Prateek P Kulkarni

BTech(ECE)

+91 9113237754
pkulkarni2425@gmail.com
http://prateekpkulkarni.github.io/
pkulkarni2425

Employment History

Dec. '24 – Present **Research Intern**, *NYU Quantum Technology Lab, NYU Shanghai*
Advised by Prof. Chandrashekhar Radhakrishnan and Prof. Tim Byrnes, I will be working on certain aspects of Jaynes-Cummings Models.

Oct. '24 – Dec. '24 **Visiting Research Intern**, *Quantum Computing Research @IIIT Dharwad*
Advised by Prof. Aswath Babu H, work focused towards applications and frameworks of Quantum NLP (using `lambeq` framework).

Aug. '24 – Present **Research Assistant**, *Photonics and Quantum Tech Lab, PES University*
Working on the foundational aspects and implications of quantum machine learning. Current focus is on VQAs and QNNs. (*Thesis*)

March '24 – Present **Visiting Research Student**, *Indian Institute of Science*
Part of the Future Computing Systems Lab led by Prof. Sumit K. Mandal in the Department of Computer Science and Automation, working in the areas of quantum multicore architecture. *(Manuscript under Preparation)*

Feb. '24 – Aug. '24 **Research Intern**, *ISFCR, PES University*
Worked on various frameworks/protocols in quantum and post-quantum cryptography at the Center for Information Security, Forensics and Cyber Resilience at PES University.

Oct. '23 – Jan. '24 **Research Intern**, *IIT Tirupati*
Worked on aspects of Quantum Causality and implications, with a focus on its applications in Quantum Cryptography frameworks under Prof. S Aravinda, of Department of Physics and CAMOST.

Education

2022–2026 (Expected) **BTech in Electronics and Communications Engineering (VLSI)**, *PES University*
Thesis title: Photonic FPGA for Variational Quantum Algorithms (Ongoing Work)

2021-2022 **Grade 12**, *Kendriya Vidyalaya*, Hebbal

Relevant Courses

Completed: Quantum Mechanics, Analog Circuit Design, Computer – Aided Digital Design, Digital VLSI, Networks Analysis and Synthesis, Signals and Systems, Digital Signal Processing, Control Systems, Digital Communication, Linear Algebra, Calculus

Ongoing: Computer Organization and Design, Chip – Level Photonics, Electromagnetic Field Theory, Computer Communication Networks, Quantum Computing and Quantum Entanglement

Research Publications

Conferences

1. Prateek Kulkarni. **A Low-Latency Memory Architecture using 3D XPoint and Memristor Technologies**. [Appearing in C2I6-2024].

2. Prateek Kulkarni. **RAPID: Row-Access Pattern-aware In-DRAM Prefetching**. [Appearing in ETIS'25].

3. Prateek Kulkarni. **CacheWeave: Cross-Domain Data Extraction Through Systematic Cache Pattern Manipulation**.[Submitted to HOST'25].

4. Prateek Kulkarni and M. Sivasankar. **Quantum Circuits for Locating and Enumerating the Factors of Morphic Words**. [Submitted to CIAC'25].

5. Prateek Kulkarni and Suhas N Bharadwaj **A Framework for Efficient Conversions of LDPC Codes to Quantum Circuits**. [In Preparation].

Skills

Languages	Strong reading, writing and speaking competencies for English, Hindi and Kannada
Coding	Python, R, Julia, Verilog, C++, Haskell, Q#, LaTeX
Tools	Matlab, Lumerical, Comsol, Cadence, Vivado Design Suite, gem5, Qiskit, Cirq
Misc.	Academic research, teaching, training, consultation, LaTeX typesetting and publishing

Projects

(Completed, Find it here.)	**PipSim**: PipSim, written in python, offers a basic framework for simulating RISC-V pipelines, visualizing instruction execution, and exploring the effects of data hazards and forwarding.
(Completed)	**Field-Induced Isomorphic Optimization Algorithms**: Developed a new class of optimization algorithms sharing philosophy similar to Nature-Inspired Optimization Algorithms (NIOAs).
(Ongoing)	**TESSCrypt**: Tessellated Encryption is a new, advanced technique of encrypting data securely exploiting the properties of tessellations.
(Patent Filed)	**RegDyno.Ai**: Co-founded a company that offers a robust prediction model, aiming to reduce noise and errors in time-series data plots, using custom distribution and regression model.
(Preparing for Distribution)	**surface2cirqit**: Created a full-fledged package in python for converting any Surface Code to an equivalent, fully-functional Quantum Circit.

Awards and Achievements

Sept. 2024	**Q-Pragathi**, *IISc Quantum Technology Initiative* Part of the team working on the proposal selected to be funded over a year. (*Surface – based Quantum Information Processing*)
Jan. 2024	**Present and Future Computing Systems**, *Indian Institute of Science* Selected as one of about 80 participants to attend the workshop organized by CSA, IISc.

Jan. 2024 **ISFCR, Funded Long-Term Internship**, *PES University*
Awarded one of the 10 funded long-term internships at the Center for Information Security, Forensics and Cyber Resilience.

Feb. 2019 **Pravega 2019, Second National Prize**, *Indian Institute of Science*
Won the Second prize, nationally, in the Explain The Concept event at the Undergraduate Fest, while in 9th grade.

Clubs and Volunteering

Aug. '24 – Present **QForest**, *PES University*
Leading the flagship quantum computing club. Also a core part of the technical domain.

Sept. '23 – Sept. '24 **Research Et. Al.**, *PES University*
Content head at the research-oriented club under the Dept. of CSE.

Aug. '23, Aug. '24 **Bootstrap, Dept. of ECE**, *PES University*
Volunteering to demonstrate and briefly explain the main themes of research and focus at the Photonics and Quantum Tech Lab to new cohorts.

Oct. '23 – Nov. '23 **HackeZee, Dept. of ECE**, *PES University*
Part of the Operations Team for the flagship hardware design hackathon.

Oct. '22 **TedXPESU**
Part of the Organising Team for the event hosted by TedX chapter.

Apr. '20 – Feb. '22 **Literary Club President**, *K V Hebbal*
President of the Literary Club, responsible for editing, curating, and supervising club magazine publications and organizing events.

References

- **Prof. Dr. Kaustav Bhowmick**
  Associate Professor,
  Dept. of ECE, PES University.
  kaustavbhowmick@pes.edu

- **Prof. Dr. R Srikanth**
  Associate Professor,
  Theoretical Sciences Division, Poornaprajna Institute for Scientific Research.
  srik@ppisr.res.in

- **Prof. Dr. Sumit K Mandal**
  Assistant Professor,
  Dept. of Computer Science and Automation, IISc.
  skmandal@iisc.ac.in