Chidera "Chi" Biringa

(508) 863-7923 | biringachidera@gmail.com | biringachi.github.io/lines/ | biringaChi

Education

University of Massachusetts Dartmouth — MA, US

College of Engineering (ABET Accredited) — Ph.D. in Computer Science — September 2021 - May 2025 (Expected)

- **Research Interest:** The overarching theme of my doctoral research is to reduce attack surfaces vulnerable to adversarial exploits by preventing the accidental or intentional introduction of vulnerabilities in the design and development phases of the SDLC.
- **Active Research Projects:** Developing **Security-in-the-Middle (SiTM)**, a vulnerability state integrated into Git and tasked with sandboxing hard-coded credentials in transit to GitHub, and **TRACE: Transforming Encrypted Data for Detecting Secrets**. TRACE transforms unintelligible ciphertext to contextual embeddings, consequently improving the predictive accuracy of machine learning classifiers.

University of Massachusetts Dartmouth — MA, US

College of Engineering (ABET Accredited) — M.S. in Computer Science — September 2019 - May 2021

- Graduate Research Award Recipient

Bells University of Technology — Ota, Nigeria

College of Natural and Applied Sciences — B.Tech. in Computer Science — November 2013 - May 2017

Professional Experience

College of Engineering - University of Massachusetts Dartmouth — September 2020 - Present

Graduate Research Assistant

- Developing **SiTM:** Security-in-the-Middle and **TRACE:** Transforming Encrypted Data for Detecting Secrets.
- Developed **SARA:** Exposing Mediocre Performance Code, **SPECDET:** Detecting Spectre Vulnerabilities and Attacks, **SEAL:** Secure Design Pattern Approach Toward Tackling Lateral-Injection Attacks, and **BEWARE:** BERT-Assisted Detection of Secrets in GitHub Repositories.

NSA/DHS Cybersecurity Center - University of Massachusetts Dartmouth — May 2020 - September 2021

Doctoral Student Fellow

- Conducted research on program analysis for vulnerability detection with Dr. Gokhan Kul and Dr. Lance Fiondella.
- Mentored 3 students participating in the NSF-Undergraduate Research program from the University of Massachusetts Dartmouth, University of Maryland College Park, and Arizona State University in Backdoor Attack Detection and User Experience Testing Research.

Peer-Reviewed Publications

- **Chidera Biringa**, Gokhan Kul. 2021. "Automated User Experience Testing through Multi-Dimensional Performance Impact Analysis" ACM/IEEE 2nd International Conference on Automation of Software Test co-located with the International Conference on Software Engineering (ICSE'21).
- Gokhan Kul, **Chidera Biringa**. 2022. "Forensics in Cyber-Physical Systems (CPS)" Springer Cyber Forensics for Cyber-Physical Systems.
- **Chidera Biringa**, Gaspard Baye and Gokhan Kul. 2022. "Static and Microarchitectural ML-Based Approaches For Detecting Spectre Vulnerabilities and Attacks" Hardware and Architectural Support for Security and Privacy (HASP'22), in conjunction with the 55th IEEE/ACM International Symposium on Microarchitecture (MICRO'22).
- **Chidera Biringa** and Gokhan Kul. 2022. "A Secure Design Pattern Approach Toward Tackling Lateral-Injection Attacks" The 15th IEEE International Conference on Security of Information and Networks (SIN).
- **Chidera Biringa** and Gokhan Kul. 2022. "BERT-Assisted Detection of Secrets in GitHub Repositories" The Security Track at the ACM Symposium on Applied Computing (SAC) — **Under Review — Notification of Acceptance: 11/19/2022.**
- **Chidera Biringa** and Gokhan Kul. 2022. "Exposing Mediocre Performance Code" The 16th IEEE International Conference on Software Testing, Verification and Validation (ICST) — **Under Review — Notification of Acceptance: 12/16/2022.**

Technical Skill

Research: Software Security, Vulnerability Detection, Artificial Intelligence, Natural Language Processing & Machine Learning

Programming Languages: C/C++/C#, Java, Python, R, SQL, MATLAB, HTML/CSS & JavaScript.

Selected Projects

- **Intelligent Fuzzing using Deep-Reinforcement Learning** (September 2021 - Present): Developing a Markov Decision Process-enabled Actor-Critic (AC) Reinforcement learning (RL) multi-agent to identify bugs via mutation and software coverage. Agents create a policy to maximize cumulative rewards by generating quality mutation samples and causing rapid crashes.
- **Predictive Frame Inference** (April - May 2020): Developed a generative adversarial neural network (GAN) model that interpolates in-between frames of a given video, thus increasing the frame rate. A high-definition 25 FPS video was increased to 50 FPS without loss in resolution, reduced video length, or noticeable distortion.
- **SQL Engine** (February - April 2020): Developed a SQL query evaluator. Implemented SELECT, PROJECT, JOIN, UNION, and AGGREGATE statements. Built standard optimization techniques like projection push-down, selection push-down, and cross-product to join the conversion.
- **Authorship Attribution** (November 2019): Developed classifiers to detect Victorian Era Authors using sentiment features of authored novels.
- **Customer Response Chatbot** (December 2019): Developed a customer response chatbot to classify responses to customer inquiries.

Services

- Very Large Data Base (VLDB) Reproducibility Reviewer. 2021.
- Startup Weekend UMassD Technical Mentor. 2021 & 2022.