

Madhav Natarajan H

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Summary

Dedicated software engineer and researcher with expertise in Python and Unix Shell scripting. Pursuing an MS in Computer Science with a focus on cryptography, secure multiparty computation (MPC), and consensus protocols. Experienced in developing high-quality software solutions and contributing to innovative projects, combining academic pursuits with professional experience.

Education

International Institute of Information Technology Bangalore, MS by Research in Computer Science August 2024 - Present

- GPA: 3.0/4.0
- **Coursework:** Algorithms, Concrete Mathematics, Secure Computation, Distributed Consensus
- **Research:** Secure Multiparty Computation protocols, Verifiable Secret Sharing protocols, Consensus protocols.

PES University Bangalore, B.Tech in Electronics and Communication Engineering August 2019 - July 2023

- GPA: 8.09/10.0

Experience

SDET, QNu Labs – Bengaluru August 2023 – August 2024

- **Quantum Key Distribution Hub N Spoke network for the Indian Navy.** Contributed to the Quantum Key Distribution (QKD) Hub-and-Spoke Network implementation for the Indian Navy, the largest QKD network globally. Played a key role in automating deployment, system bring-up, and configuration processes.
- Designed and implemented an automation software application for database encryption, population automation, and full software stack initialization, including OS and IP address assignment, on Twin FPGA SoCs. **Impact:** Reduced deployment time for the Hub-and-Spoke Setup (6 nodes) from 6 hours to 15 minutes.
- Automated user input for interactive command-line test suites (e.g., NIST SP 800-22, Dieharder RNG, and ENT) using Tcl Expect scripts. **Impact:** Enabled uninterrupted 24-hour and 48-hour test suite runs by removing manual intervention.
- Automated the UI flow of the product using Selenium (Python) and Puppeteer for functional testing.

Product Security Engineering Intern, Infoblox – Bengaluru January 2023 – June 2023

- Developed a Python-based periodic scan for organization-wide GitHub repositories to detect Dockerfiles and verify the lineage of image imports using the GitHub REST API.
- Built a pipeline using Packer to automatically create golden images for penetration testing tools, delivering OVF images. **Impact:** Streamlined operations for the penetration testing team by providing a ready-to-use environment, saving significant setup time
- Programmed and deployed a Dockerized application on EC2 for Carbon Black EDR inventory cleanup, querying idle endpoints and deleting entries older than X days. Integrated AWS SES for stakeholder notifications. **Impact:** Optimized license usage, preventing the need to acquire an additional 100 expensive licenses.

Publications

Bio Algorithms for Resource Optimisation and Analysis of Data April 2023 | IEEE Xplore Digital Library

Ananda M, *Madhav Natarajan H*, K Chaitanya, Dasara Sri Saarthak, Kristipati Pravallika

10.1109/ICAECIS58353.2023.10170678

- Explored energy optimization for wireless sensor nodes using bio-inspired algorithms like Particle Swarm Optimization (PSO).
- Compared energy conservation achieved by PSO with the existing LEACH protocol. Results demonstrated a **72% reduction in energy consumption** for moisture sensor nodes, validating the hypothesis.

Projects

Packet Filtering and Rerouting with eBPF

- Developed an XDP-based network filter using eBPF to reroute packets originally destined for port 1 or port 2 to port 3.
- Tested functionality by setting up a Python server on one port and using netcat to simulate traffic, verifying redirection through a separate terminal.
- Tools Used: Python, C, eBPF

Skills

Programming Languages: Python, C, SQL, Unix Shell

Tools and Technologies: Git, REST API, Docker, AWS, Postman, Packer, eBPF

Libraries and Frameworks: Pandas, Locust

Certifications

Certified Network Security Practitioner

The SecOps Group

Computer Architecture

NPTEL IIT-M

- Silver medal, Top 2% among 2200 course takers

Quantum Computing, Quantum Algorithms and Qiskit

NPTEL IIT-M

Python for Datascience

NPTEL IIT-M

- Silver medal