Chidera Biringa

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Education

University of Massachusetts Dartmouth — MA, US

College of Engineering, ABET Accredited

Ph.D. in Engineering and Applied Science (Computer Science and Information Systems) — September 2021 - Present

- Courses Taken: Advanced Engineering Mathematics, Artificial Intelligence, and Advanced Computer Systems
- Research Interest: Secure Software Design, Performance and Side-channel Attacks

University of Massachusetts Dartmouth — MA, US

College of Engineering, ABET Accredited

M.S. (Master of Science) in Computer and Information Science (Honors) — September 2019 - May 2021

- Courses Taken: Algorithms and Complexity, Advanced Data Mining, Advanced Machine Learning, Database Design
- Award: CIS Graduate Research Award Recipient

Bells University of Technology — Ota, Nigeria

College of Natural and Applied Sciences

B.Tech. (Bachelor of Technology) in Computer Science and Information Technology (Honors) — November 2013 - May 2017

Professional Experience

College of Engineering - UMass Dartmouth — September 2021 - Present

Graduate Research Assistant

- Currently performing research on secure software design
- Currently performing research on fuzzing using reinforcement learning
- Performed research on security exploits that originate from vulnerability in speculative execution inherent in modern-day microprocessors

NSA/DHS Center of Academic Excellence in Cyber Defense Research (CAE-R) — May - September 2021

Graduate Student Research Fellow and Mentor

- Conducted research on secure software design and performance with Dr. Gokhan Kul
- Mentored two undergraduate students towards the completion of their Research Experience for Undergraduates (REU) program

CIS Dept. - UMass Dartmouth — September 2020 - May 2021

Graduate Research Assistant

- Research assistant for Dr. Gokhan Kul (Interest: Cybersecurity and Database Systems)
- Developed an Automated User Experience Testing System methodology through multi-dimensional performance impact analysis

NSA/DHS Center of Academic Excellence in Cyber Defense - UMass Dartmouth — September 2020 - Present

Graduate Fellow

- Fellow at the NSA/DHS Center of Academic Excellence in Cyber Defense at the UMass Dartmouth

CIS Dept. - UMass Dartmouth — September - December 2019

Graduate Student Grader

- Former grader for the undergraduate course: *Software Process and Project Management*
- Graded assignments, projects, and exams

CIS Dept. - UMass Dartmouth — August 2019

iOS Camp Instructor

- Worked as an instructor at the UMass Dartmouth iOS Mobile App Development Camp under the supervision of Dr. Raymond N. Laoulache
- The team taught campers programming, problem-solving and iOS mobile app development using the Swift 5 programming language

Amuwo-Odofin Secondary School — Port Harcourt, Nigeria

Information Technology Teacher - NYSC — May 2017 - April 2018

- Worked as an Information Technology teacher at Amuwo-Odofin IT Department
- Taught Information Technology to 9th-grade students

Nigerian National Petroleum Corporation — Port Harcourt, Nigeria

Software Engineering Intern — May - August 2015

- Worked as a software engineer at the NNPC/PPMC ETSD Department
- Developed webpages for the engineering section of the company
- Updated the software of over 100 desktop computers and laptops in the refinery

Publication

Papers

- Chidera Biringa, Gokhan Kul. 2021. Automated User Experience Testing through Multi-Dimensional Performance Impact Analysis. *In Proceedings of the ACM/IEEE 2nd International Conference on Automation of Software Test*
- Chidera Biringa, Baye Gaspard, and Gokhan Kul. 2022. SpecDet: A Two-factor Spectre Attack Detection System using Code Vulnerabilities and CPU Processes State. *USENIX Security 2022 – Under Review*
- *Under Review* – Chidera Biringa, Gokhan Kul. 2022. A Source Code Evaluation Framework for Automated Quality of Experience Testing. *IEEE Transactions on Software Engineering – Under Review*

Technical Skill

Programming Languages	C, C++, Java, Python, R, SQL, HTML/CSS, JavaScript
Databases	MySQL, NoSQL
Libraries, Packages	Pytorch, Scikit-Learn, Caret, OpenCV, Pandas, Bootstrap, Quanteda, Tidyverse, Git
Software	GitHub, VSCode, MS Office, LaTeX, Power Bi, Tableau, Godot, Travis CI
Programming Paradigms and others:	OOP, FP, PP, IP, Agile Development, MVC, UML, Unit Testing, Integration Testing

Technical Experience

SpecDet | A Two-factor Spectre Attack Detection System

September 2021 - Present

- Developed a bipartite detection system that employs both CPU processes state and Spectre-V1 gadgets to detect spectre attacks
- Built a neural embeddings-based CNN and SVM architecture to predict *Spectre* vulnerabilities with a 0.99 F1-score
- Investigated security exploits that originate from speculative execution component of modern processors

iFuzz | Intelligent Fuzzing using Deep-Reinforcement Learning

September 2021 - Present

- Utilized Markov Decision Process (MDP) to deploy a multi-agent Actor-Critic (AC) Reinforcement learning (RL) technique to identify bugs via mutation and software coverage
- The agents developed a policy that maximizes the cumulative rewards by generating quality mutation samples and causing rapid crashes

SEF | Source Code Evaluation Framework

August 2021 - September 2021

- Developed a source-code based evaluation framework for software performance learning
- SEF provides a zero upfront effort performance estimation method and presents the evaluation of the automated QoE testing method

Master's Thesis | Multi-Dimensional Performance Impact Analysis of Security Updates in Software Development Lifecycle

September 2020 - March 2021

- Developed a novel automated user experience testing methodology
- Built a pipeline of regression models capable of learning how code changes impact the test time unit of a software
- Created a robust code stylometry feature set using layout, lexical and syntactic features
- Created a benchmark dataset to enable experiments in software engineering research

Neural Network Model | Predictive Frame Inference (PIF) Model

April - May 2020

- Built an encoder-decoder convolutional neural network that can interpolate 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 length of the video, or noticeable distortions

Database System | SQL Query Evaluator

February - April 2020

- Built an SQL query evaluator for a single-threaded database that can run TPC-H queries
- Implemented support for Select, Project, Cross Product, Union, and Aggregate operations
- Implemented standard optimization techniques like projection pushdown, selection pushdown & cross product to join conversion

Classification Model | Authorship Attribution

November - December 2019

- Built a random forest classification model that predicts Victorian Era Authors based on their authored novels
- Sentiment features were extracted and used as features in the model

References

Dr. Lance Fiondella. lfiondella@umassd.edu. 508-999-8596

Director, Cybersecurity Center, A NSA/DHS designated Center of Academic Excellence in Cyber Defense Research (CAE-R). University of Massachusetts Dartmouth

Dr. Gokhan Kul. gkul@umassdedu. 508-910-6484

Assistant Professor and Ph.D Supervisor. University of Massachusetts Dartmouth