Yanbing Mao

CONTACT

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RESEARCH INTERESTS

- Physics-AI
- Self-Driving Vehicles
- Social Cyber-Security
- Social Information Dynamics and Control

WORK EXPERIENCE

- **Assistant Professor (2022-Present)**, *Engineering Technology Division, Wayne State University*
- **Postdoctoral Research Associate (2019-2022)**, *Departments of Computer Science, Mechanical Engineering, University of Illinois at Urbana-Champaign*

EDUCATION

- **Ph.D., Electrical and Computer Engineering**, *State University of New York at Binghamton*, USA, 2019
- **M.E., Circuits and Systems**, *University of Electronic Science and Technology of China*, China, 2013

TEACHING

Year 2022-2023 at Wayne State University

- **ET 3500 Electrical Machines and Power Systems**: Fall 2022, Spring 2023
- **ET 3300 Applied Signal Processing**: Fall 2022

INVITED TALKS

- NSF CPS PI Meeting, Workshop on Rethinking Socio-Cyber-Physical System of Tomorrow, "Apollo-Rokwire: Infodemics Management Framework", 2021
- Center for Collective Dynamics of Complex Systems at Binghamton University–SUNY, "Topology Switching for Secure Networked Control Systems", 2019

PROFESSIONAL EXPERIENCE

Conference/Workshop Program Committee

- **Program Chair**, The 7th International Workshop on Social Sensing at ICWSM 2022
- **Conference Session Chair/Co-Chair**, 2021 IEEE Third International Conference on Cognitive Machine Intelligence. 2018 57th IEEE Conference on Decision and Control.
- **Program Committee**, TRASE-2022: AAAI Workshop on Trustworthy Autonomous Systems Engineering

Reviewer

- **Journals**, Automatica, Frontiers in Big Data, ACM Transactions on Cyber-Physical Systems, IEEE Transactions on Cybernetics, IEEE Transactions on Fuzzy Systems, IEEE Transactions on Automatic Control, IEEE Transactions on Control of Network Systems, IEEE Transactions on Network Science and Engineering, IEEE Transactions on Aerospace and Electronic Systems, IEEE Transactions on Systems, Man, and Cybernetics: Systems
- **Conferences and Workshops**, TRASE-2022 AAAI Workshop on Trustworthy Autonomous Systems Engineering, American Control Conference, IEEE Conference on Decision and Control, IEEE Conference on Control Technology and Applications

STUDENTS

- Dario Amaral (EET)
- Nazia Chowdhury (EET)

DEMO

- Safe Driving in Dynamic and Unforeseen Environments via Simplex: [YouTube]
- Safe and Fast Driving via Physics-AI: Phy-Taylor: [YouTube]

OPEN SOURCE

- Phy-Taylor: [GitHub]
- AutoRally with Simplex: [GitHub]

PUBLICATIONS

Journal Papers

1. **Yanbing Mao**, Lui Sha, Huajie Shao, Yuliang Gu, Qixin Wang, and Tarek Abdelzaher "Phy-Taylor: Physics-Model-Based Deep Neural Networks," *Nature Communications, in preparation.*
2. **Yanbing Mao**, Jinning Li, Naira Hovakimyan, Tarek Abdelzaher, and Christian Lebiere, "Cost Function Learning in Memorized Social Networks with Cognitive Behavioral Asymmetry," *IEEE Transactions on Computational Social Systems, in revision.* [pdf]
3. **Yanbing Mao**, Naira Hovakimyan, Tarek Abdelzaher, and Evangelos Theodorou, "Social System Inference from Noisy Observations," *IEEE Transactions on Computational Social Systems, in revision.* [pdf]

4. **Yanbing Mao**, Yuliang Gu, Naira Hovakimyan, Petros Voulgaris, and Lui Sha, "S$\mathcal{L}_1$-Simplex: Safe Velocity Regulation of Self-Driving Vehicles in Dynamic and Unforeseen Environments," *ACM Transactions on Cyber-Physical Systems (Special Issue on Special Issue on Automotive CPS Safety & Security), to appear*. [link]

5. **Yanbing Mao**, Hamidreza Jafarnejadsani, Pan Zhao, Emrah Akyol, and Naira Hovakimyan, "Novel Stealthy Attack and Defense Strategies for Networked Control Systems," *IEEE Transactions on Automatic Control (Special Issue on Security and Privacy of Distributed Algorithms and Network Systems)*, vol. 65, no. 9, pp. 3847–3862, 2020. [url]

6. **Yanbing Mao**, Emrah Akyol, and Naira Hovakimyan, "Impact of Confirmation Bias on Competitive Information Spread in Social Networks," *IEEE Transactions on Control of Network Systems*, vol. 8, no. 2, pp. 816–827, 2021. [url]

7. **Yanbing Mao**, and Emrah Akyol, "On Inference of Network Topology and Confirmation Bias in Cyber-Social Networks," *IEEE Transactions on Signal and Information Processing over Networks (Special Issue on Network Topology Inference)*, vol. 6, pp. 633–644, 2020. [url]

8. **Yanbing Mao**, Sadegh Bolouki, and Emrah Akyol, "Spread of Information with Confirmation Bias in Cyber-Social Networks," *IEEE Transactions on Network Science and Engineering (Special Issue on Network of Cyber-Social Networks: Modeling, Analyses, and Control)*, vol. 7, no. 2, pp. 688–700, 2020. [url]

9. **Yanbing Mao**, and Ziang Zhang, "Asymptotic Frequency Synchronization of Kuramoto Model by Step Force," *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, vol. 50, no. 8, pp. 2768–2778, 2020. [url]

10. **Yanbing Mao**, Hongbin Zhang, and Ziang Zhang, "Finite-Time Stabilization of Discrete-Time Switched Nonlinear Systems without Stable Subsystems via Optimal Switching Signal Design," *IEEE Transactions on Fuzzy Systems*, vol. 25, no. 1. pp. 172–180, 2017. [url]

11. **Yanbing Mao**, Hongbin Zhang, and Shengyuan Xu, "The Exponential Stability and Asynchronous Stabilization of A Class of Switched Nonlinear System via The T–S Fuzzy Model," *IEEE Transactions on Fuzzy Systems*, vol. 22, no. 4. pp. 817–828, 2014. [url]

Conference Papers

1. Hongjue Zhao, Yizhuo Chen, Dachun Sun, Yingdong Hu, Kaizhao Liang, **Yanbing Mao**, Lui Sha, and Huajie Shao, "TaylorNet: A General Neural Architecture for Vision, Language, and Scientific Discovery," *2023 International Conference on Learning Representations, submitted*.

2. Pan Zhao, **Yanbing Mao**, Chuyuan Tao, Naira Hovakimyan, and Xiaofeng Wang, "Adaptive Robust Quadratic Programs using Control Lyapunov and Barrier Functions," *in 59th IEEE Conference on Decision and Control*, Jeju Island, Korea, pp. 3353–3358, 2020. [url]

3. **Yanbing Mao**, Hamidreza Jafarnejadsani, Pan Zhao, Emrah Akyol, and Naira Hovakimyan, "Detectability of Intermittent Zero-Dynamics Attack in Networked Control Systems," *in 58th IEEE Conference on Decision and Control*, Nice, France, pp. 5605–5610, 2019. [url]

4. **Yanbing Mao**, Emrah Akyol, and Ziang Zhang, "A Novel Defense Strategy against Zero-Dynamics Attacks in Multi-Agent Systems," *in 58th IEEE Conference on Decision and Control*, Nice, France, pp. 3563–3568, 2019. [url]

5. **Yanbing Mao**, and Emrah Akyol, "Competitive Information Spread with Confirmation Bias," *in 53rd Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, USA, pp. 391–395, 2019. [url]

6. **Yanbing Mao**, and Emrah Akyol, "On Network Topology Inference of Social Networks," *in 57th Annual Allerton Conference on Communication, Control, and Computing*, Monticello, USA, pp. 804–809, 2019. [url]

7. **Yanbing Mao**, and Emrah Akyol, "Detectability of Cooperative Zero-Dynamics Attack," *in 56th Annual Allerton Conference on Communication, Control, and Computing*, Monticello, USA, pp. 227–234, 2018. [url]

8. **Yanbing Mao**, and Emrah Akyol, "Synchronization of Coupled Harmonic Oscillators by Time-Dependent Topology Switching," *in 7th IFAC Workshop on Distributed Estimation and Control in Networked Systems*, Groningen, Netherlands, 2018. [url]

9. **Yanbing Mao**, Emrah Akyol, and Ziang Zhang, "Second-Order Consensus for Multi-Agent Systems by Time-Dependent Topology Switching," *in 57th IEEE Conference on Decision and Control*, Miami Beach, USA, pp. 6151–6156, 2018. [url]

10. **Yanbing Mao**, Sadegh Bolouki, and Emrah Akyol, "On The Evolution of Public Opinion in the Presence of Confirmation Bias," *in 57th IEEE Conference on Decision and Control*, Miami Beach, USA, pp. 5352–5357, 2018. [url]

11. **Yanbing Mao**, and Ziang Zhang, "Second-Order Consensus for Multi-Agent Systems by State-Dependent Topology Switching," *in 2018 Annual American Control Conference*, Milwaukee, USA, pp. 3392–3397, 2018. [url]

12. **Yanbing Mao**, and Ziang Zhang, "Distributed Frequency Synchronization and Phase-Difference Tracking for Kuramoto Oscillators and Its Application to Islanded Microgrids," *in 55th IEEE Conference on Decision and Control*, Las Vegas, USA, pp. 4364–4369, 2016. [url]