Anna Raymaker

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Research Summary

Ph.D. researcher working on empirical measurement and analysis of globally distributed systems. My work uses large-scale data collection, statistical analysis, and human-centered methods to study real-world behavior, reliability, and security of networked and AI-enabled infrastructure.

Research Interests

- Network and system security, with a focus on securing cyber-physical and safety-critical infrastructures across transportation and energy systems.
- Large-scale data analysis and network measurement for uncovering real-world cyber risks, including GPS spoofing, sensor manipulation, and exposure of distributed energy resources.
- Human-centered and operational technology security, integrating usability, operator workflows, and domain constraints into practical and deployable defenses.

Education

Ph.D. in Electrical and Computer Engineering — Fall 2022 - Present
Georgia Institute of Technology — Atlanta,GA
Cyber-Physical Systems Security Lab
Advisor: Professor Saman Zonouz

M.S. in Electrical and Computer Engineering — Spring 2025
Georgia Institute of Technology — Atlanta,GA

B. S. in Computer Engineering — Spring 2022
University of Florida — Gainesville, Florida

Honors & Awards

Spark Award Scholarship — November 2025
Awarded to Georgia Tech graduate students demonstrating outstanding leadership in advancing student engagement in energy research and broader service impact.

President's Fellowship — August 2022
Offered to the top 10% of the Georgia Institute of Technology's doctoral program applicants.

Commencement Speaker at the University of Florida [link] — Spring 2022
(52:00 - 57:00 approx.)

Presidential Service Award at the University of Florida — Spring 2022

National Merit Scholar — 2018

Benacquisto, Bright Futures, and Vicar's Landing Scholarships — 2018 - 2022

Publications

Raymaker, A., Kumar, A., Wong, M., Pickren, R., Chhotaray, A., Li, F., Zonouz, S., Beyah, R., "A Sea of Cyber Threats: Maritime Cybersecurity from the Perspective of Mariners," in *The ACM Conference on Computer and Communications Security (CCS)*, 2025

Raymaker, A., Von Brock, R., Pickren, R., Chhotaray, A., Li, F., Zonouz, S., Beyah, R., "She Spoofed Sea Ships by the Sea Shore: Characterizing GPS Anomalies in Global Maritime Positioning Data," *in submission*, 2025

Kumar, A., **Raymaker, A.**, Specter, M., "Security and Privacy Analysis of Tile's Location Tracking Protocol," *to appear at USENIX Security*, 2026

Pickren, R., **Raymaker, A.**, Chhotaray, A., Li, F., Zonouz, S., Beyah, R., "Mutiny!, Compromising Maritime Systems via Weaponized Situational Awareness Broadcast Messages," *in submission*, 2025

Ashebo, B., Asiamah, R., Talkington, S., **Raymaker, A.**, Chhotaray, A., Zonouz, S., Molzahn,

D., "Analyzing Cyber Resilience of Distribution Systems with High Penetrations of Inverter-Based Resources," *in submission*, 2025

Ryu, Z., Chung, S., Karim, M., **Raymaker, A.**, Jodha, K., Chaturvedi, Y., Mertoguno, S., "Beware EviLLM: Enabling Vulnerability Injection via Large Language Models," *in submission*, 2025

Relevant Coursework

Advanced Computer Security, Empirical Computer Security, Cybersecurity of Drones, Network Security, Advanced Malware Analysis, Linear Systems and Controls, Advanced Programming Techniques

Research Experience

Graduate Research Assistant - CPSec Lab Spring 2024 - Current
Georgia Institute of Technology Atlanta,GA

Energy and Critical Infrastructure Security (Department of Energy Funded)

• Developed scalable techniques for discovering exposed Distributed Energy Resources (DERs), particularly solar inverters, using Censys data collection, web scraping, and active scanning.

• Led a team of master's students to build a global pipeline that has already uncovered thousands of exposed inverters, with grid-impact simulations underway for Oahu, Hawaii to evaluate risks to real-world power systems.

Maritime and Transportation Cybersecurity

• Built a large-scale maritime data analysis tool to detect GPS spoofing by combining Kalman filtering, geodesic deviation checks, and spatial clustering across global, Internet-scale data; identified persistent spoofing zones worldwide (paper under submission).

• Led a user study identifying key cybersecurity gaps in mariner mental models and training (CCS 2025).

• Built a maritime cybersecurity testbed to evaluate cyber threats and defenses.

• Contributed to a research project on AIS-based malware propagation, assisting in the development and evaluation of situational message-based attack vectors (paper under submission).

• Reverse engineered NMEA 2000 messages over CAN bus to support analysis of vessel controller behavior.

Binary Analysis for Software Supply Chain Security (Department of Defense Funded)

• Applied machine learning models (e.g., Trex, GNNs) for binary similarity analysis to support automated Bill of Materials (BA-BOM) extraction in large-scale binaries.

Graduate Research Collaborator - D2I Lab Spring 2024
Georgia Institute of Technology Atlanta,GA

• Led a project on data preprocessing pipelines for large-scale ML analytics.

Graduate Research Collaborator - COEUS Fall 2023
Georgia Institute of Technology Atlanta,GA

• Helped develop efficient binary analysis tools, experimenting with regex and code lifters.

Graduate Research Assistant - CyFI Lab Fall 2022 - Fall 2023
Georgia Institute of Technology Atlanta,GA

• Studied web-based malware, focusing on botnet hijacking and remediation.

Undergaduate Research Assistant - ARC lab August 2021 - May 2022
University of Florida Gainesville, Florida

• Developed an FPGA-accelerated genetic programming tool in VHDL.

Undergaduate Research Assistant - FICS lab June 2020 - Feb 2022
University of Florida Gainesville, Florida

• Conducted fault injection attacks on FPGAs to assess FSM vulnerabilities.

Undergaduate Research Assistant - SWAMP lab August 2019 - 2020
University of Florida Gainesville, Florida
• Analyzed SiGe diffusion using TCAD modeling.

Teaching

Head Graduate Teaching Assistant, Georgia Institute of Technology
ECE 3030: Physical Foundations of Computer Engineering Spring 2024

Graduate Teaching Assistant, Georgia Institute of Technology
ECE 6100: Advanced Computer Architecture Fall 2023

Undergraduate Teaching Assistant, University of Florida
EEL 4712: Digital Design Fall 2021 - Spring 2022
EEL 4744: Microprocessor Applications Fall 2021
EEL 3701C: Digital Logic and Computer Systems Spring - Summer 2021

Invited Talks

Cyber Security Agency of Singapore Talk (Atlanta, GA) Nov 2025
Will demonstrate the maritime cybersecurity testbed and present research findings to government officials at the Cyber Security Agency of Singapore.

SecurityWeek ICS Cybersecurity Conference (Atlanta, GA) Oct 2025
From Ship to Shore: Real-World Threats and Zero-Day Attacks in Maritime Operational Technology
icscybersecurityconference.com

ACM CCS 2025 Conference Presentation (Taipei, Taiwan) Oct 2025
A Sea of Cyber Threats: Maritime Cybersecurity from the Perspective of Mariners

Guest Lecture for Critical Infrastructure Security class (Atlanta, GA) Oct 2025
Presented research on maritime cybersecurity to a class of graduate and undergraduate students at Georgia Tech

Fireside Chat with Dmitri Alperovitch (Atlanta, Georgia) Sept 2025
As President of the GSA for the School of Cybersecurity and Privacy (SCP), I hosted distinguished alumnus Dmitri Alperovitch (co-founder of CrowdStrike) for a fireside chat with Georgia Tech graduate students, discussing his career and insights on cybersecurity.

Georgia Institute of Technology - CPSec Lab Testbed Tour Aug 2025
Demonstrated the maritime cybersecurity testbed and research to faculty members, the School of Cybersecurity and Privacy (SCP) Chair, and distinguished visitors including John Tien (former Deputy Secretary of DHS) and Ann Dunkin (former CIO, U.S. Department of Energy).

TEDxGeorgiaTech Talk Mar 2025
The Invisible War: Protecting Our Future from Cyber Threats
tedxgeorgiatech.com/conference2025

Professional Experience

FPGA Electrical Engineering Intern May 2021 - August 2021
L3Harris Melbourne, Florida
• Developed SpaceVPX test card in Vivado SPI IP.
• Defined FPGA requirements & collaborated with a multi-specialty engineering team.

Service

External Reviewer
Conference on Computer and Communications Security (CCS) 2023
European Symposium on Research in Computer Security (ESORICS) 2023
IEEE S&P Workshop on Language-Theoretic Security (LangSec) 2023
IEEE International Conference on Trust, Privacy and Security (TPS) 2022

Extra-Curricular Activities

President of SCP Graduate Student Association (GSA) May 2025 - Present
Georgia Institute of Technology Atlanta, Georgia
• Lead the executive board and oversee all GSA initiatives across the SCP.
• Plan and organize inter-college and campus-wide engagement events for the COC.
• Serve as the sole student representative on the SCP Chair Search Committee, ensuring graduate student perspectives are included in the hiring process.

Student and Faculty Affairs Chair for SCP GSA May 2024 - April 2025
Georgia Institute of Technology Atlanta, Georgia
• Organized faculty-student engagement events.
• Advocated for a graduate student ombudsperson and mental health resources.

Presencia Volunteer May 2024 - August 2024
Presencia Atlanta, Georgia
• Assisted immigrant youth in nutrition & fitness programs.

Engineering Ambassador January 2021 - May 2022
University of Florida Gainesville, Florida
• Gave tours for the college and acted as a student engineering leader.

IEEE HKN August 2020 - May 2022
University of Florida Gainesville, Florida
• Held exam reviews and tutored students in the ECE department.

Alpha Phi Omega August 2018 - May 2022
University of Florida Gainesville, Florida
• Volunteered for over 1,000 hours at various local organizations (e.g., the Humane Society, Salvation Army, UF student gardens, CADE Museum for Science and Creativity, local nursing homes).