

SAI PAVAN KRISHNA NAGAM

+91-830-953-3922 ✉ nasapakri@gmail.com  LinkedIn  GitHub  nasapakri.com  ORCID

Research Interests

Quantum Algorithms · Quantum Error Correction · Classical-Quantum Optimisation · Hardware-aware Algorithms · Complexity Theory

Education

Indian Institute of Science (IISc)

M.Tech in Quantum Technology

- CGPA: 8.3/10.0

Bengaluru, India

Aug 2024 – Present

Amrita Vishwa Vidyapeetham

B.Tech in Computer Science and Engineering

- CGPA: 9.83/10.0 (College Gold Medalist)

Amritapuri, Kerala, India

Aug 2019 – May 2023

Research Experience

Graduate Researcher

SINESys Lab, Indian Institute of Science

- Designing FPGA-based accelerators for real-time quantum error correction and tensor-network quantum dynamics; co-developing hardware-aware decoders and systolic compute fabrics on Xilinx Zynq UltraScale+ platforms

Aug 2025 – Present

Bengaluru, India

Quantum Computing Intern

IBM Quantum

- Engineered an end-to-end implementation benchmarking suite for Qiskit functions, characterising fidelity, runtime, and noise sensitivity across IBM hardware backends
- Designed adversarial quantum circuits using evolutionary search to expose latent error mechanisms, informing transpiler and noise-model improvements

May 2025 – Aug 2025

Bengaluru, India

Research Intern

International Institute of Information Technology (IIIT) Hyderabad

- Investigated multi-objective optimisation strategies for scheduling under conflicting performance criteria; benchmarked Pareto-optimal heuristics against exact solvers
- Developed a delay-aware multi-armed bandit algorithm for large-scale recommendation, with regret bounds validated on real-world session logs

Jul 2023 – Feb 2024

Hyderabad, India

Research Intern

Pennsylvania State University

- Built deep-learning classifiers for chemi-sensing on 2D-semiconductor devices and designed constraint-satisfaction algorithms on 2D neuromorphic substrates, exploring hardware-native algorithm design

Jan 2023 – Jun 2023

State College, PA, USA

SURGE Summer Research Fellow

Indian Institute of Technology (IIT) Kanpur

- Profiled Quicksort variants across input distributions and deployed a stable-matching algorithm for departmental TA allocation, replacing a manual pipeline

May 2022 – Aug 2022

Kanpur, India

Project Assistant

Amrita School of Computing

- Directed-graph link prediction using Stochastic Block Models + MLE (published in BDCC, 2023); influential-node identification via a modified PageRank tailored to motif-rich graphs

Dec 2021 – Dec 2022

Kerala, India

Publications & Preprints

- **BDCC 2023, 7(1), 31:** An Improved Link Prediction Approach for Directed Complex Networks Using Stochastic Block Modeling
- **PiCET 2024:** Surveying Keyword Extractors: Classification, Applications, and Empirical Analysis
- **ISTA 2023 (accepted):** Probabilistic Distributions on Directed Motifs in Complex Social Networks: A Deep Analysis

Selected Projects

FPGA Decoders for Real-Time Surface-Code QEC | *M.Tech Thesis, SINESys* Aug 2025 – Present

- Comparative study of MWPM, Union-Find, and belief-propagation decoders on FPGAs over latency, logical error rate, and syndrome throughput; kernel profiling and resource/timing-aware mapping onto Xilinx FPGAs
- HLS vs. hand-crafted RTL on F_{\max} and resource use; robustness under correlated/biased noise; hierarchical decoders for adaptive low-latency QEC cycles

Systolic Fabric for Tensor-Network Quantum Dynamics | *Course Project, IISc* Aug 2025 – Nov 2025

- Parameterised $N \times N$ systolic GEMM fabric ($N \in \{4, 8, 16, 32\}$, 16/24/32-bit datapaths) on Xilinx ZCU104 with hybrid RTL+HLS stack: Verilog PE/SVD/QR cores under a Vitis HLS C++ MPS/PEPS-BMPS/tree-TN layer
- 16×16 fixed16 closes timing at $F_{\max} = 569.5$ MHz, 14.8% DSP use; 11,280+ MACs verified vs. float64; analytical model predicts $82 \times -6500 \times$ speed-up over single-core CPU

TRACE-Q: Automated Transmon Characterisation | *QTL, IISc* Dec 2024 – Present

- Automated tool extracting internal quality factor, anharmonicity, and dispersive (χ) shifts from VNA/IQ data; PyVISA+PyQt6 control with cavity-QED fitting

Calibration of Sequential Sensor Data | *Penn State* Jan 2023 – Jun 2023

- ML/DL calibration pipelines suppressing sensor-to-sensor variance while preserving discriminative signal patterns for chemi-sensing

Link Prediction via MAP Estimation and Motifs | *Independent Study* Mar 2023 – Jul 2023

- Maximum A-Posteriori link prediction over local network motifs; improved recall on directed-graph benchmarks vs. embedding baselines

Teaching Experience

Teaching Assistant Aug 2025 – Present *Indian Institute of Science* Bengaluru, India

- QT 207: Introduction to Quantum Computation (3:0)

Teaching Assistant Oct 2022 – Dec 2022 *Amrita School of Engineering* Kollam, India

- 19CSE100: Problem Solving and Algorithmic Thinking; 19CSE101: Computer Essentials
- Conducted workshops and mentored ACM student clubs

Leadership & Service

Lead Organizer, IISc \times Qiskit Fall Fest 2025 Aug 2025 – Nov 2025 *Indian Institute of Science* Bengaluru, India

- Led a 5-member team for the IBM Quantum / IQTI / QuRP-sponsored event; managed speaker invitations, logistics, session delivery, and hackathon judging

Department Representative, Seminar Coordinator & SWAN M.Tech Coordinator Aug 2024 – Present *Dept. of Instrumentation and Applied Physics / IAP, IISc* Bengaluru, India

- Represent the M.Tech cohort, run the departmental seminar series, and coordinate student-wellness initiatives across the IAP department

Honors & Awards

AIR 72, GATE-CS 2024 | College Gold Medalist (Amrita University, CGPA: 9.83) | Top 1000 Global in LeetCode Contest Rating | ICPC Regionalist | SURGE-2022 Fellow (IIT Kanpur)

Technical Skills

Programming Languages: Python, C/C++, Java, Scala, Haskell, SQL, HTML/CSS/JavaScript

Hardware & EDA: Verilog, Vitis HLS, LLVM/MLIR, Vivado, Yosys, Xilinx Zynq UltraScale+ (ZCU104)

Quantum & ML Stacks: Qiskit, Stim, TensorFlow, Keras, scikit-learn, PyVISA, PyQt6, Django, REST, ReactJS

Areas of Expertise: Quantum Error Correction, FPGA Acceleration, Hardware-Aware Algorithms, Tensor Networks, Machine Learning, Algorithm Design

Relevant Coursework

Graduate Courses: Randomised Algorithms, Quantum Error-Correcting Codes, Scientific Computing using Quantum Algorithms, Computational Methods for Optimisation, Efficient and Secure Digital Circuits and Systems, Digital System Design with FPGAs, Compiler Design, Bioinformatics

Undergraduate Courses: Deep Learning for Computer Vision, Advanced Programming, Cloud Computing, Advanced Computer Networks, Wireless and Mobile Communications

Additional Certifications: Deep Learning using TensorFlow (Coursera), Randomized Methods for Approximation (GIAN), Meta Backend Developer (Coursera), Optimisation Techniques (NPTEL)