

Yanbing Mao

264 Computing Applications Bldg, 605 E Springfield Ave, Champaign, IL 61820

✉ ybmao@illinois.edu

☎ 607-232-4867

🏠 My Website

RESEARCH INTERESTS

- Physics-Informed AI
- Connected Self-Driving Vehicles
- Social Information Dynamics and Control
- Safety and Security of Socio-Cyber-Physical Systems

EDUCATION

State University of New York at Binghamton

Ph.D. in Electrical and Computer Engineering

Thesis: Control- and Game-Theoretic Approaches to Secure Networked Systems

Committee: N. Hovakimyan (UIUC), H. Sayama, Z. Zhang, E. Akyol

Binghamton, NY

Sept. 2015–Sept. 2019

University of Electronic Science and Technology of China

M.E. in Circuits and Systems

Chengdu, Sichuan

Sept. 2010–Jul. 2013

Liaocheng University

B.E. in Electronic Information Science and Technology

Liaocheng, Shandong

Sept. 2006–Jul. 2010

PROFESSIONAL APPOINTMENTS

Department of Computer Science & Department of Mechanical Engineering, UIUC

Postdoctoral Research Associate

Oct. 2019–Present

Host: Prof. L. Sha, Prof. N. Hovakimyan and Prof. T. Abdelzaher

Advanced Controls Research Laboratory & Coordinated Science Laboratory, UIUC

Visiting Researcher

Oct. 2018–Jan. 2019

Host: Prof. N. Hovakimyan

State University of New York at Binghamton

Research Assistant and Teaching Assistant

Sept. 2015–Sept. 2019

Host: Prof. E. Akyol and Prof. Z. Zhang

Oregon State University

Research Assistant

Jan. 2014–Mar. 2015

Host: Prof. H. Wang

GRANT EXPERIENCE

Funded.....

DOD: Foundations of Social Information Dynamics and Control
No. HQ00342110002, \$1.5 mln

04/01/2021–03/31/2024,

- Architect, Leading Contributor

- Members: T. Abdelzaher (PI), N. Hovakimyan (Co-PI), E. Theodorou (Co-PI), C. Lebiere (Co-PI)

Pending.....

UIUC Strategic Research Initiatives: Cognitive-Social Actuator: Human-Centered Defense to Fight against Malicious Information Sources \$7,5000

- Architect, Leading Contributor
- Members: N. Hovakimyan (PI), T. Abdelzaher (Co-PI), H. Ji (Co-PI), Y. Mao (Co-PI)

Unfunded.....

NSF Convergence Accelerator Track F: Apollo-Rokwire: Spatio-Temporal Health Misinformation Management Framework for Human Communication Ecosystems 2021

- Architect, Leading Contributor
- Members: N. Hovakimyan (PI), T. Abdelzaher (Co-PI), L. Varshney (Co-PI), H. Ji (Co-PI), W. Sullivan (Co-PI), C. Bigman (SP), Y. Mao (SP)

NSF CPS: SPEEDD: Safety Promised Energy Efficient Delivery Drones 2020

- Architect, Leading Contributor
- Members: N. Hovakimyan (PI), T. Abdelzaher (Co-PI), L. Sha (Co-PI)

RESEARCH PROJECTS

DOD #HQ00342110002: Foundations of Social Information Dynamics and Control

Leading Researcher

Apr. 2021–Present

NSF #1932529 CPS: Virtual Sully: Autopilot with Multilevel Adaptation for Handling Large Uncertainties

Leading Researcher

Oct. 2019–Present

NSF #1739732 CPS: Against Coordinated Cyber and Physical Attacks: Unified Theory and Technologies

Leading Defense Developer

Oct. 2018–Oct. 2020

NSF #1663460 CMMI: Sampled Data Driven Attack Detection and Adaptation for Security in Control Systems

Leading Defense Developer

Oct. 2018–Oct. 2020

SUNY Interdisciplinary Collaboration Grant: Mathematical Models of Media Bias, Polarization and Misinformation Spread Over Networks

Leading Researcher

Dec. 2018–Sep. 2019

SUNY Collective Dynamics Seed Grant: Secure Networked CPS via Topology Switching

Leading Researcher

Oct. 2017–Oct. 2018

DEMO

- Self-Driving Vehicles: Safe Velocity Regulation in Dynamic and Unforeseen Environments
 - Model Learning Based RHAC v.s. RHAC: [[YouTube](#)]
 - \mathcal{L}_1 Adaptive Controller v.s. Normal Controller: [[YouTube](#)]

Open Source

- Codes:
 - AutoRally: Safe Autonomous Driving in Dynamic and Unforeseen Environments: [[GitHub](#)]
 - Taylor Neural Operator: [[GitHub](#)]
- Data:

PUBLICATIONS

In Preparation.....

1. **Yanbing Mao**, Huajie Shao, Lui Sha, Tarek Abdelzaher and Naira Hovakimyan, "Scientific Model Based Neural Networks: Taylor Neural Operator."
2. Jinning Li, **Yanbing Mao**, Huajie Shao, Tarek Abdelzaher, Heng Ji, and Naira Hovakimyan, and Christian Lebiere, "Strategic Text Generation via Social-Cognitive Model Prediction Control."
3. **Yanbing Mao**, et al., "Polarization Evolution-Part II: Humans v.s. Social Media v.s. Information Sources."
4. Jiyang Chen, **Yanbing Mao**, Lui Sha, and Naira Hovakimyan, "Self-Mapping, Self-Searching and Self-Mission-Planning for Medical UAVs."

Journal Papers.....

1. **Yanbing Mao**, Yuliang Gu, Naira Hovakimyan, Petros Voulgaris, and Lui Sha, "SC₁-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)*, *Minor Revision*. [[pdf](#)]
2. **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](#)]
3. **Yanbing Mao**, Naira Hovakimyan, Petros Voulgaris, and Lui Sha, "Finite-Time Model Inference from a Single Noisy Trajectory," *IEEE Transactions on Automatic Control*, *Revised as Regular Paper*. [[pdf](#)]
4. **Yanbing Mao**, Naira Hovakimyan, Tarek Abdelzaher, and Evangelos Theodorou, "Social System Inference from Noisy Observations," *submitted to IEEE Transactions on Computational Social Systems*. [[pdf](#)]
5. **Yanbing Mao**, Jinning Li, Naira Hovakimyan, Tarek Abdelzaher, and Christian Lebiere, "Cost Function Learning in Memorized Social Networks with Cognitive Behavioral Asymmetry," *submitted to IEEE Transactions on Computational Social Systems*. [[pdf](#)]
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. 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](#)]
2. **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](#)]
3. **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](#)]
4. **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](#)]
5. **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](#)]
6. **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](#)]
7. **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](#)]
8. **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](#)]
9. **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](#)]
10. **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](#)]
11. **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](#)]

Theses.....

Ph.D. Dissertation, "Control- and Game- Theoretic Approaches to Secure Networked Systems," State University of New York at Binghamton, 2020. [[url](#)]

MAJOR TALKS

Invited Talks.....

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

Conference Presentations.....

- "On Network Topology Inference of Social Networks"** 2019
57th Annual Allerton Conference on Communication, Control, and Computing
- "Detectability of Cooperative Zero-Dynamics Attack"** 2018
56th Annual Allerton Conference on Communication, Control, and Computing
- "On the Evolution of Public Opinion in the Presence of Confirmation Bias"** 2018
57th IEEE Conference on Decision and Control
- "Second-Order Consensus by State-Dependent Topology Switching"** 2018
2018 Annual American Control Conference
- "Second-Order Consensus by Time-Dependent Topology Switching"** 2018
57th IEEE Conference on Decision and Control

PROFESSIONAL SERVICE

Conference/Workshop Program Committee.....

- o TRASE-2022: AAI Workshop on Trustworthy Autonomous Systems Engineering

Conference Session Chair/Co-Chair.....

- o 2022 International AAI Conference on Web and Social Media: Workshop on Social Sensing
- o Research Session 2, 2021 IEEE Third International Conference on Cognitive Machine Intelligence
- o Session Title: Control of Networks I. 57th IEEE Conference on Decision and Control, Miami Beach, FL, USA, December 17-19, 2018

Reviewer for Journals.....

- o Automatica
- o IEEE Transactions on Cybernetics
- o IEEE Transactions on Fuzzy Systems
- o IEEE Transactions on Automatic Control
- o ACM Transactions on Cyber-Physical Systems
- o IEEE Transactions on Control of Network Systems
- o IEEE Transactions on Network Science and Engineering
- o IEEE Transactions on Aerospace and Electronic Systems
- o IEEE Transactions on Systems, Man, and Cybernetics: Systems

Reviewer for Conferences.....

- o TRASE-2022: AAI Workshop on Trustworthy Autonomous Systems Engineering
- o American Control Conference (2018–2022)
- o IEEE Conference on Decision and Control (2016–2022)
- o IEEE Conference on Control Technology and Applications (2022)

MENTORSHIP EXPERIENCE

- Jinning Li (Ph.D. project, CS, UIUC)** Fall 2021–Present
Project: "Strategic Text Generation"
- Jiyang Chen (Ph.D. project, CS, UIUC)** Fall 2020–Present
Project: "Resource-Efficient and Timing-Aware Safe Operation for Self-Driving Vehicles"
- Yuliang Gu (Ph.D. project, ME, UIUC)** Fall 2020–Present
Project: "Foundations of Social Information Dynamics and Control"

Sitao Zhang (Master project, ME, UIUC)

Project: "AutoRally: Complex Self-Driving Environments Simulator"

Fall 2020–Spring 2021

TEACHING EXPERIENCE

Teaching Assistant

EECE315 Electronics

State University of New York at Binghamton, Department of ECE

2017 Fall

Teaching Assistant

EECE260 Electric Circuits

State University of New York at Binghamton, Department of ECE

2018 Spring

REFERENCES

Lui Sha

Donald B. Gillies Chair

Department of Computer Science

University of Illinois at Urbana-Champaign

✉ lrs@illinois.edu

☎ 217-244-1887

Naira Hovakimyan

W. Grafton and Lillian B. Wilkins Professor

Department of Mechanical Science and Engineering

University of Illinois at Urbana-Champaign

✉ nhovakim@illinois.edu

☎ 217-244-1672

Tarek Abdelzaher

Sohaib and Sara Abbasi Professor and Willett Faculty Scholar

Department of Computer Science

University of Illinois at Urbana-Champaign

✉ zaher@illinois.edu

☎ 217-265-6793

Evangelos Theodorou

Associate Professor

Department of Aerospace Engineering

Georgia Institute of Technology

✉ evangelos.theodorou@gatech.edu

☎ 404-894-8197

Petros Voulgaris

Chair, Founding Aerospace Program Director, and Victor LaMar Lockhart Professor

Department of Mechanical Engineering

University of Nevada, Reno

✉ pvoulgaris@unr.edu

☎ 775-682-5725