Parinaz Naghizadeh

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Integrated Systems Engineering &
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EDUCATION

Ph.D., Electrical Engineering, University of Michigan · August 2016
  Advisor: Mingyan Liu
  Ph.D. thesis: "On the Provision of Public Goods on Networks:
  Incentives, Exit Equilibrium, and Applications to Cyber Security"

M.Sc., Mathematics, University of Michigan · May 2014

M.Sc., Electrical Engineering, University of Michigan · May 2013

B.Sc., Electrical Engineering, Sharif University of Technology, Iran · June 2010

APPOINTMENTS

Ohio State University

Assistant Professor, Operations Research, Integrated Systems Engineering · Sep. 2019 - present

Assistant Professor, Electrical and Computer Engineering · Sep. 2019 - present

Affiliate, Translational Data Analytics Institute · Dec. 2019 - present

Purdue University and Princeton University Edge Lab · Sep. 2017 - Aug. 2019

Postdoctoral Research Associate, College of Engineering
Host: Mung Chiang

University of Michigan · Sep. 2016 - Aug. 2017

Postdoctoral Research Fellow, Electrical Engineering and Computer Science
Host: Mingyan Liu

HONORS AND AWARDS

- Ethics Circle Fellow, Center for Ethics and Human Values, Ohio State University · 2021

- Rising Stars in EECS, Stanford University · 2017

- Finalist for ProQuest Distinguished Dissertation Award, University of Michigan · 2016

- Honorable Mention for Richard and Eleanor Towner prize for outstanding Ph.D. research, University of Michigan · 2015

- Barbour Scholarship, University of Michigan · 2014 - 2015

- Iran's National Elites Foundation Scholarship · 2007 - 2010

- President's Honorary Award at Sharif University of Technology · 2006

- Ranked 14th among nearly 350,000 participants in Iran's Physics and Mathematics Nation-wide Universities Entrance Exam · 2006

GRANT SUPPORT

RESEARCH KEYWORDS

Network economics; game theory; algorithmic economics; reinforcement learning; economics of cyber security.

PUBLICATIONS

WORKING PAPERS:

[W1] "Data Debiasing through Exploration and Fairness", with Yifan Yang. *In preparation.*

[W2] "The Impacts of Prediction Technologies on Relational Contracts", with Thanh Nguyen and Shai Vardi. *Submitted.*

[W3] "The Role of Managers, Revisited", with Thanh Nguyen. *Working paper.*

JOURNAL PAPERS:

[J1] M. Abdallah, P. Naghizadeh, A. R. Hota, T. Cason, S. Bagchi, S. Sundaram. "Behavioral and Game-Theoretic Security Investments in Interdependent Systems Modeled by Attack Graphs", *IEEE Transactions on Control of Network Systems*, 7 (4): 1585-1596, 2020.

[J2] P. Naghizadeh, M. Liu. "Using Private and Public Assessments in Security Information Sharing Agreements", *IEEE Transactions on Information Forensics and Security*, 15 (1): 1801-1814, 2020.

[J3] D. Ghavidel, P. Naghizadeh, M. Liu, V. Gupta. "A Reputation-Based Contract for Repeated Crowd-sensing with Costly Verification", *IEEE Transactions on Signal Processing*, 67 (23): 6092-6104, 2019.

[J4] P. Naghizadeh, M. Liu. "Provision of Public Goods on Networks: On Existence, Uniqueness, and Centralities", *IEEE Transactions on Network Science and Engineering*, 5 (3): 225-236, 2018.

[J5] M. Khalili, P. Naghizadeh, M. Liu. "Designing Cyber Insurance Policies: The Role of Pre-Screening and Security Interdependence". *IEEE Transactions on Information Forensics and Security*, 13 (9): 2226-2239, 2018.

[J6] P. Naghizadeh, M. Liu. "Opting out of Incentive Mechanisms: A Study of Security as a Non-Excludable Public Good", *IEEE Transactions on Information Forensics and Security*, 11 (12): 2790-2803, 2016.

[J7] A. Sarabi, P. Naghizadeh, Y. Liu, M. Liu. "Risky Business: Fine-grained Data Breach Prediction Using Business Profiles", *Journal of Cybersecurity*, 2 (1): 15-28, Oxford University Press, 2016.

[J8] P. Naghizadeh, M. Liu. "Perceptions and Truth: A Mechanism Design Approach to Crowd-Sourcing Reputation", *IEEE/ACM Transactions on Networking*, 24 (1): 163-176, 2016.

Refereed Conference and Workshop Papers:

[C1] M. Abdallah, D. Woods, P. Naghizadeh, I. Khalil, T. Cason, S. Sundaram, S. Bagchi. "Morshed: Guiding Behavioral Decision-Makers towards Better Security Investment in Interdependent Systems", *the 16th ACM Asia Conference on Computer and Communications Security (ASIACCS'21)*, Jun. 2021.

[C2] P. Naghizadeh, T. Nguyen, S. Vardi. "The Impacts of Prediction Technologies on Relational Contracts"', *the 30th Workshop on Information Systems and Economics (WISE'19)*, Dec. 2019.

[C3] M. Abdallah, P. Naghizadeh, T. Cason, S. Bagchi, S. Sundaram. "Protecting Assets with Heterogeneous Valuations under Behavioral Probability Weighting", *Control and Decision Conference (CDC'19)*, Dec. 2019.

[C4] P. Naghizadeh, A. Sinha. "Adversarial Contract Design for Private Data Commercialization", *ACM Conference on Economics and Computation (EC'19)*, Jun. 2019.

[C5] M. Abdallah, P. Naghizadeh, A. R. Hota, T. Cason, S. Bagchi, S. Sundaram. "The Impact of Behavioral Probability Weighting on Security Investments in Interdependent Systems", *American Control Conference (ACC'19)*, Jul. 2019.

[C6] S. Ahn, M. Gorlatova, P. Naghizadeh, M. Chiang. "Personalized Augmented Reality Via Fog-based Imitation Learning", *IEEE Workshop on Fog Computing and the IoT (co-located with IEEE CPS-IoT Week)*, Apr. 2019.

[C7] P. Naghizadeh, M. Gorlatova, A. Lan, M. Chiang. "Hurts to Be Too Early: Benefits and Drawbacks of Communication in Multi-Agent Learning", *IEEE INFOCOM'19*, Apr. 2019.

[C8] S. Ahn, M. Gorlatova, P. Naghizadeh, M. Chiang, P. Mittal. "Adaptive Fog-Based Output Security for Augmented Reality", *ACM SIGCOMM VR/AR Network Workshop*, Aug. 2018.

[C9] P. Naghizadeh, M. Liu. "On the Uniqueness and Stability of Equilibria of Network Games", *the 55th Annual Allerton Conference on Communication, Control and Computing (Allerton'17)*, Oct. 2017.

[C10] M. Khalili, P. Naghizadeh, M. Liu. "Embracing Risk Dependency in Designing Cyber-Insurance Contracts", *the 55th Annual Allerton Conference on Communication, Control and Computing (Allerton'17)*, Oct. 2017.

[C11] M. Khalili, P. Naghizadeh, M. Liu. "Designing Cyber Insurance Policies in the Presence of Security Interdependence", *the 12th Workshop on the Economics of Networks, Systems and Computation (NetEcon'17)*, Jun. 2017.

[C12] D. Ghavidel, P. Naghizadeh, M. Liu, V. Gupta. "A Reputation-Based Contract for Repeated Crowdsensing with Costly Verification", *American Control Conference (ACC'17)*, May 2017.

[C13] M. Khalili, P. Naghizadeh, M. Liu. "Designing Cyber Insurance Policies: Mitigating Moral Hazard Through Security Pre-Screening", *the 7th International Conference on Game Theory for Networks (GameNets'17)*, May 2017.

[C14] P. Naghizadeh, M. Liu. "Exit Equilibrium: Towards Understanding Voluntary Participation in Security Games", *IEEE INFOCOM'16*, Feb. 2016.

[C15] P. Naghizadeh, M. Liu. "Inter-Temporal Incentives in Security Information Sharing Agreements", position paper, *AAAI Workshop on Artificial Intelligence for Cyber Security (AICS'16)*, Feb. 2016.

[C16] P. Naghizadeh, M. Liu. "Provision of Non-Excludable Public Goods on Networks: From Equilibrium to Centrality Measures", *the 53rd Annual Allerton Conference on Communication, Control and Computing (Allerton'15)*, Oct. 2015.

[C17] Y. Liu, A. Sarabi, J. Zhang, P. Naghizadeh, M. Karir, M. Bailey, M. Liu. "Cloudy with a Chance of Breach: Forecasting Cyber Security Incidents", *the 24th USENIX Security Symposium (USENIX'15)*, Aug. 2015.

[C18] A. Sarabi, P. Naghizadeh, Y. Liu, M. Liu. "Prioritizing Security Spending: A Quantitative Analysis of Risk Distributions for Different Business Profiles", *the 14th Workshop on the Economics of Information Security (WEIS'15)*, Jun. 2015.

[C19] P. Naghizadeh, M. Liu. "Budget Balance or Voluntary Participation? Incentivizing Investments in Interdependent Security Games", *the 52nd Annual Allerton Conference on Communication, Control and Computing (Allerton'14)*, Oct. 2014.

[C20] A. Sarabi, P. Naghizadeh, M. Liu. "Can Less Be More? A Game-Theoretical Analysis of Investment vs. Filtering", *the 5th Conference on Decision and Game Theory for Security (GameSec'14)*, Nov. 2014.

[C21] P. Naghizadeh, M. Liu. "Voluntary Participation in Cyber-insurance Markets", *the 13th Workshop on the Economics of Information Security (WEIS'14)*, Jun. 2014.

[C22] P. Naghizadeh, M. Liu. "Establishing Network Reputation via Mechanism Design", *the 3rd International Conference on Game Theory for Networks (GameNets'12)*, May 2012.

Non-refereed Publications and Pre-Prints:

[P1] P. Naghizadeh, C. Joe-Wong, M. Chiang. "Paid Prioritization with Content Competition", *arXiv preprint arXiv:2007.14574*, 2020.

[P2] S. Chaterji, P. Naghizadeh, M.A. Alam, S. Bagchi, M. Chiang, D. Corman, B. Henz, S. Jana, N. Li, S. Mou, M. Oishi, C. Peng, T. Rompf, A. Sabharwal, S. Sundaram, J. Weimer, J. Weller. "Resilient Cyberphysical Systems and their Application Drivers: A Technology Roadmap", *arXiv preprint arXiv:2001.00090*, 2020.

[P3] P. Naghizadeh, M. Liu. "Inter-Temporal Incentives in Security Information Sharing Agreements", *Information Theory and Applications Workshop (ITA'16)*, Feb. 2016.

[P4] P. Naghizadeh, M. Liu. "Closing the Price of Anarchy Gap in the Interdependent Security Game", *Information Theory and Applications Workshop (ITA'14)*, Feb. 2014.

[P5] P. Naghizadeh, M. Liu. "Incentives, Quality, and Risks: A Look into the NSF Proposal Review Pilot", *arXiv preprint arXiv:1307.6528*, 2013.

Teaching Experience

Ohio State University

- ISE 7200: Advanced Nonlinear Optimization   Spring 2020, 2021
  Graduate course for first-year Ph.D. and advanced M.Sc. students.
  Student evaluation of instruction for Spring 2020: 4.89/5.

- ISE 6194: Reinforcement Learning   Autumn 2020
  New graduate course I developed and taught.
  Student evaluation of instruction for Autumn 2020: 5.00/5.

- ISE 4100: Stochastic Modeling and Simulation   Autumn 2020
  Senior-level course on introductory stochastic modeling and discrete-event system simulation.
  Student evaluation of instruction for Autumn 2020: 4.85/5.

University of Michigan

- EECS 401: Probabilistic Methods in Engineering (*Graduate Student Instructor*)   Fall 2012

Advising Experience

Current Ph.D. Students:

- Yifan Yang, ISE, Ohio State University   2020 - present

Past Students:

- Tengmu Hu, M.Sc., ISE & Math, Ohio State University   2020

Ph.D. Committee Member:

- Hao Li, ECE, Ohio State University   (in progress)
- Tong Zhao, MAE, Ohio State University   (in progress)
- Mohammad Mahdi Khalili, EECS, University of Michigan   2019

M.Sc. and B.Sc. Thesis Committee Member:

- Tengmu Hu, M.Sc., Math, Ohio State University   2020
- Jianzong Pi, B.Sc., ECE, Ohio State University   2020

Invited Talks

- "The Impacts of Prediction Technologies on Relational Contracts", *Information Theory and Applications Workshop (ITA), UCSD*, Feb. 2020.

- "Improving Cyber Security through Incentive Design and Data Analytics", *Center for Automotive*

Research, Ohio State University, Feb. 2020.

- "On Information Sharing in Multi-agent Reinforcement Learning", *Conference on Edge & Fog on Princeton Edge Lab 10th Anniversary, Princeton University*, May 2019.

- "Information and Incentives in Learning and Decision Making on Networks", *Department of Electrical, Computer, and Systems Engineering, Rensselaer Polytechnic Institute*, Mar. 2019.

- "Information and Incentives in Learning and Decision Making on Networks", *Department of Electrical and Computer Engineering, University of Southern California*, Mar. 2019.

- "Information and Incentives in Learning and Decision Making on Networks", *Department of Integrated Systems Engineering, Ohio State University*, Feb. 2019.

- "On Information Sharing in Multi-Agent Reinforcement Learning", *Information Theory and Applications Workshop (ITA), UCSD*, Feb. 2019.

- "Information and Incentives in Learning and Decision Making on Networks", *Department of Industrial and Enterprise Systems Engineering, University of Illinois, Urbana-Champaign*, Feb. 2019.

- "Information and Incentives in Learning and Decision Making on Networks", *Department of Electrical and Computer Engineering, University of Minnesota*, Feb. 2019.

- "Information and Incentives in Learning and Decision Making on Networks", *Department of Industrial Engineering and Management Science, Northwestern University*, Dec. 2018.

- "On Communication in Multi-agent Reinforcement Learning", *INFORMS 2018 Annual Meeting, Advanced Probability Invited Session*, Nov. 2018.

- "Network Games with Applications in Cyber Security", *Purdue CS Theory Seminar*, Apr. 2018.

- "Adversarial Contract Design for Selling Data", *Information Theory and Applications Workshop (ITA), UCSD*, Feb. 2018.

- "Network Games with Applications in Cyber Security", *Purdue ECE Seminar*, Dec. 2017.

- "Decision Making and Crowdsourcing on Networks", *EDGE lab, Princeton University*, May 2017.

- "Improving Cyber Security through Cyber Insurance and Data Analytics", *Electrical Engineering Department, Texas A&M University*, Apr. 2017.

- "Incentivizing Improved Cyber Security: A Study of Security as a Public Good"', *Computer Engineering and Systems Group Remote Seminar, Texas A&M University*, Mar. 2017.

- "Network Structures and Public Good Provision Games", *Information Theory and Applications Workshop (ITA), UCSD*, Feb. 2017.

- "Security Pre-Screening in the Design of Cyber-Insurance Policies", *CSP Seminar, Department of Electrical Engineering, University of Michigan*, Jan. 2017.

- "Incentivizing Improved Cybersecurity: A Study of Security as a Public Good", *Department of Electrical Engineering, University of California San Diego*, Nov. 2016.

- "On the Provision of Public Goods on Networks", *Communications, Networks, and Systems Seminar, Ming Hsieh Institute, University of Southern California*, Nov. 2016.

- "Provision of Public Goods on Networks and its Applications to Cyber-Security", *University of Notre Dame*, Sep. 2016.
- "Provision of Non-Excludable Public Goods on Networks: Incentives, Exit Equilibrium, and Applications to Cyber Security", *ITA Graduation Day, UCSD*, Feb. 2016.

SERVICE AND PROFESSIONAL ACTIVITIES

TECHNICAL PROGRAM COMMITTEE MEMBER:

- ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (ACM MobiHoc)   2019 - 2021
- International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks (WiOpt)   2019 - 2021
- AML-IoT FLAME Special Session of ICMLA   2020
- IEEE Sarnoff Symposium   2019
- IEEE/IFIP Conference on Dependable and Secure Networks (DSN) Fast Abstract   2019
- ACM International Conference on emerging Networking EXperiments and Technologies (CoNEXT) Student Workshop   2019

EXTERNAL REVIEWER FOR JOURNALS AND CONFERENCES:

Journals: (each listed only once) IEEE Transactions on Information Forensics & Security, IEEE Transactions on Control of Network Systems, IEEE/ACM Transactions on Networking, IEEE Transactions on Communications, IEEE Transactions on Information Theory, IEEE Transactions on Mobile Computing, IEEE Transactions on Dependable and Secure Computing, IEEE Transactions on Vehicular Technology, IEEE Transactions on Cognitive Communications & Networking, IEEE Security & Privacy, IEEE Networking Letter, IEEE JSAC Special issue on Smart Data Pricing for Next Generation Networks, ACM Transactions on Internet Technology, Computer, Information Technology and People, Physica A, International Journal on Robust and Nonlinear Control, Elsevier Computers & Industrial Engineering.
Conferences: VTC 2015,18, GlobalSIP 2015, ICC 2016-17, ACC 2017,21, CDC 2018-20, SODA 2020.

SESSION ORGANIZER/CHAIR:

- **Session chair**, Game theory session, Information Theory and Applications Workshop (ITA)   2017
- **Track chair**, control and robotics, systems and communications, and signal processing and computer vision sessions, at the Engineering Graduate Symposium, University of Michigan   2013

OUTREACH, VOLUNTEERING, AND OTHER SERVICE:

- **Judge**, Summer Undergraduate Research Fellowship (SURF) Program, Purdue University   2018
- **Organizing member**, networking events and social gatherings for graduate women in Electrical Engineering and Computer Science, University of Michigan   Winter 2013 - Winter 2015

PROFESSIONAL MEMBERSHIPS: IEEE, INFORMS.