Asish Kumar Mandoi

Senior Undergraduate
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Education

Year	Degree/Certificate	Institute	CPI/%
2019 - 2023	B.Tech in Electrical Engineering, *Minor in Quantum Physics*	Indian Institute of Technology Kanpur, India	7.50/10.00
2019	Grade XII (CBSE Board)	MBS Public School, Bhubaneswar, India	93.80%
2017	Grade X (CBSE Board)	DAV Public School, Bhubaneswar, India	10.0/10.0

Experiences

Software Engineer Intern, Citrix *May '22 – Jul '22*
DevOps and Automation Services Team, Bengaluru, India
- Developed a robust monitoring system for detecting issues related to **Grafeas**, a software auditing service critical for multiple internal applications at Citrix
- Implemented a **Golang** microservice with **safeguarded endpoints against DDoS attacks** and deployed it with **Kubernetes** using **Helm** Charts to private cloud
- Built a periodically triggered **CI/CD** pipeline using **Jenkins** and incorporated it with a **metadata capturing** component handled using Grafeas
- Facilitated **active monitoring of the Grafeas API** by creating a dashboard and an alert system on Slack based on reports collected from the pipeline logs using **Splunk**
- Secured a **pre-placement offer** for valuable contribution during the internship

Research Associate, QResearch Project, QWorld *Dec '21 – Present*
Optimizing Logistics using Quantum Algorithms, Mentor: Dr. Paweł Gora
- **Contributed to a working publication** focused on various **hybrid quantum-classical techniques** to solve **combinatorial optimization problems in logistics**
- Validated theoretical results of 5 solvers of the Vehicle Routing Problem (VRP) by performing experiments for **550+ VRP instances** on the **D-Wave quantum annealers**
- **Devised a new solver** for VRP with **higher performance** compared to existing solvers
- **Co-mentored** several interns in designing **QUBO** formulations for VRP
- Presented our work on Quantum Annealing based VRP formulations at the **IT conferences WDI 2022 and Data Science Summit 2022**

Quantum Computing Mentorship Program, QOSF *Oct '21 – Jan '22*
Mentor: Dr. Vesselin G. Gueorguiev *Project*
- Among **40 out of 1000+** applicants to be selected for the program and recognized for developing **one of the best solutions** to a **Quantum Search problem**
- Implemented new solvers for the **Travelling Salesman Problem** (TSP) and the **Vehicle Routing Problem** (VRP) based on clustering and non-clustering techniques
- **Improved performance** of existing quantum annealing-based solvers for TSP and VRP by optimizing our algorithms to use **minimal number of qubits**
- Benchmarked accuracies and running times of solvers by testing them on **D-Wave Quantum Annealers**

Presentations

S. Borah, **A. Mandoi**, A. Verma, "*Heuristic QUBO Formulations for solving the Vehicle Routing Problem using Quantum Annealing*." Talk presented at the 13th **WDI '22**, Warsaw, Poland. (Apr 2022)

A. Mandoi, "*Quantum Annealing methods for solving the Vehicle Routing Problem*." Talk presented at **Data Science Summit 2022**, Warsaw, Poland. (Nov 2022)

Selected Projects

Quantum Algorithms for Semidefinite Programming *Mar '22 – Apr '22*
Advisor: Prof. Ketan Rajawat *Report*
- Studied **Arora and Kale**'s classical algorithm based on Multiplicative Weights Update method for solving Semidefinite Programs (SDPs)
- Compared its complexity and lower bounds with that of **Brandão and Svore**'s quantum extension of SDP solvers and **Apeldoorn and Gilyén**'s subsequent speed-ups
- Investigated practical applications of quantum algorithms for solving SDPs like **Quantum Error Recovery** and **Shadow Tomography**

IITK-Coin *May '21 – Jul '21*
Backend of a pseudo-currency system | Programming Club, IIT Kanpur *GitHub*
- **Developed a microservices-based application** using **Golang** and **SQLite**
- **Reinforced backend security** by employing **Bcrypt algorithm** to **hash & salt passwords** and implementing an **OTP-based confirmation system** for transactions
- Built an **additional layer of protection** against attacks by incorporating endpoints with user authorization using **JSON Web Tokens**
- Facilitated **transaction tracking** for admins by logging all activity into the database
- **Increased server efficiency** by allowing up to **300 concurrent transactions per second** by utilizing **Redis** for caching and enabling WAL journal mode in SQLite
- Containerized the application using **Docker** with minimal size images and **automated the workflow** using **GitHub Actions** *DockerHub*

Achievements & Honours

Programming Achievements

HAQS, qBraid *2022*
Won the qBraid Open Challenge and among the **top three** winners of the QML Challenge

Quantum Excellence, QGSS22, IBM *2022*
Among 1200 worldwide to complete the 2 week long **Qiskit Global Summer School** program with intensive hands-on labs focused on **quantum simulations using NISQ hardware**

IBM Quantum Challenges *2021, 22*
Among 1000 worldwide to complete challenges of *fall 2021* and *spring 2022* by solving problems in areas of finance, fermionic chemistry, machine learning and optimization

Google Kickstart *2020, 21, 22*
Globally ranked 846 in Round E 2022, **1055** in Round D 2021, and **976** in Round H 2020

Facebook Hacker Cup *2020, 21*
Globally ranked 1967 in Round-1 2021 and **2769** in Round-1 2020

Scholastic Achievements

All India Rank 3592 in **JEE-Advanced** out of 220,000+ shortlisted candidates *2019*

All India Rank 7480 in **JEE-Main** out of 0.9 million+ candidates *2019*

National Top 300 to be selected for **Indian National Chemistry Olympiad**, HBCSE *2019*

All India Rank 322 in **KVPY** out of 50,000+ candidates and awarded **KVPY Fellowship** by Govt. of India, and IISc Bangalore *2017*

Technical Skills

Languages C, C++, Python, Go, MATLAB, JavaScript

Web Node.js, Next.js, HTML, CSS, PHP, MySQL, SQLite, Redis

SDKs Qiskit, Ocean

Tools Git, Docker, Kubernetes, Jenkins, Splunk, LaTeX, Linux shell utilities

Relevant Coursework

Computer Science Quantum Computing, Data Structures and Algorithms, Fundamentals of Computing, Intro to Machine Learning

Electrical Core Digital Communication Networks, Convex Optimization in SP-COM, Digital Control, Digital Electronics, Microelectronics, Principles of Communications

Maths & Physics Quantum Mechanics I, Probability and Statistics, Partial Differential Equations, Complex Analysis