Alapan Chaudhuri

UNDERGRADUATE RESEARCHER, CQST & CSTAR, IIITH

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EDUCATION

International Institute of Information Technology, Hyderabad
B.Tech. and M.S. in Computer Science and Engineering   *July 2019 - Present*

Teaching Assistant: Automata Theory (Monsoon 2021), Linear Algebra (Spring 2022)
Positions of Responsibility: Student Moderator at NQSTS 2021 (July 2021 - Aug 2021), Literary Club Coordinator (Apr 2020 - June 2022)

EXPERIENCE

Collaborator, Ayers Lab
McMaster University, Canada   *June 2022 - Present*

Working with Prof Paul Ayers and his group on optimization algorithms for solving the positive semi-definite Procrustes problem, and extending the Procrustes python library. This project is also a part of Google Summer of Code (GSoC) 2022 and I have been accepted as a contributor to the same.

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

Adiabatic Quantum Computing: Working with Prof Shantanav Chakraborty on algorithms to predict avoided crossings for quantum systems under adiabatic evolution.

Entanglement Detection: Working with Prof Indranil Chakrabarty on identifying the degree of entanglement within a given quantum state (which is classically NP-Hard), using convex optimization and unsupervised learning. Also, working on generating robust datasets to be used for experimental purposes within quantum information theory.

Hamiltonian Simulation: Implementing Hamiltonian simulation frameworks for quantum computing systems using optimized trotter methods and qubitization. Also, working on devising hybrid techniques, for specific groups of Hamiltonians, to further improve the current benchmarks.

Compiler Engineering Intern
Qualcomm Innovation Center   *May 2022 - June 2022*

Worked with the LLVM team at Qualcomm on using QEMU decodetree for Hexagon target. The aim was to improve the Hexagon target by transitioning from building its own decodetree to the Python infrastructure provided by QEMU for creating instruction decoders.

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 to identify trends and outliers. Furthermore, performed large scale web scraping and data cleaning to ensure correct and standardized data.

AWARDS

- Accepted as a Google Summer of Code 2022 contributor to Open Chemistry.
- **Ranked 9th** in **ICPC Asia Regionals** 2020-21 (Gwalior-Pune).
- **Winner** of the **Quantum Chemistry Challenge** at QHack 2022 by Xanadu.
- Nominated for the 2022 ICPC Training Camp powered by Huawei.
- Ranked 1st (world) in the Grand Prix of Kyoto at Open Cup (Div 2) 2022.
- **Winner** of the **Goldman Sachs Challenge** at Texas A&M Datathon 2021.
- Certificate of Merit (top 1%) for the 2019 Indian Olympiad Qualifier in Physics.
- Rated 2022 (5 star) on Codechef, Top 2% (national) in Google HashCode 2022.
- Perfect score at zonal round of the Indian Computing Olympiad 2018, organized by IARCS.

Racket Compiler
Racket Compiler   *Feb 2022 - Apr 2022*

- Developed a nano pass compiler for a subset of racket language. Optimised register allocation in assembly using graph coloring and implemented tail call optimization.
- **Technologies:** Racket, Compiler Engineering

Nostradamus: Weathering Worth
Nostradamus   *Apr 2021*

- Explored correlations between the stock market, their volatility and behavior, against environmental factors, weather conditions and natural disasters. Monitored 10913 tickers, overall.
- **Technologies:** Python, Yahoo Finance API

Cirq
Google QuantumAI (cirq)   *Aug 2021 - Dec 2021*

- Implemented rotation gate, serial concatenation of Kraus Operators and minor structural updates (with Zeeshan Ahmed).
- **Technologies:** Python, Scientific Programming (scipy and numpy), Cirq.

Canswer
Dcode Care   *Feb 2021 - Apr 2021*

- Created a mobile application (published in Google Play with 500+ downloads) for patient engagement and remote connected care amongst people battling with cancer.
- **Technologies:** 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:** Python, NLTK, Google Cloud, JavaScript, Perspective AI.

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:** 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:** C, Linux, Operating Systems.

SKILLS

C, C++, Python, Haskell; Cirq, Q#, Qiskit, Tensorflow, Tensorflow Quantum, PyTorch, Pennylane; LaTeX, Bash, x86, Racket; JavaScript, React, HTML/CSS, MySQL, MariaDB

PRE-PRINTS &
PUBLICATIONS

Games and Computational Complexity