

# ALAPAN CHAUDHURI

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## Education

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### IIIT Hyderabad

*B.Tech. and M.S. in Computer Science and Engineering*

Teaching Assistant for Linear Algebra and Automata Theory, Literary Club Coordinator, Student Moderator at NQSTS 2021.

July 2019 – Ongoing

Hyderabad, India

## Experience

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### Instabase

*Software Engineer Intern*

May 2023 – Aug 2023

Bangalore, India

- Built a language model interaction and prompting framework to improve document information extraction in AI Hub ☞ with 0.98 F1 score for invoices and 0.85 F1 score for 10-K filings.
- Implemented dilated attention to augment Large Language Models (LLMs) with bigger context window sizes and led to a reduction in training costs by 82% for a 6.7B parameter model. This was possible by swapping standard attention layers with dilated attention allowing for sub-quadratic (almost linear) computational complexity.

### Centre for Quantum Science and Technology

*Research Assistant*

Dec 2022 – Ongoing

Hyderabad, India

- **Adiabatic Quantum Computing:** Working with Prof. Shantanav Chakraborty ☞ on exploring quantum algorithms based on local adiabatic evolution to solve the spatial search problem in the presence of strong Gaussian disorder.
- **Entanglement Detection:** Working with Prof. Indranil Chakrabarty ☞ on implicit generative models to identify the degree of entanglement of any quantum state. This would help in characterizing the geometry of absolutely separable states and investigating its equivalence with absolute PPT states.

### Ayers Lab, McMaster University

*Collaborator and GSOC Contributor*

June 2022 – Oct 2022

Hamilton, Canada

- Worked with Dr. Paul Ayers ☞ on optimization algorithms for solving the positive semi-definite Procrustes problem and extending the Procrustes ☞ python library. Contributed under Open Chemistry in Google Summer of Code 2022. ☞

## Skills

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Python, C/C++, Haskell, Coq, JavaScript, Racket, MySQL, HTML/CSS, TensorFlow, PyTorch, Cirq, Qiskit, React, Q#

## Awards

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- **ICPC World Finalist:** Qualified for the 46th World Finals. Placed 2nd (India) at the Asia West Finals 2022 ☞ . The International Collegiate Programming Contest ☞ is the oldest, largest & most prestigious programming contest in the world.
- **QHack 2022 Winner:** 1st place out of 800+ teams in the Quantum Chemistry Challenge at QHack 2022 by Xanadu. ☞

## Publications

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- BellQube: Experimental Quantum Resource Theory (Under Review)
- Classifying CELESTE as NP-Complete (CST 2022) ☞

## Projects

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### Racket Compiler | *Racket, Functional Programming, Compiler Design*

2022

- Developed a nano pass compiler for a subset of the racket language (supporting vectors and loops as well). Optimized register allocation with greedy graph coloring and recursive calls with tail call optimization. ☞

### Quarkstone | *Python, Rust, Linear and Quadratic Programming*

2022

- Created a library for asset pricing and portfolio optimization that can be ported onto a trading terminal for investment research. Closely studied 28 stocks across 5 major sectors and monitored the behavior of a total of 10915 tickers.

### PauliZee | *Qiskit, Hamiltonian Simulation*

2022

- Engineered a quantum simulation framework with optimized Trotter methods exceeding the performance of Qiskit's default implementation on 7-qubit IBM systems. ☞

### Mariam: a Unix shell | *C/C++, Linux, Operating Systems*

2021

- Implemented a Unix shell with inter-process communication, custom signal handling, I/O redirection, as well as error handling, using raw Linux system calls. ☞

### Christine | *Python, NLTK, Google Cloud Platform*

2020

- Created a discord bot that moderates online harassment along with toxicity and depressive behavior. 1.6 million tweets were used for constructing and calibrating a scale to measure depression from text messages. ☞