ASIF IQBAL RAHAMAN

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Software Engineer with expertise in backend development, full-stack solutions, and microservices architecture. Demonstrated success in streamlining deployments and boosting efficiency through innovative automation and scalable system design. Proficient in Python, Docker, AWS, CI/CD, and microservices, with proven experience delivering high-impact applications across diverse domains. Collaborates effectively with cross-functional groups to address customer needs and enhance product performance.

SKILLS

Programming: Python, Rust, Javascript, Typescript, C++, Java, GoLang, SQL, Bash, Shell, C#, .NET, HTML, CSS, ReactJS, Matlab
Frameworks: FastAPI, Flask, RestAPI, Pandas, Numpy, Microservices, SQLAlchemy, AWS-CDK, Requests, PyTest, OpenAI, MLlib, Apache Spark, PyTorch, Tensorflow, Matplotlib, Seaborn, Scikit-learn, Streamlit, Pillow, OpenCV, Django, Jinja2, PyAutoGUI, Selenium
Tools: Docker, Git, Jenkins, Unix, Nginx, Supervisor, MySQL, MongoDB, Kubernetes, AWS, Azure, GCP, Terraform, GitHub Actions

EDUCATION

Virginia Tech — Blacksburg, VA, US — Aug 2022 — May 2024

Master of Engineering in Computer Science Applications — **CGPA: 3.9/ 4.0**

- **Courses**: AI Tools for Software Development, Natural Language Processing, Data Analytics, Information Security, Theory of Algorithms, Information Visualization, Applications of Machine Learning, Computer Vision
- **Publication:** Banerjee, A., **Rahaman, A. I.**, Mehandale, A., & Kraikivski, P. (2024). A perturbation approach for refining Boolean models of cell cycle regulation. Plos one, 19(9), e0306523 (journals.plos.org/plosone/article?id=10.1371/journal.pone.0306523)

Vellore Institute of Technology (VIT University) — Vellore, IN — Aug 2015 — May 2019

Bachelor of Technology in Computer Science — **CGPA: 8.0/ 10.0**

- **Courses**: Data Structures and Algorithms, Cell Biology and Biochemistry, Analytical Bioinformatics, Data Mining, Cyber Security, Artificial Intelligence, Operating System, Database Management System, Image Processing, Parallel and Distributed Computing

EXPERIENCE

Department of System Biology, Virginia Tech — Oct 2022 — Present

Software Developer/ Research Assistant — **Blacksburg, VA, US**

- Pioneered a **novel algorithm** to simulate yeast and mammalian cell cycle with Boolean model of protein interaction, evaluating model perturbations based on **mutation paths and final states**, optimizing computational efficiency for large-scale simulations.
- Drove **5x** efficiency and accuracy by leveraging **parallel processing** and **algorithm optimization** on ARC high-performance compute cluster at Virginia Tech for an exponentially growing protein interaction graph perturbation model, with sizes exceeding **1.6 million** during each cycle, enabling **faster simulations**, **improved scalability**, **more accurate** biological pathway predictions.
- Engineered a comprehensive approach for **data validation** using protein interaction data from **SIGNOR 3.0** via **third-party APIs**.
- Used libraries like pandas, numpy for **data manipulation**; networkx, seaborn for **visualization**; and dataclass for **input modeling**.
- Resulted in a **peer-reviewed publication** available at journals.plos.org/plosone/article?id=10.1371/journal.pone.0306523.
- Planning algorithm development for automating optimal model perturbation calculation using **backtracking, heuristic search, and/or machine learning models** to **enhance efficiency, scalability, and accuracy** in biological simulations.

Skills/ Tech stack: Python, Pandas, Numpy, Simulation, Algorithm Design, Optimization, Parallel Processing, Database Management

Seclore Technologies Pvt. Ltd. — Dec 2021 — Jul 2022

Product Engineer — **Mumbai, IN**

- Built a **DevOps automation** framework, slashing customer onboarding time from **5 days to 4 hours**, achieving **10x** efficiency.
- Orchestrated integration of **AWS** services like **CloudFormation, DynamoDB, RDS, ECS, EC2, ECR, CloudWatch**, along with **Redis** and **Active Directory**, using **Python AWS-CDK**, **Kubernetes** to onboard new customers in private cloud with a customizable infra stack, **streamlining deployment, improving resource management**, and **enhancing system scalability** for the **DevOps** team.
- Designed end-to-end **CI/CD pipeline** and **Infrastructure as Code** (IaC) for containerized microservices with **Docker** and **Jenkins**, collaborating with three developers and two QA testers, ensuring efficient and seamless deployment under tight deadlines.
- Employed **test-driven development** (TDD) with **end-to-end, integration, unit test** using **PyTest**, and maintained **version-control**.

Skills/ Tech stack: Python, AWS-CDK, Docker, Jenkins, PyTest, Redis, Java, Kubernetes, Amazon Web Services, Microservices, Agile

Ericsson Global India Services Pvt. Ltd. — Jan 2019 — Jul 2021

Software Engineer — **Bangalore, IN**

- Developed and deployed a **custom RPA framework** for network engineers to automate maintenance tasks with **35%+** efficiency.
- Designed the backend with **Flask**, supporting remote execution without direct interaction with GUI elements using **PyAutoGUI, win32, Selenium** for enhanced automation. Leveraged **OpenCV, Pillow** to identify actionable items, used **RestAPI** with **MongoDB** to store logs with screengrabs, consolidating automated failure detection and real-time monitoring for improved reliability.
- Migrated to **Hashicorp Vault** for encryption key storage and used **PerconaDB** as open-source alternative to **MySQL8** for security standards, ensuring encryption of **data at rest** and **data in transit** with **TLS protocol** and **access management** for compliance.
- Integrated the RPA framework with Ericsson's **automation hosting platform** BotStore, enabling **seamless deployment, real-time monitoring** and **centralized management**, streamlining processes and boosting adoption by over **50%** across multiple teams.
- Engineered a **rule-based recommendation engine** to calculate **worst performing cells** with **KPIs** given by network engineers.
- Prototyped a **machine learning** replacement for the **rule-based system** using historical cell performance data using **TensorFlow**, focusing on **feature engineering, tuning** and **model optimization** to improve prediction accuracy.
- Architected an **ETL pipeline** as a set of **microservices** using **RestAPI** with **requests** and **Flask** to efficiently fetch data with **over 1B rows and 30K columns** from datalakes using **third-party APIs** of network providers. Used data preprocessing techniques to

clean, categorize, sort and **transform** data before storing it in **parquet format** within an SQL database using **Pandas** and **NumPy**, ensuring **optimal query performance, scalability** and **efficient data retrieval** for downstream analytics.
- Processed large datasets using parallel processing on the **Linux server**, while automating daily triggers with an **Apache Airflow** and **cronjob** execution pipeline, ensuring **seamless scheduling, monitoring** and **fault tolerance** for reliable data processing.

Skills/ Tech stack: Python, SQL, NoSQL, Data Analysis, Image Recognition, Encryption, Pandas, Apache Spark, Parallel Processing

PROJECTS

DNA Sequence Alignment CLI Tool — Dec 2017

- Engineered a **DNA sequence alignment CLI tool** implementing **Smith-Waterman** (local) and **Needleman-Wunsch** (global) algorithms using **dynamic programming**, optimizing sequence comparison efficiency and accuracy for genetic research.
- Designed a **modular architecture**, separating alignment logic, file I/O, and visualization components, ensuring scalability, maintainability, and ease of extension, while enabling seamless integration of additional alignment algorithms.
- Built a comprehensive testing suite using **pytest**, ensuring over **90% test coverage** for core algorithms, file operations, and CLI visualization to maintain accuracy and reliability while validating visual outputs and command-line functionalities.
- Implemented support for **multiple file formats** (JSON, YAML, CSV, TXT) for flexible data input/output and integrated **CLI-based visualization** options, including color-coded alignments, ASCII heatmaps, and Matplotlib plots for enhanced usability.

Game Development with Unity3D Engine in C# — Mar 2018

- Developed a **2D side-scrolling platform** game (Flappy Bird) with **personalized object models** and **custom game physics**.
- Gained hands-on experience with **game engines, C#, and Blender**, experimenting with asset creation and in-game mechanics.
- Although the game was functional, it lacked polished assets and sound design, which led to the decision not to release it on any game store; but it served as a valuable introduction to **game development** and **physics-based gameplay design** using **Unity3D**.

Object Recognition and Face Detection with TensorFlow and CUDA — Oct 2018

- Built a **mobile app** to identify common objects in image and video frames using an **on-device AI model** with **TensorFlow**.
- Implemented **real-time face detection** with continuous detection in live video streams, achieving **70% accuracy** in bounding box detection using the **TensorFlow** library, with reliable performance across varying lighting and motion conditions.
- Enhanced computational efficiency by optimizing the algorithm for **concurrent and parallel execution** on video frames with **CUDA in C++**, achieving a **50%** improvement in processing speed and significantly reducing latency in real-time processing.

Dynamic Personal Website using FastAPI and SQLAlchemy ORM — Jul 2023

- Embraced hands-on learning approach for front-end by designing a dynamic website using **FastAPI** with **Jinja2** templates, and **SQLAlchemy ORM** to connect the backend to an **SQLite** database, **docker-compose** for containerization, **PyTest** for automated testing and self-hosted on a server with **Nginx**, ensuring scalability, performance, flexibility and ease of deployment.
- Improved website usability by integrating interactive features, including **customizable themes** and **dynamic timeline** generation.
- Built a pipeline with **GitHub Actions** to automate **Docker Image** update in **Docker Hub**, enabling seamless and rapid deployments.
- Designed the website with a **scalable structure** to potentially support multiple user profiles, incorporating **role-based access control** and **dynamic content generation**, employing a backend database instead of a static website for improved flexibility.

EEG-to-Text conversion by fine-tuning BART with zero-shot classification — Nov 2023

- Reproduced pioneering research to **convert EEG signals into embeddable text** by **fine-tuning** the **BART model** with custom data, optimizing model hyperparameters, and achieving an **F1 Score** of **25.9**, improving contextual text generation from neural activity.
- Implemented a **zero-shot classification algorithm** using **PyTorch** to categorize generated texts for sentiment analysis of EEG signals, achieving over **80% accuracy**, enhancing the model's ability to infer emotional and cognitive states from neural data.
- Developed a **preprocessing and inference pipeline** to clean, normalize and segment EEG data, ensuring NLP model compatibility and enabling real-time signal processing and text conversion for applications like **brain-computer interfaces** (BCI).

Soccer commentary/summary generation with Assistant-based GPT API — May 2024

- Built an AI-powered football summary and commentary generator using **GPT-based Assistant APIs** to create realistic, event-driven match commentary with **multilingual support**, integrating dynamic narrative adjustments based on game events.
- Engineered a **pipeline** for automatic match narration, integrating **event-driven insights**, **prompt engineering** for context-aware storytelling, and text-to-speech models to produce lifelike audio with multilingual support, and real-time adaptability.
- Created a front-end with **ReactJS**, integrating text summaries with images and audio from **DALL.E, text-to-speech**, and **translation** models via APIs for immersive **multilingual commentary**, designing the system to emulate **Peter Drury's** voice, with real-time speech synthesis and adaptive narration for greater engagement and realism.

Real-time Sentiment and Subjectivity Trend Analysis for Social Media — Feb 2025

- Architected an automated data ingestion pipeline using **third-party APIs** in Python, integrating free-tier Twitter and Reddit APIs to periodically get relevant posts related to AI and Technology, and managing **data retrieval** schedules using **GitHub Actions**.
- Applied sentiment analysis techniques with cloud-based big data services, leveraging parallel processing with **PySpark**, secure data storage with **Azure Storage** and regular data processing with **Databricks Job Scheduler** for scalable and efficient analytics.
- Deployed a **user-friendly interactive dashboard** built with a simple Python framework **Streamlit**, using continuous integration and deployment pipelines with **GitHub Actions** and deployed the dashboard with real-time updates as a web-app in **Azure**.
- Employed best practices for version control, security, and clean code principles to ensure maintainability and scalability.

PUBLICATIONS

- [J1] Banerjee, A., **Rahaman, A. I.**, Mehandale, A., & Kraikivski, P. (2024). A perturbation approach for refining Boolean models of cell cycle regulation. Plos one, 19(9), e0306523.

CERTIFICATIONS & AWARDS

- **Python for Data Science and Machine Learning Bootcamp** — Udemy Certificate — May 2021
- **Improving Deep NN: Hyperparameter Tuning, Regularization & Optimization** — Coursera Certificate — Jul 2020
- **Neural Networks and Deep Learning** — Coursera Certificate — Jan 2020

Bi-annual Galactic Award for developing data automation framework — **Ericsson - 2020**