

PRATEEK P. KULKARNI

BTech (Electronics and Communications Engineering)

Mobile: +91 9113237754 • Email: pkulkarni2425@gmail.com

Website: <http://prateekpkulkarni.github.io> • Github: prateekpkulkarni

LinkedIn: pkulkarni2425

EDUCATION

PES University

2022–2026 (Expected)

BTech in Electronics and Communications Engineering (VLSI)

Thesis: Photonic FPGA for Variational Quantum Algorithms

Kendriya Vidyalaya, Hebbal

2021–2022

Grade 12

RESEARCH INTERESTS

Quantum Computing, VLSI Design, Electronic Design Automation, Systems Architecture

SELECTED COURSEWORK

Analog Circuit Design, Computer - Aided Digital Design, Digital VLSI, Computer Organization and Design, High Performance Computing, Chip – Level Photonics, Quantum Computing and Quantum Entanglement, Quantum Transport and Logic Gates, Non-Linear Optics and Quantum Technology

RESEARCH EXPERIENCE

Research Assistant

Aug 2024–Present

Photonics and Quantum Tech Lab, PES University

Advisor: Prof. Kaustav Bhowmick

Foundational aspects and implications of quantum machine learning (Undergraduate Thesis)

Visiting Research Student

Mar 2024–Present

Future Computing Systems Lab, Indian Institute of Science

Advisor: Prof. Sumit K. Mandal, Department of Computer Science and Automation

Distributed Quantum Computing and Quantum Complexity Theory

PUBLICATIONS

Journals:

1. Ramaseshan R, Abhishek Kumar V S, Adith Rajeev, Prathik V, Aditya Aravind, Prateek P. Kulkarni and Kaustav Bhowmick. **A Generalized Hamiltonian Approach for Designing Simple Single Photon-based Optical Quantum Devices.** *The Journal of Supercomputing*, Springer, 2025.

Conferences:

1. Prateek Kulkarni. **A Low-Latency Memory Architecture using 3D XPoint and Memristor Technologies.** *5th International Conference on Communication, Computing and Industry 6.0*, 2024.
2. Prateek Kulkarni. **RAPID: Row-Access Pattern-aware In-DRAM Prefetching.** *International Conference on Emerging Technologies for Intelligent Systems*, 2025.

Preprints:

1. Ramaseshan R, Prateek P. Kulkarni, Sharanya Madhusudhan and Kaustav Bhowmick. **A Theoretical Treatment of Optical Metasurfaces as an Efficient Basis for Quantum Correlations.** *arXiv:2507.09517 [quant-ph]*, 2025

TECHNICAL SKILLS

Programming Languages: Python, R, Julia, Verilog, C++, Haskell, Q#, L^AT_EX

Software Tools: Matlab, Lumerical, Cadence, Vivado Suite, gem5, Qiskit, Cirq, PennyLane

SELECTED PROJECTS

PipSim: RISC-V pipeline simulation framework in Python with visualization capabilities for instruction flow and hazard detection. Educational tool implementing 5-stage pipeline architecture with data forwarding and branch prediction mechanisms. (Github Repository)

RegDyno.Ai: Time-series prediction model for noise reduction using custom distribution modeling and regression techniques. Machine learning framework deployed for forecasting with demonstrated improvements over traditional ARIMA models. (Patent published)

surface2cirqit: Python package for Surface Code to Quantum Circuit conversion with automated syndrome extraction protocols and circuit optimization for gate count reduction. (Github Repository)

AWARDS AND RECOGNITION

Q-Pragathi Funding Sept 2024

IISc Quantum Technology Initiative - Surface-based Quantum Information Processing

Workshop Selection Jan 2024

Present and Future Computing Systems, IISc (80 participants selected)

Funded Internship Jan 2024

ISFCR Long-Term Internship, PES University (10 recipients)

National Second Prize Feb 2019

Pravega 2019, Indian Institute of Science

TEACHING EXPERIENCE

Teaching Assistant: Quantum Transport and Logic Gates Spring 2025

Teaching Assistant: Quantum Entanglement and Quantum Computation Fall 2025

PROFESSIONAL SERVICE

Reviewer: IEEE CONECCT 2025, IEEE Transactions on Quantum Engineering

REFERENCES

Prof. Sumit K. Mandal

Assistant Professor, Department of CSA, Indian Institute of Science

Email: skmandal@iisc.ac.in

Prof. Kaustav Bhowmick

Associate Professor, Department of ECE, PES University

Email: kaustavbhowmick@pes.edu