

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

CGPA (out of 10): **9.08** (*in-major*), **8.63** (*overall*)

July 2019 - Present

Teaching Assistant: Automata Theory (Monsoon '21 and '22), Linear Algebra (Spring '22)

Positions of Responsibility: Moderator at NQSTS 2021, Literary Club Coordinator

RESEARCH INTERESTS

Quantum Computation

Algorithm Design (*with applications in ML*)

Programming Language Theory (*and logic*)

Computational Economics (*with applications to finance*)

EXPERIENCE

Quantitative Researcher

Quarkstone Capital

Oct 2022 - Present

Working on building multivac, our data analytics system and trading terminal, to improve and accelerate decision-making for trading/investing across all domains of the Indian financial markets.

Collaborator, Ayers Lab

McMaster University, Canada

June 2022 - Oct 2022

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.

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 using unsupervised learning.

Compiler Engineering Intern

Qualcomm Innovation Center, Austin, United States

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.

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.
 - 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](#).
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PRE-PRINTS & PUBLICATIONS

Classifying CELESTE as NP Complete
CST 2022 | [arXiv:2012.07678](https://arxiv.org/abs/2012.07678)

PROJECTS &
OPEN SOURCE

Racket Compiler

Racket Compiler

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

PauliZee

PauliZee

2022

- Implemented a framework to simulate Hamiltonians on a quantum computing system using optimized trotter methods and Szegedy quantum walks.
- Benchmarked it to be better than the default Qiskit implementation for simulating the Heisenberg Spin Chain Hamiltonian on a 7-qubit IBM quantum computer.
- **Technologies:** Python, Qiskit

Nostradamus: Weathering Worth

Nostradamus

2021

- Explored correlations using statistical learning between volatility and behavior of NYSE stocks against environmental factors, weather conditions, natural disasters.
- Closely studied 28 stocks across 5 major sectors and monitored behavior of total 10913 tickers.
- **Technologies:** Python, Yahoo Finance API

Canswer

Dcode Care

2021

- Worked with Dcode Care on a mobile application for patient engagement and remote connected care amongst people battling with cancer. Published in [Google Play](#) with 100+ downloads.
- **Technologies:** JavaScript, Firebase, React JS, Python.

Benchmarking Algorithms for Graph Classification

How Powerful are Graph Neural Networks?

2021

- Designed a provably maximally powerful GNN under the neighborhood aggregation framework and compared our implementation with that of Graph Isomorphism Networks (GINs) and the Weisfeiler-Lehman Test.
- **Technologies:** PyTorch, Datasets for Graph Classification (PROTEINS, MUTAG)

Cirq

Google QuantumAI (cirq)

2021

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

Christine

Christine

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.

SKILLS

C, C++, Python, Haskell, L^AT_EX, Bash, x86, Racket, Cirq, Q#, Qiskit, Tensorflow, PyTorch, PennyLane, JS, React, HTML/CSS, MySQL