Alapan Chaudhuri

Undergraduate Researcher, CQST & CSTAR, IIITH

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Education

International Institute of Information Technology, Hyderabad
B.Tech. (with Honours) in Computer Science and Engineering (8.81/10) *July 2019 - Present*

Teaching Assistant: Automata Theory (Monsoon 2021), Linear Algebra (Spring 2022)

Experience

Research Assistant, IIITH
Centre of Quantum Science and Technology *Dec 2021 - Present*

Characterizing absolute classes of quantum states: Working with Prof Indranil Chakrabarty on devising algorithmic approaches like convex optimisation to characterize absolutely separable quantum states. Furthermore, studying several other absolute classes like absolutely Bell-CHSH local states and ACVENN to find similar characterization criteria.

Fast Hamiltonian Simulation: Implementing a framework that can simulate any generalized Hamiltonian for quantum computing systems using methods like trotterization, qubitisation etc. In addition, working towards devising hybrid techniques, for specific groups of Hamiltonians, that can be leveraged to further improve the current benchmarks.

Signal Processing and Communication Research Center *May 2021 - Present*

Quantum Private Information Retrieval: Working on QPIR capacity and protocols under different scenarios like replicated, colluding and/or coded servers with Prof Prasad Krishnan.

Data Analyst Intern
Trivedi Center for Political Data *Dec 2020 - Jan 2021*

Worked on the data set of Indian Governors to produce representations and visualizations for recognising trends, outliers and patterns. Furthermore, performed large scale web scraping and data cleaning to ensure correct and standardized data.

Awards

- **Ranked 9^{th}** in **ICPC Asia Regionals** 2020-21 (Gwalior-Pune)
- **Winner** of **Quantum Chemistry Challenge** (by QunaSys) in **QHack 2022**
- Nominated for the 2022 ICPC Training Camp powered by Huawei
- Ranked 1^{st} (world) in Open Cup XXII-10 (Div 2)
- **Winner** of the **Goldman Sachs Challenge** at Texas A&M Datathon 2021
- Sports Programming: highest rating of 2022 (5 star) on Codechef
- Certificate of Merit (top 1%) for the 2019 Indian Olympiad Qualifier in Physics

Positions of Responsibility

Student Moderator at NQSTS 2021
National Quantum Science and Technology Symposium *July 2021 - Aug 2021*

Club Coordinator
Theory Group, IIITH *Sep 2020 - Oct 2021*

Moderator
Programming Club, IIITH *May 2020 - June 2021*

Club Coordinator
Literary Club, IIITH *April 2020 - Present*

Projects & Open Source

Cirq
Google QuantumAI (cirq) — *Aug 2021 - Present*

- Working on implementing support for OpenQASM3 in Cirq (ongoing).
- Implemented rotation gate and serial concatenation of Kraus Operators (with Zeeshan Ahmed).

Nostradamus: Weathering Worth
Nostradamus — *Apr 2021*

- Explored correlations between the stock market - its volatility and behavior - against weather conditions, environmental factors, and natural disasters.
- **Technologies Used:** Python, Yahoo Finance API

Canswer Mobile App
Caregrades Technologies — *Feb 2021 - Apr 2021*

- Created a mobile app (published in playstore) for patient engagement and remote connected care along with a similar version designed for hospitals to connect them to patients directly.
- **Technologies Used:** JavaScript, Firebase, React JS, Python.

Christine
Christine — *Oct 2020*

- Discord-bot that moderates online harassment along with toxicity and depressive behavior.
- Used 1.6 million tweets for constructing a scale to measure depression from text messages.
- **Technologies Used:** Python, NLTK, Google Cloud, JavaScript, Perspective AI.

Games and Computational Complexity
Playing Games — *Sep 2020 - Nov 2020*

- Proved the video game 'CELESTE' is NP-complete (original work). Furthermore, presented a dissertation explaining computational complexity of different games. Here is the preprint.

Dotabase
Dota2 Analyzer — *Sep 2020*

- Analyzer for professional matches in the popular game Dota 2. Implemented a fully functioning DBMS based on data scraped from OpenDota and built a suitable CLI using Python.
- **Technologies Used:** MySQL, Pymysql, Python.

Mariam: a Linux Shell
Mariam — *Aug 2020 - Sep 2020*

- Basic shell/terminal implemented from scratch in C using Linux system calls. Includes piping, redirection, signal handling as well as extensive error handling.
- **Technologies Used:** C, Linux, Operating Systems.

Skills

Primary Languages: C, C++, Python, LaTeX, Bash, x86, Haskell, Racket
Others: Cirq, Q#, Qiskit, Tensorflow, Tensorflow Quantum, PyTorch, Pennylane
Web: JavaSrcipt, React, HTML/CSS, MySQL, MariaDB

Interests

Quantum Computing, Algorithms and Optimisation, Programming Language Theory, Quantitative Finance