ZACKARY CROSLEY

MICHIGAN | MAIL@CROSLEYZACK.COM | 925.550.6184 | CROSLEYZACK.COM

EDUCATION

OPERATIONS RESEARCH MILITARY APPLICATIONS COURSE

Certificate · Army Logistics University · Honor Graduate · Dec 2020

MASTER'S OF SCIENCE

Computer Science · Arizona State University · GPA 3.80 · Aug 2019

BACHELOR'S OF SCIENCE

Computer Science · Arizona State University · GPA 3.76 (Magna Cum Laude) · Dec 2017

EXPERIENCE

OPERATIONS RESEARCH ANALYST GS-12

The Research and Analysis Center · Army Futures Command · May 2017 – Present

- Served as developer on a Combined Arms Analysis Tool for the 21st Century (COMBATXXI), a stochastic (Monte Carlo), high resolution, closed-form, discrete event combat simulation.
- Developed a navigation suite in Python to aid in rapid implementation of maneuver behaviors. Library estimated to save hundreds of man hours of scenario development per scenario.
  - Created a graph data structure loaded from terrain, storing contextual data (trafficability, node or edge type) for nodes and edges to facilitate intelligent searching and knowledge representation.
  - Optimized graph via functional programming approach with memoization and lazy evaluation.
  - Implemented search methods (A*, Djikstra, Ant Colony Optimization) and heuristics.
  - Designed path manipulation algorithms to produce unit maneuver order stacks.
- Developed Python script to produce scenario alternatives for Analysis of Alternatives study from a matrix defining alternative attributes. Script estimated to save hundreds of man hours per scenario.
- Developed Utility AI framework in Java to enable user-defined utility measures, considerations (state variables), normalizations, aggregation (combining considerations), and selection methods.
  - Performed literature review of Utility AI publications on applications to combat modeling.
  - Implemented autonomous behaviors using utility framework, such as engagement decisions.
- Developed Python script to parse wargaming tool output and generate scenario behaviors. Script uses maneuver defined in planning meetings to create scenario maneuver, rather than copying manually.
- Developed Java terrain reasoning methodology as sequential discrete sampling and utility evaluation.
  - Utilized Terrain Reasoning to develop advanced behaviors, such as an automated tank defilade.
- Led efforts to develop high-fidelity Directed Energy Weapon COMBATXXI representation. Coordinated with external agencies and shareholders to define modeling requirements and approach.
  - Worked with data vendor to define data requirements and data table schema. Identified additional data required for representation in a high fidelity model and communicated needs to vendor.
- Led model development for an analysis alternative study. Identified required model enhancements and model behaviors and coordinated with integration team on scenario implementation.
- Developed script to identify and delete instances of Log4j on server for mitigation of CVE-2021-44228.
- Attended Operations Research Military Appications Course teaching Operations Research techniques and tools. Course instruction included regression analysis, probability, statistical inferencing, design of experiments, mathematical programming, data cleaning, data visualization, and data analysis.
  - Received honor graduate recognition for exceptional performance as one of the top five students.

STUDENT RESEARCHER

Security Engineering for Future Computing Lab · Arizona State University · Jul 2017 – Aug 2019

- Worked with Professor Adam Doupé applying inductive programming to software security.
- Worked with members of SEFCOM lab to generalize inductive programming technique presented in paper by Sumit Gulwani (Microsoft). Methodology uses Directed Acyclic Graph intersection to isolate operations that could result in individual characters of output.
- Created novel technique of synthesizing exploits from samples in Capture the Flag (CTF) scenarios.
- Application sniffed network traffic using Scapy and categorized exploits, learned logic of exploit scripts from traffic using inductive programming, and attacked players with synthesized exploit.
- Developed Docker test suite to validate and demonstrate successful replication of exploit script logic.
- Documented research in thesis and presentation at Arizona State University. Research is ongoing and pending publication.

COMPUTER SCIENCE INTERN

High Performance Computing Directorate · Patuxent River Naval Air Station · Jun 2015 – Aug 2016

- Worked at High Performance Computing division on project using machine learning to evaluate existing aircraft Tactics, Techniques, and Procedures (TTPs) and identify superior TTPs.
- Implemented and tested evolutionary algorithms for learning TTPs. Validated algorithm results with Subject Matter Experts on real-world scenarios with modern aircraft data.
- Worked with team to perform IT and maintenance on Windows High Performance Computer (HPC).
- Performed system updates, replaced faulty HPC components, and developed remote job submission program in Microsoft Powershell.
- Job submission program tracked job by user, allowing for scheduling of tests by user-allotted time.

PUBLICATIONS

AUTOMATED REFLECTION OF CTF HOSTILE EXPLOITS (ARCHES)

Master's Thesis · Arizona State Univeristy · 2019

MINING ASSOCIATIONS IN LARGE GRAPHS FOR DYNAMICALLY INCREMENTED MARKED NODES

International Conference on Machine Learning and Data Mining in Pattern Recognition · 2018

PROFICIENCIES

Python	Clojure	Neo4j	Scipy	Scapy
Java	Julia	Pandas	BeautifulSoup	Linux
C++	SQL	Numpy	Matplotlib	Bash

HONORS AND ACTIVITIES

Operations Research Military Applications Course Honor Graduate · 2020
Science Mathematics and Research for Transformation Scholarship · 2016 · 2018
ASU Hacking Club Member · 2018 – 2019
FIRST Robotics Team Mentor · 2017 – 2019

crosleyzack crosleyzack