Mrinaal Ramachandran

MS in Computer Science - UMass Amherst

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Profile

Graduate student in Computer Science interested in projects that combine technical skills with social impact. I'm specifically passionate about security, applied AI, and developing technology to detect and prevent online abuse. I'm currently working on CaseLinker and researching online child exploitation, and I hope to continue building tools that help make the digital world safe for everyone.

Education

University of Massachusetts Amherst — M.S. in Computer Science (Expected 2027)

- **Security Concentration :** Adv Computer Network Security, Internet Law, Digital Forensics, Machine Learning, Mobile and Wireless Networks

Arizona State University — B.S. in Computer Science (2022–2025)

- Relevant Coursework: Operating Systems, Distributed Software Development, Computer Architecture, Information Assurance, Computer Network Security, Data Structures and Algorithms, Artificial Intelligence, Natural Language Processing

Experience

Android Security Intern – DriverAI (Startup)
Remote | June 2025 – Aug 2025

- Developed secure authentication workflows using SQLCipher, Play Integrity API, and Credential Manager for Android MVP app.
- Designed AES encryption layer for Room database and implemented encrypted data handling to secure sensitive user input.
- Implemented backend authentication flows including JWT-based token verification and integration with managed identity providers Firebase Auth and AWS Cognito.
- Conducted root detection and SELinux status checks across multiple device profiles, including emulator bypass techniques.
- Collaborated directly with startup CTO to define milestones, propose deliverables, and outline future security tasks.

Undergraduate Research Assistant – PERSUE Labs, ASU
Tempe, AZ | Feb 2024 – May 2025

- Collaborated alongside Professor Hasan to investigate the intricacies of Zoom mini-apps, focusing on data access and security implications.
- Co-authored a research paper submitted to **PETS 2025 (Privacy Enhancing Technologies Symposium)** titled - *Who's Watching You Zoom? Investigating Privacy of Third-Party Zoom Apps* - conducted as part of a year-long longitudinal study analyzing 97,000+ snapshots of Zoom Marketplace apps.
- Developed a proprietary Zoom app, gaining hands-on experience with the Zoom SDK development process and data access / manipulation capabilities
- Conducted privacy and security analysis of Zoom Marketplace apps by reverse-engineering API interactions, auditing OAuth scopes, and Wireshark analysis
- Actively participated in weekly research meetings and paper discussions, developing both technical insights and professional communication skills in a collaborative lab environment.

Projects

Ultra-Wideband (UWB) Data Communication Capstone Project

CSE 485/486 - Computer Science Capstone Project, ***General Dynamics Mission Systems (GDMS)***

- Worked alongside fellow seniors and GDMS engineers to complete a two semester capstone project
- Designed and implemented Ultra-Wideband (UWB) communication boards for data transmission, focusing on modular and scalable code to support bidirectional communication between devices
- Conducted in-depth feasibility and hardware testing to validate UWB technology for data transmission, including signal strength, latency, and reliability.
- Collaborated directly with General Dynamics Mission Systems (GDMS) and utilized Agile methodologies to manage sprints, adapt to evolving project scope, and deliver iterative progress

CaseLinker — Independent Research Project

Tool designed to aid ***visualization*** *and* ***cross-case analysis*** *of Internet* ***Crimes Against Children cases***

- Architected 5-layer modular system (ingestion, processing, storage, clustering, visualization) to handle unstructured data sources and analyze case data
- Implemented feature extraction from cases including victim and perpetrator context, demographics, technology platforms, enforcement organizations, and prosecutorial outcomes
- Built interactive web visualization layer with D3.js for timeline analysis, pattern detection, and cross-case relationship analysis
- Processed 95 real-world cases from public ICAC / NCMEC reports (AZICAC and CyberTipline annual report), demonstrating structured extraction and clustering of case material for analysis and policy advocacy
- Published open-source with comprehensive documentation and modern tech stack including Python, FastAPI, D3.js, SQLite
- **Technical Report : CaseLinker: An Open-Source System for Cross-Case Analysis of Internet Crimes Against Children Reports**

Publications

Goenka, S., Prabhu, A., Sakurai, P., **Ramachandran, M.**, & Hasan, R. (2025). *Who's Watching You Zoom? Investigating Privacy of Third-Party Zoom Apps.* Accepted to **PETS 2025 (Privacy Enhancing Technologies Symposium)**

Past Extracurriculars, Leadership, and Achievements

2017 - 2022 | FIRST Tech Challenge - Captain of HS Robotics Team - Tacobots

- Applied creative problem-solving, learned engineering principles, performed outreach.
- Developed software using FTC SDK on Android platform using Java.
- We went to World's twice, once in St. Louis and once in Houston!

2017 - 2019 | FIRST (For Inspiration and Recognition of Science and Technology) - *Volunteer*

- Over 100 hours per year in volunteering.
- Organized local and regional level competitions by recruiting volunteers.
- Master of Ceremonies for several events.

2021 - **Eagle Scout**, Boy Scouts of America

Additional Information

- Fluent in Python and C, versed in Java, C/C++ and efficient with collaboration tools
- Avid MMA (Mixed Martial Arts) fan, training no-gi jiu jitsu, wrestling, Muay Thai, and Taekwondo
- US Citizen (No work authorization is required)