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)

Experience

Characterizing Absolute Classes of Quantum States
Centre of Quantum Science and Technology, IIITH *Dec 2021 - Present*

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.

Photonics for Quantum Communication
Centre of Quantum Science and Technology, IIITH *Jan 2022 - Present*

Studying fully deployable QKD systems using quantum photonic chips and working towards implementing various secure quantum communication systems using photonic integrated circuits.

Quantum Private Information Retrieval
Signal Processing and Communication Research Center, IIITH *May 2021 - Present*

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

Awards

- **Ranked 9^{th}** in ICPC Asia Regionals 2020-21 (Gwalior-Pune)
- Sports Programming: highest rating 1795 on Codeforces and 1967 on Codechef
- Certificate of Merit (top 1%) for the 2019 Indian Olympiad Qualifier in Physics (then NSEP)
- Top 6% (national) in Google HashCode 2020

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*

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).
- Updated `cirq.Circuit` to `cirq.AbstractCircuit` for compatibility.

Games and Computational Complexity
Supervisor: Prof. Kannan Srinathan *Sep 2020 - Nov 2020*

- Proved the video game 'CELESTE' is NP-complete (original work).
- Presented a dissertation explaining computational complexity of different games using constraint logic (by Demaine et al.) or classes like PPAD (under the context of Nash Equilibrium).
- Pre-print for the above work can be found at arXiv:2012.07678.

Christine
Christine *Oct 2020*

- Discord-bot that moderates sexual harassment along with toxicity and depressive behavior using approaches such as sentiment analysis.
- Used 1.6 million tweets for constructing a working scale to measure depression from text messages. Python NLTK framework was used for the same.
- **Technologies Used:** Python, Google Cloud, JavaScript, Perspective AI.

Technical Projects

Rogue One: a Game
Rogue-One *Apr 2021*

- Implemented a space-ship battle game using WebGL. Further, designed an animated trailer for the game using Blender.
- **Technologies Used:** JavaScript, WebGL, Blender.

Canswer Mobile App
Caregrades Technologies Pvt. Ltd. *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.

Dotabase
Dota2-Analyzer *Sep 2020*

- Analyzer for professional matches in 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
Quantum: Cirq, Q#, Qiskit
Web: JavaSrcipt, React, HTML/CSS, MySQL, MariaDB
ML: Tensorflow, Tensorflow Quantum

Interests

Quantum Computation and Information, Programming Language Theory, Algorithms and Optimization