ZACKARY CROSLEY

NEW MEXICO | _@CROSLEYZACK.COM | 925.550.6184 | CROSLEYZACK.COM

EDUCATION

MASTER'S OF SCIENCE

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

BACHELOR'S OF SCIENCE

Computer Science · Arizona State University · GPA 3.69 (Magna Cum Laude) · Dec 2017

EXPERIENCE

OPERATIONS RESEARCH ANALYST GS-12

The Research and Analysis Center · Army Futures Command · May 2018 – 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. Created a navigation suite in Python to aid in rapid implementation of maneuver behaviors. Navigation suite was a graph data structure loaded from terrain, including user defined routes, terrain embedded roads, and buildings. Graph data structure stored dictionary on nodes and edges to facilitate intelligent searching and knowledge management. Operations on graph data structure implemented using functional programming approach, utilizing memoization and lazy evaluation for efficiency. Implemented multiple search methods (A*, Djikstra, Ant Colony Optimization) and heuristics to perform graph searches. Path manipulation algorithms developed to create bounding maneuver order stack from path. Developed framework for Utility AI based on publications by Kevin Dill. Framework enabled the definition of utility considerations (model state variables) for use in calculations. Users defined utility measure (single or dual utility), normalization method for each consideration, aggregation methodology for combining considerations into single value, and selection method for choosing action from utility measures (absolute, relative). Utility was used to develop numerous autonomous behaviors, particularly engagement decisions. Utility was also used as a methodology for implementing terrain reasoning. Terrain reasoning developed as a sequence of sampling terrain and evaluating locations based on utility. Environment querying was used to create UAS swarm behaviors and automated tank defilade. Lead developer on implementing directed energy weapons in combat model. Led definition of approach and worked with analysts to determine feasible, high-fidelity implementation. Served as lead developer for analysis of alternative study, responsible for developing model changes required for the study measurement space.

STUDENT RESEARCHER

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

Worked with Professor Adam Doupé on research applying inductive programming to software security. Worked with members of the SEFCOM lab to generalize inductive programming techniques for learning variety of problems. Applied inductive programming library to recreate software logic without source code access. 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. Utility sniffed network traffic using Scapy and split by port, learning logic of exploit script off incoming traffic by source. Utility attacks players in CTF using learned exploits. Utility components are docker instances for modularity. Developed Docker test suite to validate methodology via successful replication of exploit script logic. Documented research in thesis and presentation at ASU. Research ongoing and pending publication.

COMPUTER SCIENCE INTERN

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

Worked at High Performance Computing division on project using machine learning to evaluate aircraft Tactics, Techniques, and Procedures (TTPs). Team worked with Subject Matter Experts (SME) to

evaluate effectiveness of existing TTPs and identify superior TTPs. Implemented and tested evolutionary algorithms including Tabu Search in C++. Validated algorithm results with SME on real-world scenarios with modern aircraft data. Worked with team to perform IT and maintenance work on Windows High Performance Computer. Performed system updates, replaced faulty HPC components, and developed remote job submission program via Microsoft Powershell. Job submission program tracked job by user, allowing for scheduling of tests by user-allotted time.

OPERATIONS RESEARCH MILITARY APPLICATIONS COURSE

US Army Logistics University · Aug 2020 – Dec 2021

Course taught advanced Operations Research techniques and tools. Learned analytical and mathematical methods to quantify alternative courses of action, identify issues, and draw study conclusions. Methods covered included cost modeling, regression analysis, and statistical inferencing. Conducted study to evaluate tradeoffs of Army missile platforms using cost models, simulations, and statistical analysis. Produced study problem statement and examined available data and scenarios to identify constraints, limitations, and assumptions. Prepared and presented brief covering findings and recommendation of new platform acquisition. For exceptional performance in the course as one of the top five in my class I was awarded Honor Graduate.

PUBLICATIONS

AUTOMATED REFLECTION OF CTF HOSTILE EXPLOITS (ARCHES)

Z Crosley · A Doupe · Y Shoshitaishvili · R Wang

MINING ASSOCIATIONS IN LARGE GRAPHS FOR DYNAMICALLY INCREMENTED MARKED NODES

A Rai · Z Crosley · S Pacham

PROFICIENCIES

Python	Julia	LaTeX	Pwntools
Java	SQL	Pandas	Numpy
C++	Linux	Numpy	Neo4j
Clojure	Bash	Scapy	OpenMP

HONORS AND ACTIVITIES