

Mrinaal Ramachandran

M.S. Computer Science, University of Massachusetts Amherst

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PROFILE

My main professional focus is computational criminology: using formal modeling and computational methods to understand technology-facilitated exploitation, and translating research into intelligence and tools for prevention and disruption. I'm currently a Strategic Research Fellow at Project VIC International, where I'm conducting research into the mechanics of technology-mediated exploitation and contributing to the CASE/UCO and Crimes Against Children Ontology open-source infrastructure.

EDUCATION

University of Massachusetts Amherst

Expected 2027

M.S. in Computer Science

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

Arizona State University

2022 – 2025

B.S. in Computer Science

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

RESEARCH EXPERIENCE

CaseLinker: Open-Source Research Platform

Oct 2025 – Present

Independent Researcher, building a tool for visualization and cross-case analysis of Internet Crimes Against Children (ICAC) cases

- Architected a 5-layer modular system (ingestion, processing, storage, clustering, visualization) to handle unstructured case data at scale
- Built a corpus of **10,282 case reports** spanning **125,891 extracted features** and **4,137 law enforcement agencies** across 56 public ICAC sources (ICAC Task Forces, DOJ, NCMEC, and state AG offices), compiled entirely from public records under UMass HRPO NHRD Determination #7668
- Implemented deterministic feature extraction covering victim and perpetrator context, demographics, technology platforms, enforcement organizations, and prosecutorial outcomes
- Mapped the case corpus onto a semantic knowledge graph aligned to the CAC Ontology and CASE/UCO standard, with SPARQL and natural-language search across cases
- Built a 37-tool MCP server enabling structured, LLM-based query and graph construction over the case corpus
- Published open-source with full documentation on a Python, FastAPI, D3.js, and PostgreSQL stack, with a live deployment at caselinker.up.railway.app
- **Technical Reports:** [CaseLinker: An Open-Source System for Cross-Case Analysis of ICAC Reports](#) · [Interpretable ML Approaches for Analyzing ICAC Reports](#) · [Painting the Landscape of Internet Crimes Against Children with Interpretive Tooling](#)

Project VIC International

Sept 2026 – Present

Strategic Research Fellow (Research Collaborator, Jun – Aug 2026)

- Contributing extensions to the CAC Ontology, Project VIC's Crimes Against Children domain ontology, including state-machine classes for ICAC exploitation-lifecycle modeling: the AffordanceMisuse class ([PR #33](#), merged) and the ConditioningPhase macro-phase with a 9-value controlled vocabulary ([PR #39](#), merged)
- Authored a trajectories extension to the CASE-UCO-SDK enabling exploitation-pathway modeling within the CASE/UCO cyber-investigation standard ([PR #135](#), in review)
- Informed ontology modeling refinements in the CASE/UCO SDK by sharing CaseLinker's SPARQL endpoint and underlying public source records, with the resulting corpus adopted into Project VIC's production knowledge graphs
- Conducted Project VIC-supported collection and analysis of 30 primary-source federal court records (PACER), including indictments, Statements of Offense, and sentencing memoranda, to construct the exploitation state machines underlying the *Affordances for Harm* publication
- Nominated by Cory Hall to the Cyber Domain Ontology Technical Steering Committee for ontology contributions

PERSUE Labs, Arizona State University

Feb 2024 – May 2025

Undergraduate Research Assistant, Tempe, AZ

- Investigated data access and security implications of Zoom mini-apps under Professor Hasan

- Co-authored *Who's Watching You Zoom? Investigating Privacy of Third-Party Zoom Apps*, published at PETS 2025, from a year-long longitudinal study analyzing 97,000+ snapshots of Zoom Marketplace apps
- Built a proprietary Zoom app using the Zoom SDK to study data access and manipulation capabilities firsthand
- Performed privacy and security analysis of Zoom Marketplace apps via API reverse-engineering, OAuth scope auditing, and Wireshark analysis

PUBLICATIONS

- **Ramachandran, M.** (2026). *Affordances for Harm: How Offenders Misuse Platform Capabilities to Exploit Children, and Where to Intervene*. Preprint. Zenodo. doi.org/10.5281/zenodo.21347781.
- **Ramachandran, M.** (2026). *Caselinker: An Open-Source System for Cross-Case Analysis of Internet Crimes Against Children Reports*. [arXiv:2603.18020](https://arxiv.org/abs/2603.18020); Zenodo: doi.org/10.5281/zenodo.18744216
- Goenka, S., Prabhu, A., Sakurai, P., **Ramachandran, M.**, & Hasan, R. (2025). *Who's Watching You Zoom? Investigating Privacy of Third-Party Zoom Apps*. *Proceedings on Privacy Enhancing Technologies*, 2025(4), 530–548. doi.org/10.56553/popets-2025-0143

TECHNICAL EXPERIENCE

DriverAI (Startup)

Jun – Aug 2025

Android Security Intern, Remote

- Developed secure authentication workflows using SQLCipher, Play Integrity API, and Credential Manager for an Android MVP app
- Designed an AES encryption layer for the Room database and implemented encrypted handling of sensitive user input
- Implemented backend authentication flows including JWT-based token verification, integrated with Firebase Auth and AWS Cognito
- Conducted root detection and SELinux status checks across device profiles, including emulator bypass techniques
- Collaborated directly with the startup's CTO to define milestones and scope future security work

Ultra-Wideband (UWB) Data Communication Capstone

General Dynamics Mission Systems (GDMS)

CSE 485/486, Computer Science Capstone Project, Arizona State University

- Designed and implemented UWB communication boards for bidirectional data transmission with modular, scalable code
- Conducted feasibility and hardware testing (signal strength, latency, reliability) to validate UWB for data transmission
- Collaborated with GDMS engineers using Agile methodology across a two-semester sprint cycle

LEADERSHIP & ACHIEVEMENTS

FIRST Tech Challenge, Captain, Tacobots

2017 – 2022

- Led the team through two FIRST World Championship qualifications (St. Louis and Houston), winning awards at both
- Developed FTC SDK software on the Android platform in Java; applied engineering design process and led team outreach

FIRST, Volunteer

2017 – 2019

- Organized local and regional competitions and recruited volunteers, contributing 100+ hours per year
- Served as Master of Ceremonies for multiple competition events

[Eagle Scout, Boy Scouts of America](#) (2021)

ADDITIONAL INFORMATION

- Fluent in Python and C; proficient in Java and C/C++
- Avid MMA fan, trains no-gi jiu-jitsu, wrestling, Muay Thai, and Taekwondo
- U.S. Citizen, no work authorization required