

# Jeongkeun Shin

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## Education

<b>Carnegie Mellon University, School of Computer Science</b>	Pittsburgh, PA
Doctor of Philosophy (Ph.D.) in Societal Computing	Sep 2024 - Now
◦ Advised by Professor Kathleen M. Carley	
<b>Carnegie Mellon University, School of Computer Science</b>	Pittsburgh, PA
Master of Science (M.S.) in Societal Computing	Sep 2024 - May 2025
<b>Carnegie Mellon University, College of Engineering</b>	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)	
<b>Carnegie Mellon University, College of Engineering</b>	Pittsburgh, PA
Master of Science (M.S.) in Electrical and Computer Engineering	Jan 2020 - May 2021
◦ Advisor: Professor Marios Savvides	
<b>University of Michigan, College of Engineering</b>	Ann Arbor, MI
Bachelor of Science in Engineering (B.S.E.) in Computer Science, <i>Cum Laude</i>	Dec 2019
◦ Advisor: Professor Walter S. Lasecki	

## Research & Work Experience

<b>Graduate Research Assistant, CASOS Center</b>	Pittsburgh, PA
Advisor: Professor Kathleen M. Carley, Professor L. Richard Carley	Jan 2022 - Now
◦ 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.	
<b>Graduate Research Assistant, CyLab Biometrics Center</b>	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.	
<b>Graduate Research Assistant, Human and Robot Partners Lab</b>	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.	
<b>Undergraduate Research Assistant, Crowd and Machine Lab</b>	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

Advisor: Professor Xin Zhang

Champaign, IL

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

Engineering Department, 66th Infantry Division

Gapyeong, South Korea

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

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### [J.2] Simulating Trust Dynamics Model for Human-IDS Interaction under DoS Alerts

**Jeongkeun Shin**, L. Richard Carley, Kathleen M. Carley

*Under Review*

### [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)

## Publications - Conference Proceedings

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### [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

### [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 (ICWS) 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 Simulation 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 Simulation 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

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[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

[P.3] **Impact of Operating System Updates on Cybercriminal Access Duration: A Simulation-Based Study**  
**Jeongkeun Shin**, Tanav Changel, 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

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[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

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**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 Symphony

**Video Production:** Davinci Resolve

**Machine Learning:** Weka, Pytorch

**Game Development:** Unity

**Design:** Adobe Photoshop, Google Sketchup, Blender

## Academic Services

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### Mentoring

- **Han (Corince) Wang** (01/2025 - 06/2025)
  - Bachelor of Science (B.S.) in Information Systems @ Carnegie Mellon University
  - Co-authored [C.8]

- **Tong (Adrianna) Fu** (01/2025 - 04/2025)
  - Bachelor of Science (B.S.) in Mathematical Sciences @ Carnegie Mellon University
- **Siyuan (Freya) Zhai** (10/2024 - Now)
  - Bachelor of Science (B.S.) in Mathematical Sciences & Statistics @ Carnegie Mellon University
  - Co-authored [J.1][C.9][P.4][T.2]
- **Tanav Chngal** (06/2024 - 07/2024)
  - High School Student @ Troy High School
  - First Position: Bachelor of Science (B.S.) in Mathematics @ University of California, Berkeley
  - Co-authored [P.3]
- **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

- Computational and Mathematical Organization Theory [2025]
- The Journal of Artificial Societies and Social Simulation (JASSS) [2024 · 2025]
- 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