

Armin Sarabi

Assistant Research Scientist, University of Michigan

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RESEARCH INTERESTS

Data-driven security, IoT security, Internet measurement, security economics, deep learning.

APPOINTMENTS

University of Michigan

Ann Arbor, MI

Assistant Research Scientist

Sep 2018 - Present

- Department of Electrical Engineering and Computer Science

University of Michigan

Ann Arbor, MI

Postdoctoral Research Fellow

Jan 2018 - Aug 2018

- Department of Electrical Engineering and Computer Science
- *Host*: Prof. Mingyan Liu

EDUCATION

University of Michigan

Ann Arbor, MI

PhD, Electrical Engineering: Systems

Jan 2014 - Dec 2017

- *Dissertation*: “Quantifying Security: Methods, Challenges, and Applications”
- *Committee members*: Mingyan Liu (chair), J. Alex Halderman, Tudor Dumitras, Vijay Subramanian

University of Michigan

Ann Arbor, MI

MSE in Electrical Engineering: Systems

Sep 2012 - Dec 2013

- *Major*: Communications
- *Minor*: Signal Processing

Sharif University of Technology

Tehran, Iran

BSc, Electrical Engineering

Sep 2007 - June 2012

- *Major*: Communications

TEACHING EXPERIENCE

University of Michigan

Ann Arbor, MI

- EECS 452: Digital Signal Processing Design Laboratory (Winter 2023)
- Engineering 100: Self-Driving Cars, Drones, and Beyond, An Intro to Autonomous Electronic Systems (Fall 2018, Winter 2019)
 - Developed curricular materials for the pilot course and subsequent offerings, including lectures, lab material, and software/hardware to introduce freshmen students to autonomous control, signal processing, and embedded systems using programmable quadcopters.

WORK EXPERIENCE

Fair Isaac Corp. (FICO)

Data Scientist

Ann Arbor, MI

May 2016 - Apr 2017

- Member of the Enterprise Security Score (ESS) analytics team for developing the FICO Cyber Risk Score, following the acquisition of Quadmetrics by FICO in May 2016.
- Refined models for accurate prediction of cyber-risk, by curating features indicative of high risk, expanding the utilized database of known incidents for model training, and exploring appropriate models for providing precise and interpretable predictions.
- Trained new members of the ESS analytics team to facilitate the transition following the acquisition of Quadmetrics by FICO.

Quadmetrics Inc.

Data Scientist

Ann Arbor, MI

Sep 2015 - May 2016

- Cyber security startup for transitioning cyber-risk forecasting research to industry.
- Led the development and implementation of cyber-risk forecasting models for quantifying the security posture of organizations for self and third-party assessments, using supervised machine learning models trained on publicly reported incidents and symptoms of mismanagement exposed by network probes.

PUBLICATIONS

Working Papers

- J. Jacobs, S. Romanosky, O. Suciuro, B. Edwards, and **A. Sarabi**. “Enhancing Vulnerability Prioritization: Data-Driven Exploit Predictions with Community-Driven Insights”. *arXiv preprint arXiv:2302.14172*, 2023.

Conference Papers

- T. Yin, **A. Sarabi**, and M. Liu. “Deterrence, Backup, or Insurance: A Game-Theoretic Analysis of Ransomware”. In *Workshop on the Economics of Information Security (WEIS)*, June 2021.
- **A. Sarabi** and M. Liu. “Characterizing the Internet Host Population Using Deep Learning: A Universal and Lightweight Numerical Embedding”. In *Internet Measurement Conference (IMC)*, pages 133–146, Boston, MA, Oct 2018.
- C. Xiao, **A. Sarabi**, Y. Liu, B. Li, M. Liu, and T. Dumitras. “From Patching Delays to Infection Symptoms: Using Risk Profiles for an Early Discovery of Vulnerabilities Exploited in the Wild”. In *USENIX Security Symposium*, pages 903–918, Baltimore, MD, Aug 2018.
- **A. Sarabi**, Z. Zhu, C. Xiao, M. Liu, and T. Dumitras. “Patch Me If You Can: A Study on the Effects of Individual User Behavior on the End-Host Vulnerability State”. In *International Conference on Passive and Active Network Measurement (PAM)*, pages 113–125, Sydney, Australia, Mar 2017.
- **A. Sarabi**, P. Naghizadeh, Y. Liu, and M. Liu. “Prioritizing Security Spending: A Quantitative Analysis of Risk Distributions for Different Business Profiles”. In *Workshop on the Economics of Information Security (WEIS)*, Delft, The Netherlands, June 2015.
- Y. Liu, **A. Sarabi**, J. Zhang, P. Naghizadeh, M. Karir, M. Bailey, and M. Liu. “Cloudy with a Chance of Breach: Forecasting Cyber Security Incidents”. In *USENIX Security Symposium*, pages 1009–1024, Washington, D.C., Aug 2015.
- Y. Liu, J. Zhang, **A. Sarabi**, M. Liu, M. Karir, and M. Bailey. “Predicting Cyber Security Incidents Using Feature-Based Characterization of Network-Level Malicious Activities”. In *ACM International Workshop on Security and Privacy Analytics (IWSPA)*, pages 3–9, San Antonio, TX, Mar 2015.

- **A. Sarabi**, P. Naghizadeh, and M. Liu. “Can Less Be More? A Game-Theoretic Analysis of Filtering vs. Investment”. In *International Conference on Decision and Game Theory for Security (GameSec)*, pages 329–339, Los Angeles, CA, Nov 2014.

Journal Papers

- T. Yin, **A. Sarabi**, and M. Liu. “Deterrence, Backup, or Insurance: Game-Theoretic Modeling of Ransomware”. *Games*, 14(2):20, 2023.
- **A. Sarabi**, P. Naghizadeh, Y. Liu, and M. Liu. “Risky Business: Fine-Grained Data Breach Prediction Using Business Profiles”. *Journal of Cybersecurity*, 2(1):15–28, Dec 2016.

Book Chapters

- **A. Sarabi**, K. Jin, and M. Liu. “Smart Internet Probing: Scanning Using Adaptive Machine Learning”. In *Game Theory and Machine Learning for Cyber Security*, pages 411–437. Wiley-IEEE Press, 2021.

INVITED TALKS, POSTERS, AND WORKSHOPS

Talks

- “Compressing the Internet Using Deep Learning: Numerical Characterization of the Internet Host Population”. *CSP Seminar*, EECS Department, University of Michigan, Ann Arbor, MI, Apr 2018.

Workshops

- *Computing Community Consortium (CCC) Leadership in Embedded Security Workshop*, Baltimore, MD, Aug 2018.

HONORS & AWARDS

Outstanding Graduate Student Instructor , EECS Department, University of Michigan	2014
Iran’s National Elites Foundation Scholarship	2007-2011
President’s Honorary Award , Sharif University of Technology	2007
Ranked 30th among 300,000+ Participants , Iran’s Physics and Mathematics Annual Nation-Wide Universities Entrance Exam	2007

SERVICE

- **External Reviewer**,
Conferences: ICML 2022-23, NeurIPS 2021-2023, USENIX Security 2021 Artifact Evaluation.
Journals: ACM Transactions on Management Information Systems, Computers & Security, IEEE Access, IEEE Design & Test, IEEE Networking Letters, IEEE Transactions on Information Forensics & Security, IEEE Transactions on Network Science and Engineering, IEEE/ACM Transactions on Networking, International Journal of Communication Systems.