEEE Transactions on Intelligent Transportation Systems***, 2022, 23(9): 15476-15486.
6. **Wenhan Wu**#, Xiaoping Zheng*. 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**#, Wenfeng Yi, Xiaolu Wang, Erhui Wang, Xiaoping Zheng*. 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**#, Wenfeng Yi, Xiaolu Wang, Xiaoping Zheng*. 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**#, Wenfeng Yi, Jinghai Li, Maoyin Chen, Xiaoping Zheng*. Automatic Identification of Human Subgroups in Time-Dependent Pedestrian Flow Networks. ***IEEE Transactions on Multimedia***, 2023, 26: 166-177.
10. Xiaoping Zheng#, **Wenhan Wu**#, Wenfeng Deng, Chunhua Yang, Keke Huang*. Reconstruction of Tree Network via Evolutionary Game Data Analysis. ***IEEE Transactions on Cybernetics***, 2020, 52(7): 6083-6094.
11. **Wenhan Wu**#, Wenfeng Yi, Jinghai Li, Maoyin Chen, Xiaoping Zheng*. Simulating the Evacuation Process Involving Multitype Disabled Pedestrians. ***IEEE Transactions on Computational Social Systems***, 2022, 10(5): 2400-2410.
12. **Wenhan Wu**#, Maoyin Chen, Jinghai Li, Binglu Liu, Xiaolu Wang, Xiaoping Zheng*. Visual Information-Based Social Force Model for Crowd Evacuation. ***Tsinghua Science and Technology***, 2021, 27(3): 619-629.
13. Wenfeng Yi#, **Wenhan Wu**, Xiaolu Wang, Xiaoping Zheng*. 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#, **Wenhan Wu**, Xiaolu Wang, Erhui Wang, Xiaoping Zheng*. 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#, **Wenhan Wu**, Xiaolu Wang, Xiaoping Zheng*. Modeling the Mutual Anticipation in Human Crowds With Attention Distractions. ***IEEE Transactions on Intelligent Transportation Systems***, 2023, 24(9): 10108-10117.
16. Wenfeng Yi#, **Wenhan Wu**, Jinghai Li, Xiaolu Wang, Xiaoping Zheng*. 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#, Maoyin Chen, **Wenhan Wu**, Binglu Liu, Xiaoping Zheng*. Height map-based social force model for stairway evacuation. ***Safety Science***, 2021, 133: 105027.
18. Wenfeng Deng#, Chunhua Yang, Keke Huang*, **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	**National Scholarship** for Undergraduate Students (×2)
2.	2016/10 & 2017/10 & 2018/10	**Premium Scholarship** for Academic Year (×3)
3.	2022/12	**National Scholarship** for Doctoral Students (×1)
4.	2021/10 & 2023/10	Comprehensive **First Prize Scholarship** (×2)

Conference and Workshop

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

Research Skills

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