Jam Kabeer Ali Khan

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OBJECTIVE

Undergraduate student in Computer Science and Mathematics, interested in the formal verification of quantum programs. Researching device-independent quantum key distribution, and applying programming languages theory knowledge to develop formally-verified models and proofs for Quantum Computation and Information.

RESEARCH EXPERIENCE

- **HKU Programming Languages Group [website]**   *Aug 2024 - Present*
  Bachelor's Thesis: Formal Verification of Quantum Programs   Hong Kong SAR
  ○ Deepening understanding of **Coq** Theorem Prover and type theory through Software Foundations series and "Types and Programming Languages" book. Conducting literature review on formal verification of quantum programs, and exploring tools like **Qbricks**, **QWIRE**, and **CoqQ** to identify and address specific research problems.

- **Quantum Information and Computation Lab [website]**   *Feb 2024 - Present*
  Research Assistant   Hong Kong SAR
  ○ Developed code for semi-definite programming (NPA Hierarchy) to find maximum quantum and classical violations of Bell inequalities, proving self-testing properties using SOS-decomposition. Utilized tools such as QuantumNPA.jl, QETLab, CVXOPT, YALMIP, Scipy, Sympy, and Numpy with **Python**, **Julia**, and **Matlab**.
  ○ Calculated guessing probability of an adversary in device-independent quantum key distribution to certify randomness against noise.

- **HKU Sleep Lab [website]**   *March 2022 - Oct 2022*
  Research Assistant   Hong Kong SAR
  ○ Improved Android app performance by migrating legacy Android libraries to AndroidX and integrating Google's ExoPlayer to increase video player performance by 40% with added Mandarin language support, using Java, XML, and Android Studio.
  ○ Worked in collaboration with PhD students to reduce iOS app latency by 80% and fixed server connection bugs by updating the Objective-C code using Xcode.

EDUCATION

- **University of Hong Kong**   *Sept 2021 - July 2025*
  BEng, Computer Science and Mathematics   Hong Kong SAR
  ○ GPA: 3.44, Major-GPA: 3.56
  Coursework: Functional Programming, Algorithms, Discrete Math, Linear Algebra, Quantum Computation and Information, Multi-variable Calculus, Computational Methods, Operating Systems etc.

- **Northeastern University**   *Jan 2024 - May 2024*
  Semester Exchange, BSc Computer Science and Mathematics   Boston, USA
  ○ GPA: 3.92
  Coursework: Programming Languages, Networks and Distributed Systems, Algorithms, and Number Theory.

- **Nixor College**   *Sept 2018 - July 2020*
  GCE A-levels   Karachi, Pakistan
  ○ 4 A^*s & 2 As (Regional Distinction for Computer Science and Physics.)

INDUSTRY EXPERIENCE

- **ActusRayPartners Limited (Quant Hedge Fund)**   *June 2023 - Aug 2023*
  SWE Internship   Hong Kong SAR
  ○ Developed an efficient Python-based database management library using SQLAlchemy, Pandas, and MSSQL, enhancing performance by 40% and mitigating data corruption risks for quantitative algorithms by migrating data from CSV format to SQL database with unit testing.
  ○ Implemented data synchronization in the trade tech software eliminating the chance of executing prohibited trades by 100% using Flask and Visual Basic (VBA).

- **AllRound Education Academy**   *Feb 2023 - Oct 2023*
  Software Developer - Part Time   Hong Kong SAR
  ○ Designed and developed a full stack revision platform web app for IB students with deployed with 100+ users, using NextJS, TailwindCSS, Firebase, Auth0 and Redux and perform A/B testing with users.

PROJECTS

- **Router: Simple BGP Router** *March 24*
  Tools: Python, Socket, TCP [Github Link]
  ◦ Simulation of a BGP router using routing logic, packet forwarding etc.
- **SLUG: Toy Interpreter** *April '24*
  Tools: Racket, DrRacket IDE
  ◦ Toy Programming Language with environments, and bindings as part of CS4400/5400 course at Northeastern University.
- **Shell** *Oct '23*
  Tools: C, POSIX Library [Github Link]
  ◦ Parses simple terminal commands, e.g. cd, pwd, echo, with upto 5 pipes and executes and manages processes.
- **Notakto game with AI-Agent** *April '22*
  Tools: C++ [Github Link]
  ◦ Implementation of AI Agent based on following paper: https://arxiv.org/pdf/1301.1672.pdf
- **Flymate: Travel App** *Nov '23*
  Tools: Dart, Flutter [Github Link]
  ◦ Travel app with chatbot, documents assitant, and in-flight support for people with disabilities.

HONORS AND AWARDS

- **HKUWW Exchange Scholarship** *2024*
- **HKU Undergraduate Entrance Scholarship for Outstanding Academic Talents** *2022-23, 2023-24*
- **Cathay Hackathon Winner** *Nov 2023*
  Cathay Pacific Airline [🌐]
  ◦ Won a free return ticket worth 3000 USD to Boston.
  ◦ Won out of 250 teams for creating an app to improve flight experience of people with disabilities.
- **HKSAR Government Scholarship Fund** *2021-22, 2022-23, 2023-24*
- **HKU Foundation Entrance Scholarship** *2021-22*
- **Regional Distinction in CAIE GCE A-levels Physics and Computer Science** *2018-20*
  British Council
- **Full Tuition Scholarship for GCE A-levels** *2018-20*
  Nixor College

OTHER EXPERIENCES

- **Teaching Assistant: ENGG1340 (C/C++) course** *Jan 23 - May 23*
  University of Hong Kong
- **Teaching Assistant: COMP2396 (Object-Oriented Programing) course** *Sept 23 - Dec 23*
  University of Hong Kong
- **Co-Founder and President** *Sept 2023 - Present*
  New College Programming Society
- **Founder and President** *Sept 2022 - Dec 2023*
  New College Hiking Club
- **President** *Sept 2023 - present*
  New College Events, Festival and Culture Team

REFERENCES

1. **Bruno C.d.S. Oliveira**
   Associate Professor, Department of Computer Science
   University of Hong Kong
   Email: bruno@cs.hku.hk
   Phone: +852-2219-4800
   Relationship: Bachelor's Thesis Advisor

2. **Ravi Ramanathan**
   Assistant Professor, Department of Computer Science
   University of Hong Kong
   Email: ravi@cs.hku.hk
   Phone: +852-2859-2350
   Relationship: Research Supervisor

3. **Eli Barzilay**
   Adjunct Lecturer, Khoury College of Computer Sciences
   Northeastern University
   Senior Software Developer, Microsoft
   Email: eli@barzilay.org
   Relationship: Mentor