Jeevesh Krishna Arigala

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EDUCATION

Master of Science in Computer Science, *University of Massachusetts Amherst* ↗   09/2024 – 06/2026

BE Computer Science Engineering,   2020 – 2024
Sri Sivasubramaniya Nadar College of Engineering, Chennai, Tamil Nadu ↗
   CGPA : 8.77/10

Quantum Computing, *Qubit by Qubit* ↗   2022 – 2023
   100% Grade in all assignments and projects.

RESEARCH

Post Quantum Cryptography
Focusing on cryptographic methods rooted in the hardness of lattice problems. In a broader sense, my research lies in exploring mathematical frameworks that facilitate innovative advancements in cryptography, spanning both classical and quantum computational landscapes.

Privacy-Preserving Machine Learning using Homomorphic Encryption
I'm actively engaged in a research paper and project focusing on Homomorphic Encryption for both training and inference phases, along with designing a secure multi-party computation protocol for distributed settings, addressing challenges posed by Byzantine nodes.

PROFESSIONAL EXPERIENCE

NatWest Group, *Software Development Engineer Intern* ↗   06/2023 – 08/2023
   Chennai, India
- Engineered a robust application utilizing the Spring Framework to automate the generation of Single Sign-On (SSO) tokens.
- Architected a seamless integration with the bank's Identity Provider (IDP) system, facilitating secure authentication across internal software suites.
- Demonstrated proficiency in SAML (Security Assertion Markup Language) and SOAP (Simple Object Access Protocol) protocols
- Enhanced user experience by implementing user-friendly authentication workflows, optimizing efficiency and usability across internal software systems.

SKILLS

Programming Languages
Python, JavaScript, C, OpenQASM, Q#, HTML, CSS, Markdown, Java, Bash, SQL
Libraries & Frameworks
TensorFlow, OpenCV, React.js, Tailwindcss, Next.js, Django, Flask, Trpc, React Query, Node.js, Express, Webpack, Qiskit, Cirq, QuTech
Service Providers
Vercel, AWS, Firebase, Google Cloud Platform, Netlify, PlanetScale, Github, Digital Ocean
Databases
Firebase, MongoDB, MySQL, PostgreSQL, SQLite, Oracle
Tools
Docker, Kubernetes, Git, Yarn, NPM, Postman, IntelliJ Idea, Visual Studio Code, Ftp, MS Office, Dev Tools

AWARDS

MIT iQuHACK 2023, *MIT iquise* ↗
Secured 4th place in Microsoft's challenge at the iQuHack 2023, which was focused on optimizing quantum circuits and specifically quantum oracles. The challenge involved rewriting the code of quantum oracles to maintain their correctness while using minimal resources, such as logical qubits and cycles in the circuits.

IBM Quantum Spring Challenge 2023, *IBM Quantum* ↗
7th person (globally) to completely finish all the labs successfully in IBM Quantum Spring Challenge 2023

NSEJS National Top 1 %, *IAPT (Indian Association of Physics Teachers)* ↗
Awarded the National Top 1 % certificate in NSEJS by the Indian Association of Physics Teachers.

PROJECTS

Secure-by-Design FL protocol leveraging Fully Homomorphic Encryption, *Machine Learning, Cryptography*
This work is currently under review for publishing in the International Journal of Applied Cryptography.
I developed a privacy-preserving Machine Learning protocol that leverages Fully Homomorphic Encryption (FHE) for secure training and inference in distributed settings. This secure-by-design, zero-trust system enables multiple parties to collaboratively train ML models without exposing their raw data, addressing critical privacy concerns in fields like healthcare. The protocol integrates cutting-edge cryptographic techniques, including SecAgg+ for secure aggregation. I optimized performance through quantization and FHE circuit compilation, achieving accuracy comparable to non-encrypted models. To demonstrate real-world applicability, I implemented a disease prediction model using encrypted symptom data across distributed datasets.

Smart Armband with Fall Detection (filed for patent), *IoT, ML, Human Activity Sensing and Recognition*
Developed a patented Smart Armband integrating Fall Detection, IoT, ML, and Human Activity Recognition. The design includes support for real-time data transmission, and advanced ML algorithms for activity recognition. The project, funded within the Computer Science department, focuses on elder care by predicting falls and strokes, and promptly alerting caregivers. The accompanying web application enables remote vitals monitoring, including heart rate and oxygen saturation, facilitating proactive healthcare interventions.

Quantum Enhanced Generative AI for Textual and Visual Applications, *IBM Quantum, qiskit, openai*
Developed a comic generation application, integrating quantum algorithm and generative AI techniques. Applied 1-D Bose-Hubbard model for quantum random walk across nodes, influencing entropy-driven nodes. Processed by a generative AI system, the nodes orchestrated the creation of a three-part comic plot. Segments were then input to DALL·E for image synthesis. Utilized IBM quantum computer and OpenAI API. Achieved notable traction within college community, attracting 50+ daily users in the inaugural week.

Computer Vision-based Attendance Tracking System, *dlib, SVM, Google Sheets API, opencv*
Developed a sophisticated Computer Vision-based Attendance Tracking System employing advanced techniques. Leveraged the dlib library's cutting-edge capabilities to perform precise face isolation from group photos through facial landmark detection. Subsequently, extracted distinctive facial features, which were input into an SVM model meticulously fine-tuned using individualized face data. Seamlessly integrated the system with the Google Sheets API, enabling real-time recording of attendance data. This project showcases proficiency in computer vision, feature extraction, machine learning refinement, and API integration to create an efficient attendance management solution.

Real-Time Collaborative Drawing Canvas, *HTML, CSS, PaperJS, HammerJS, Web Sockets*
Engineered a collaborative drawing canvas employing a stack comprising PaperJS, and HammerJS. Innovatively integrated Web Sockets to establish instantaneous bidirectional event-driven communication, enabling real-time collaboration. Enhanced the user experience by implementing dynamic smoothing algorithms, empowering finer control over diagrammatic elements. Designed with adaptability in mind, the canvas finds practical application on digital boards within educational settings, particularly in classrooms.

Feature-Rich Blog app with gcp integration and custom CMS,
Full-Stack, Python3.x, Html, CSS, JS, Flask, Google Firestore, Jinja
Developed a full-fledged web application leveraging the Flask framework, with Jinja employed for efficient HTML templating. Integrated Google Cloud Firestore as the NoSQL database backend to facilitate seamless data management. The project encompasses comprehensive functionalities, encompassing blog post creation and administration, alongside robust statistical analysis and analytics tracking. Implemented a dynamic tagging system for each blog post, enhancing organizational structure and enabling efficient post-retrieval.

LEADERSHIP/ACTIVITIES

ACM Student Chapter, *Chairperson*

Google Developer Student Club (GDSC), *Cybersecurity Team*

SSN Cybersecurity Club, *Chairperson/Co-Founder*

National Service Scheme (NSS), *Student Volunteer*

OPEN SOURCE

IBM Qiskit-Terra, *IBM* ↗
Deprecated the use of quantum_instance with grover's search for moving towards a new release, Corrected circuit errors in online tutorials and documentation.

Microsoft Quantum, *MSFT* ↗
Collaborated with MSFT Quantum team to translate Microsoft's famous quantum katas in Q# to intelligible qiskit code to help benefit beginners.

USA Computing Olympiad, *USACO* ↗
Contributed to language solutions in bronze, silver and gold levels for the USACO Guide to competitive programming.

Hacktoberfest 2022, *Digital Ocean*
Successfully completed and won the Hacktobefest 2022 challenge.

MOOC'S

Introduction to TensorFlow for Artificial Intelligence, Machine Learning and Deep Learning, *DeepLearning.AI* ↗

MIT Introduction to Deep Learning 6.S191, *MIT*

Quantum Algorithms and Cryptography, *IIT Madras* ↗

Introduction to Cryptography - CMSC 456, *UMD*

15-859BB: Quantum Computation and Quantum Information, *CMU*