Asish Kumar Mandoi

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Education

Year	Degree/Certificate	Institute	CPI/%
2019 - 2023	B.Tech in Electrical Engineering *Minors in Quantum Physics, Linguistics*	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 conference WDI 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. (April 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 *DockerHub* images and **automated the workflow** using **GitHub Actions**

Achievements & Honours

Programming Achievements

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 Physics, Probability and Statistics, Partial Differential Equations, Complex Analysis

'#': *ongoing*, '': *hyperlinks*