Jeongkeun Shin

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Education

Carnegie Mellon University, School of Computer Science — Pittsburgh, PA
Doctor of Philosophy (Ph.D.) in Societal Computing — Sep 2024 - Now
- Advised by Professor Kathleen M. Carley

Carnegie Mellon University, School of Computer Science — Pittsburgh, PA
Master of Science (M.S.) in Societal Computing — Sep 2024 - May 2025

Carnegie Mellon University, College of Engineering — Pittsburgh, PA
Doctor of Philosophy (Ph.D.) in Electrical and Computer Engineering (Incomplete) — Jan 2022 - Aug 2024
- Completed Coursework Requirements / Transferred to Software and Societal Systems Department (S3D)

Carnegie Mellon University, College of Engineering — Pittsburgh, PA
Master of Science (M.S.) in Electrical and Computer Engineering — Jan 2020 - May 2021
- Advisor: Professor Marios Savvides

University of Michigan, College of Engineering — Ann Arbor, MI
Bachelor of Science in Engineering (B.S.E.) in Computer Science, *Cum Laude* — Dec 2019
- Advisor: Professor Walter S. Lasecki

Research & Work Experience

Graduate Research Assistant, CASOS Center — Pittsburgh, PA
Advisor: Professor Kathleen M. Carley, Professor L. Richard Carley — Jan 2022 - Sep 2025
- Developed OSIRIS, the simulation framework that allows users to design the unique organizational structures, incorporating diverse human behaviors, human factors, and social networks.
- Modeled various cyber attack scenarios, including phishing, data exfiltration, ransomware, and Denial of Service attacks, to assess their impact on different organizational types and evaluate the effectiveness of various cyber defense strategies.
- Simulated and analyzed the performance of different AI solutions for cybersecurity across various organizational environments.

Graduate Research Assistant, CyLab Biometrics Center — Pittsburgh, PA
Advisor: Professor Marios Savvides — Jan 2020 - Dec 2020
- Developed the user interface for a web system that detects various products in images uploaded from grocery markets, utilizing models trained with computer vision and deep learning algorithms.
- By leveraging computer vision and deep learning algorithms, contributed to improve the grocery market product detection accuracy.

Graduate Research Assistant, Human and Robot Partners Lab — Pittsburgh, PA
Advisor: Professor Henny Admoni — Jan 2020 - May 2020
- Developed a 3D simulation environment for a restaurant setting, incorporating diverse human behavior patterns to accurately simulate daily operations and interactions.

Undergraduate Research Assistant, Crowd and Machine Lab — Ann Arbor, MI
Advisor: Professor Walter S. Lasecki — Jan 2018 - Jan 2019
- Solely developed a web system optimized for enhancing research lab operations, enabling researchers to submit weekly progress reports and allowing professors to efficiently sort and review these reports by date, team, and research area. The portal also features functionality for broadcasting announcements to specific groups or the entire research lab.
- Designed and implemented web applications specifically for collecting human subject responses, facilitating research in misinformation classification and human-computer interaction.

Undergraduate Research Scholar, Illinois Geometry Lab — Champaign, IL
Advisor: Professor Xin Zhang — Jan 2017 - May 2017

- Developed a simulation system that enabled the generation of critical data to test mathematical hypotheses on the behavior of group orbits in local-global conjectures, focusing on the density of integers within specific ranges.
- Revealed variances in convergence rates linked to group structures and the critical exponents, which indicate significant implications for understanding the local-global conjecture across different subgroup behaviors.

Squad Leader, Sergeant, Republic of Korea Army   Gapyeong, South Korea
Engineering Department, 66th Infantry Division   Jan 2014 - Oct 2015
- Led multiple mobilization exercises, developing and simulating plans for the allocation and operation of equipment, vehicles, and fuel in both peacetime and wartime scenarios.

Publications - Journal

[J.2] Cyber Attack Flow Networks: Structural Vulnerability Analysis and Interdiction Optimization (*Working Paper*)
Jeongkeun Shin, L. Richard Carley, Kathleen M. Carley

[J.1] Simulating Cyber Defense: The Impact of Phishing Training and System Updates on Mitigating Damage from Hybrid Phishing and Watering Hole Attacks
Jeongkeun Shin, Siyuan Zhai, L. Richard Carley, Kathleen M. Carley
The Journal of Defense Modeling and Simulation (JDMS) - *Forthcoming*

Publications - Conference Proceedings

[C.9] Network Analysis of Attack Flows in Ransomware Groups and Campaigns
Jeongkeun Shin, Siyuan Zhai, L. Richard Carley, Kathleen M. Carley
International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRiMS) 2025 - *Forthcoming*

[C.8] A Baseline Simulation of Hybrid Misinformation and Spearphishing Campaigns in Organizational Networks
Jeongkeun Shin, Han Wang, L. Richard Carley, Kathleen M. Carley
Winter Simulation Conference (WSC) 2025 - *Forthcoming*

[C.7] Simulation of Human Organizations with Computational Human Factors Against Phishing Campaigns
Jeongkeun Shin, L. Richard Carley, Kathleen M. Carley
International Conference on Cyber Warfare and Security (ICCWS) 2025

[C.6] Design, Modeling and Simulation of Cybercriminal Personality-based Cyberattack Campaigns
Jeongkeun Shin, Geoffrey B. Dobson, L. Richard Carley, Kathleen M. Carley
Winter Simualtion Conference (WSC) 2024

[C.5] Simulation-Based Study on False Alarms in Intrusion Detection Systems for Organizations Facing Dual Phishing and DoS Attacks
Jeongkeun Shin, L. Richard Carley, Kathleen M. Carley
Annual Modeling and Simulation Conference (ANNSIM) 2024
🏆 **Best Paper Runner Up Award**

[C.4] Integrating Human Factors into Agent-Based Simulation for Dynamic Phishing Susceptibility
Jeongkeun Shin, Kathleen M. Carley, L. Richard Carley
International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRiMS) 2023

[C.3] Beyond Accuracy: Cybersecurity Resilience Evaluation of Intrusion Detection System against DoS Attacks using Agent-based Simulation
Jeongkeun Shin, Geoffrey B. Dobson, L. Richard Carley, Kathleen M. Carley
Winter Simualtion Conference (WSC) 2023

[C.2] Modeling and Simulation of the Human Firewall against Phishing Attacks in Small and Medium-sized Businesses

Jeongkeun Shin, Geoffrey B. Dobson, L. Richard Carley, Kathleen M. Carley

Annual Modeling and Simulation Conference (ANNSIM) 2023

[C.1] OSIRIS: Organization Simulation in Response to Intrusion Strategies

Jeongkeun Shin, Geoffrey B. Dobson, Kathleen M. Carley, L. Richard Carley

International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRiMS) 2022

Publications - Posters

[P.4] A Machine Learning Surrogate Approach for Scalable Design Optimization in Cybersecurity Simulation

Siyuan Zhai, Jeongkeun Shin, L. Richard Carley, Kathleen M. Carley

International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRiMS) 2025 Poster Session - *Forthcoming*

[P.3] Impact of Operating System Updates on Cybercriminal Access Duration: A Simulation-Based Study

Jeongkeun Shin, Tanav Changal, L. Richard Carley, Kathleen M. Carley

Winter Simulation Conference (WSC) 2024 Poster Session

[P.2] Leveraging OSIRIS to Simulate Real-world Ransomware Attacks on Organization

Jeongkeun Shin, Geoffrey B. Dobson, L. Richard Carley, Kathleen M. Carley

Winter Simulation Conference (WSC) 2022 Poster Session

[P.1] Finding Integers from Group Orbits

Jake Shin, Yike Xu, Catherine Zhang, Xin Zhang, Junxian Li, Xin Zhang

Illinois Geometry Lab (IGL) Spring 2017 Open House

Publications - Technical Reports

[T.2] Attack Flow Network Models of MITRE ATT&CK Groups and Campaigns

Jeongkeun Shin, Siyuan Zhai, L. Richard Carley, Kathleen M. Carley

CASOS Technical Report (2025) - *Forthcoming*

[T.1] Revelation of System and Human Vulnerabilities Across MITRE ATT&CK Techniques with Insights from ChatGPT

Jeongkeun Shin, Geoffrey B. Dobson, L. Richard Carley, Kathleen M. Carley

CASOS Technical Report (2023)

Skills

Programming Languages: C, C++, C#, Java, Groovy, Python

Web Programming: HTML/CSS, JavaScript/jQuery, Node.js, React.js, TypeScript, Vue.js, PHP/MySQL

Simulation: NetLogo, Repast Simphony

Video Production: Davinci Resolve

Machine Learning: Weka, Pytorch

Game Development: Unity

Design: Adobe Photoshop, Google Sketchup, Blender

Academic Services

Mentoring

- **Han (Corince) Wang** (01/2025 - 06/2025)
  - Bachelor of Science (B.S.) in Information Systems @ Carnegie Mellon University

- **Tong (Adrianna) Fu** (01/2025 - 04/2025)
  - Bachelor of Science (B.S.) in Mathematical Sciences @ Carnegie Mellon University

- **Siyuan (Freya) Zhai** (10/2024 - 06/2025)
  - Bachelor of Science (B.S.) in Mathematical Sciences & Statistics @ Carnegie Mellon University

- **Tanav Changal** (06/2024 - 07/2024)
  - High School Student @ Troy High School
  - First Position: Bachelor of Science (B.S) in Mathematics @ University of California, Berkeley
- **Devashish Ubale** (05/2023 - 08/2024)
  - Master of Information Technology Strategy (MITS) @ Carnegie Mellon University
  - First Position: AI/ML Researcher @ FPrime AI
  - Current Position: Software Engineer @ Microsoft

Peer Review

- The Journal of Artificial Societies and Social Simulation (JASSS) [2024]
- Annual IDeaS Conference: Disinformation, Hate Speech, and Extremism Online [2024]
- International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction and Behavior Representation in Modeling and Simulation (SBP-BRiMS) [2024 · 2025]
- Winter Simulation Conference (WSC) Agent-Based Simulation Track [2024]

Guest Lecture

- CMU 17-821: Computational Modeling of Complex Socio-Technical Systems [Fall 2024]
  - Agent-based Modeling and Simulation (ABMS) for Cybersecurity with OSIRIS