Asish Kumar Mandoi

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Department of Electrical Engineering
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Education

2019 – 2023 **Bachelor of Technology in Electrical Engineering**, *Minor in **Physics**, CPI: 7.5/10.0*
Indian Institute of Technology Kanpur, India

2019 **Grade XII (CBSE Board)**, *Cumulative Percentage: 93.8%*
MBS Public School, Bhubaneswar, India

2017 **Grade X (CBSE Board)**, *CGPA: 10.0/10.0*
DAV Public School, Bhubaneswar, India

Interests

Quantum Computing, Quantum Technology, Optimization, Software Development, Open-Source Software, Quantum Physics, Relativity

Experiences

May '22 – Present **Software Engineer Intern, Citrix**
Devops and Automation Services Team, Bengaluru, India
- Made major contributions to create a robust system to detect issues for **Grafeas**, a critical software auditing service used by the devops and automation team at Citrix
- Implemented a **Golang** microservice, added unit tests with 93.8% coverage, deployed the application with **Kubernetes** using **Helm** Charts and built a multi-branch **CI/CD** pipeline in Jenkins
- Incorporated the pipeline service with a metadata analysis component handled using Grafeas
- Created a dashboard and an automated alert system on **Splunk** for **detection of potential flaws** based on reports collected from the pipeline logs

Dec '21 – Present **Research Associate, QResearch Project, QWorld**
QWorld *Optimizing Logistics using Quantum Algorithms, Mentor: Dr. Paweł Gora*
- Validated theoretical results of various solver approaches by carrying out experiments for **550+ instances** of the Vehicle Routing Problem (VRP) on the **D-Wave quantum annealers**
- **Devised a new solver approach** for VRP with **better practical accuracy** compared to similar existing solvers as shown by our experiments
- **Contributed to a comprehensive report** focused on practical implementations of various **hybrid quantum-classical techniques** to solve **combinatorial optimization problems in logistics** with a goal of getting it published in popular journals
- Presented our work on Quantum Annealing based VRP formulations in the conference **WDI 2022**

Oct '21 – Jan '22 **Quantum Open Source Foundation**
QOSF *Quantum Computing Mentorship Program, Mentor: Dr. Vesselin G. Gueorguiev*
Task
Project
- Among **40 out of 1000+** applicants to be selected for the program and recognized for developing **one of the best solutions** to an assessment task by implementing **Quantum Search on Unstructured Data** using quantum input loading and **Grover's algorithm**
- Implemented new solvers based on clustering and non-clustering approaches for the **Travelling Salesman Problem** (TSP) and the **Vehicle Routing Problem** (VRP) using **Quantum Annealing**
- **Improved applicabilities and accuracies** of existing quantum annealing-based solvers for TSP and VRP by optimizing our algorithms to use **minimal number of qubits**
- Benchmarked running times and accuracies of solvers by testing them on **D-Wave Quantum Annealers**

Presentations

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

Selected Projects

Mar '22 – Present **Quantum Algorithms for Semidefinite Programming and its Applications**
Report *Advisor: Prof. Ketan Rajawat*
- Anatomized **Arora and Kale**'s classical algorithm based on Multiplicative Weights Update method for solving Semidefinite Programs (SDPs)
- Compared its query 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**

May '21 – Jul '21 **IITK-Coin**
GitHub *Backend of a pseudo-currency system to be used in the IITK campus | Programming Club, IIT Kanpur*
- **Developed a microservices-based application** from the ground up using **Golang** and **SQLite**
- **Reinforced the backend security** by employing the **Bcrypt algorithm** to **hash and salt passwords**, and implementing an **OTP based confirmation system** for the final stage of transactions
- Built an **extra layer of protection** by incorporating endpoints with user authorization using **JWT**s
- Facilitated **transaction tracking** for administrators by logging all activity into the database
- **Increased server efficiency** by allowing it to handle up to **300 concurrent transactions per second** by utilizing **Redis** for caching and enabling the **Write-Ahead Logging** mode in SQLite
DockerHub
- Containerized the application using **Docker** and automated the workflow using GitHub Actions

Jan '21 – Feb '21 **Crio Winter of Doing**
CWoD *Externship program for developers | Crio.Do*
- Acquired familiarity in technologies like **HTTP, REST API, AWS, Linux, Git, HTML, CSS, JavaScript** by implementing core concepts on real examples in a structured manner
- Deployed the backend server of an android app on a self-launched **Amazon EC2 instance**
- Sorted cities based on the popularity of usage of an application by **analyzing 10k+ logs** using **Linux shell techniques**
- Set up my **Personal Portfolio** web application integrated with my GitHub account
- Among the **final 1200 out of 10,000+** total applicants to clear the coding round and reach **Stage-2B**

Jun '21 - Jul '21 **Edison Tinfoil Phonograph**
Advisors: Prof. Anish Upadhyaya, Prof. Shashank Shekhar
- Collaborated with a **team of 10** for a semester-long project on manufacturing the phonograph
- **Designed CAD models** of sophisticated components and assemblies in the phonograph
- **Proposed optimal and cost-effective processing techniques** to be used in the manufacturing of the individual components of the device
- **Presented** the work of the team before the professor and discussed improvements

Achievements & Honours

Programming Achievements

2021, 2022 **IBM Quantum Challenges**
Badges **Among 677 worldwide** to complete the 10 day challenge of *fall 2021* and among **560 worldwide** to complete the 5 day challenge of *spring 2022* by solving problems in areas of applications of Quantum Computing like finance, natural sciences, machine learning and optimization

2020, 2021 **Google Kickstart**
Globally ranked 1636 in Round E 2021, **1055** in Round D 2021, and **976** in Round H 2020

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

Scholastic Achievements

2019 **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

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

Technical Skills

Languages C, C++, Python, Go, MATLAB, JavaScript
Web Node.js, Next.js, HTML, CSS, PHP, MySQL, SQLite, Redis
SDKs Qiskit, Ocean
Utilities/Tools Git, Docker, Kubernetes, Jenkins, Splunk, LaTeX, Linux shell utilities

Relevant Coursework

Computer Science Quantum Computing[o], Data Structures and Algorithms, Fundamentals of Computing, Intro to Machine Learning[i]

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

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

[i]: informal, [o]: ongoing, [hyperlinked at appropriate places]