S MAHMUDUL HASAN

Arlington, Texas | P: (+1)315-412-4385 | mahmudulhasan947@gmail.com | Github: numan947 | LinkedIn: numan947

EDUCATION

M.S. in Computer Science, Syracuse University, Syracuse, NY, USA   09/2021 – 05/2024
CGPA: 3.94/4.00

B.S. in Computer Science, Bangladesh University of Eng. and Tech., Dhaka, Bangladesh   05/2014 – 10/2018
CGPA: 3.65/4.00

PUBLICATIONS

1. **SeQR: A Foolproof Configurator for Enterprise Wi-Fi** (In Submission CHI'25)
2. **Evaluating Fuzzers using Context Sensitive Inputs** (In Submission NSS'24)
3. **Automated Evaluation of Policy Enforcing IoT Defenses** (In Submission OJCOMS)
4. **Poster: SeQR: Rethinking and Redesigning Enterprise Wi-Fi Bootstrapping** (Presented in ECS Research Day, SU 2023)
5. **Revealing Influences of Socioeconomic Factors over Disease Outbreaks** (Published in ACM Compass 2022)

RESEARCH EXPERIENCE

Graduate Research Assistant, **Syracuse University, Syracuse, New York**   09/2021 – 01/2024
➤ Led projects involving development of a new secure UX for enterprise WiFi connection, evaluation of fuzzers for context sensitive input generation, and automated evaluation of policy enforcement for smart home systems.

Undergraduate Researcher, **Bangladesh University of Engineering & Technology**   06/2017 – 02/2019
➤ Worked on project involving collection and analysis of disease outbreak data and socioeconomic factors to find influences.

WORK EXPERIENCE

Programmer Analyst-I, **TechLeap Systems, Irving, TX 75038**   08/2024 – Current
➤ Contributed to the development of a platform enabling interactions between multiple user roles with features such as user authentication, profile management, and real-time tracking using **Spring Boot 3, Keycloak, Spring Data JPA, and Hibernate**.
➤ Implemented **search, filtering, review, and payment processing** functionalities for a seamless user experience.

Faculty Lecturer, **Eastern University, Dhaka, Bangladesh**   02/2019 – 08/2021
➤ Course instructor for undergraduate **C/C++ programming, Machine Learning and Data Analysis, and Compilers** courses.

Software Engineering Intern, **Reve Systems, Dhaka, Bangladesh**   04/2018 – 06/2018
➤ Worked on a microservice for a Bengali Speech Data labeling system using Java Spring Boot.

SOFTWARE AND RESEARCH PROJECTS

LineageOS SeQR-Mod [Research Project]
➤ Modified LineageOS (lineageos.org) and implemented SeQR - a more secure UX configurator for enterprise WiFi, by modifying android system application (Settings app) & framwork code in Java as well as wpa_supplicant code in C/C++ (shipped with AOSP)*[Java/C/C++]*.
➤ SeQR is an enterprise WiFi configurator for connecting to any enterprise WiFi network securly through validation of the RADIUS server certificate by scanning a QR code issued by a trusted authority such as institutions, company, etc.
➤ Assessed the implementation's correctness by employing a customized Android NDK application with the Censys dataset, confirming its flawless functionality in every instance, achieving a 100% success rate.

FuzzEval - Comparing Fuzzer Generated Input Quality [Research Project]
➤ Created a fuzzing platform to assess 12 different fuzzers on 13 cryptographic libraries using **Docker and Python** for generating context sensitive inputs that adheres to PKCS#1 v1.5 format to evaluate the capability of the fuzzers to generate valid yet diverse inputs.
➤ Created build scripts (Makefile & CMake) to automate the build of the libraries and harnesses.
➤ Performed fuzzing on Linux server using Tmux and customized bash scripts for 3 rounds with each round being 10 days.
➤ Evaluated fuzzers' input quality for 13 test subjects using Python data analysis tools (NumPy, Pandas, Scikit-Learn); most performed poorly, with only about 30% of generated inputs being valid for complex structures, even with templates available. [*C/C++/Python*]

Pocketpy: portable python 3.x interpreter - https://github.com/pocketpy/pocketpy **[Open Source Contribution]**
➤ Contributed to the open source python 3.x implementation and added core language component handling string formatting (**str.format()**) and **deque** for the collections module using **C++**.
➤ Developed a comprehensive set of test cases to assess the performance of the implemented **str.format() and deque** functions, demonstrating correctness and achieving a performance improvement of approximately 20x. *[Python]*

Helion - Integrating Machine Learning for Home Automation Security [Research Project]
➤ Integrated the Helion **ML**-based sequence generator with containerized IoT defense solution evaluation platform, **VetIoT**, using Python translation system; built a **Python** GUI **using PyQT5** for accelerating manual translation; extensively documented the project.

Airline Status Prediction - https://github.com/numan947/CIS662-Airline-Status-Prediction **[Capstone Class Project]**
➤ Led a team of 5 and devised machine learning strategy for predicting airline status for flights from Syracuse to any other US airport.
➤ Used classical machine learning methods such as **SVM, Decision Trees, XGBoost, Naive Bayes, GBM** and their combinations implemented in Python libraries (SciPy, Scikit-Learn) to achieve high prediction precision, recall, and accuracy on the task.
➤ Created custom features by combining factors involving weather and season to improve the quality of the predictions.

Fake News Detection using Embeddings - https://github.com/numan947/FakeNewsDetection **[Capstone Class Project]**
➤ Led a team of 3 and devised a feature engineering framework modifying the Correlation-based-Feature-Selection (CFS) algorithm.
➤ Used classical machine learning models (implemented in Python libraries) along with customized CFS (e.g., **SVM, Decision Trees**, etc.) achieved SOTA-comparable results.

ProjectSphere - https://github.com/numan947/ProjectSphere **[Capstone Class Project]**
➤ Created a project management tool for managing small and medium sized project with the ability to add members, create issues, and have discussion among the project members.
➤ Developed a **Spring Boot 3** backend with **JWT Auth**, **PostgreSQL, Spring Data JPA**, **Spring Security** and **OpenAPI** documentation.
➤ Built the frontend using **React 18**, with **ChakraUI** for components**, Axios** and **React-Query** for managing query**, React-Router** for routing**, and Zustand** for state management**.**
➤ Implemented features including **registration**, **email validation**, **project and issue creation, etc.**, using **REST API** best practices.
➤ Deployed infrastructure using **Docker** and set up **CI/CD pipelines with GitHub Actions**.

The Cloud Resume Challenge (https://cloudresumechallenge.dev/) - https://github.com/numan947/resume-on-the-cloud-aws
➤ Designed and implemented a serverless cloud infrastructure leveraging AWS Lambda, API Gateway, S3, DynamoDB, and SAM Templates.
➤ Set up **CI/CD pipelines** using **GitHub Actions** for infrastructure deployment.

SelfSync: A self hosted personal management application - https://github.com/numan947/SelfSync **[Capstone Class Project]**
➤ Engineered an MVC application for creating notes, to-do lists, trip planning, and budget-tracking, using the Flutter framework for cross-platform mobile and web development *[Dart/Flutter/MVC/BLoC]*.
➤ Created the backend **REST APIs** using **AWS Amplify's** serverless architecture, using **AWS API Gateway, DynamoDB, and Lambda**.

Custom Survey Application - https://github.com/numan947/SeQR-MTurk-Survey-Web-App **[Research Project]**
➤ Built a customizable survey web app for evaluating SeQR UX using Flutter and Firebase *[Dart/Firebase/MVC/SQL]*.
➤ Simulated SeQR UX as well as Trust-On-First-Use (TOFU) and traditional certificate based WiFi authentication using Flutter Web.
➤ Implemented authentication and data storage with Firebase, and designed flexible survey modules using dynamic data handling.
➤ Added real-time analytics and visualization tools to analyze user feedback, contributing valuable insights into authentication UX.

SeQR Survey [Research Project]
➤ Conducted a multi-phase survey with over 1,200 participants on Amazon Mechanical Turk, gathering user interaction data across different survey stages. Collected metrics included task completion times and responses to a modified System Usability Scale (SUS) questionnaire.
➤ Analyzed the data using Python libraries such as **SciPy** and **Scikit-learn** for statistical analysis and modeling, and visualized results with **Matplotlib**. Findings indicated that SeQR not only enhances the security of WiFi connections but also improves the usability of enterprise WiFi configuration, with participants preferring it over the traditional method by a factor of 6.6x. *[Python / Data Analytics]*.
➤ Managed payments to MTurk workers, ensuring prompt and accurate compensation. Automated the validation of completion tokens to ensure workers only received payment upon successful task completion using **Python**. Built a **Python** script to verify token authenticity and match it with participant responses in the database, reducing manual errors and preventing duplicate or incomplete submissions from being processed for payment.

Other Software and Machine Learning Projects
1. JobSummarizer *[OpenAI GPT API, Python]*
2. Mini TMDB *[React 18, Spring Boot, MongoDB, NoSQL]*
3. Multiplayer Game Database *[Oracle RDBMS, SQL]*
4. Object Detector (SSD) Implementation *[Python, PyTorch]*
5. Sentiment Analysis using Open AI API *[Python, Open AI]*
6. Protocol Implementation: Distance Vector Routing *[C++]*
7. Replication of Fuzzing papers *[Python, Docker, Fuzzing]*
8. Image data collection and labeling system *[Android, Ionic, Python, Flask, MVC]*
9. Rent-A-Tool *[Spring Boot, Java, Angular 18]*

CERTIFICATIONS

AWS Certified Developer - Associate	Validation Number: f1818f2049334419975f6f21ca60fd51
AWS Certified Machine Learning - Specialty	Validation Number: ecd6f1e093da46d4bf20f4d864fa741d

SKILLS

Programming Languages: Python, C/C++, Java, Shell scripting, SQL, Kotlin, Dart, TypeScript, Assembly.
Frameworks, Tools and Libraries: Python Flask, Spring Boot, Amazon Web Services, Docker, Kubernetes, NodeJS, React 18, Matplotlib, Pandas, Scikit-Learn, PyTorch, Tensorflow, Scipy, CI/CD, GitHub Actions;