ABHINAV RAJEEV KUMAR

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EDUCATION

Bachelor of Technology in Computer Science — September 2022 - May 2026
SRM Institute of Science and Technology — CGPA: **8.36/10.00**

EXPERIENCE

Undergraduate Researcher — February 2024 - Present
Quantum Computing Lab @ SRMIST — *Tamil Nadu, India*
Advisor: Dr. Gayathri

- Investigated and implemented QKD protocols (BB84, B92, E91, SSP) using Qiskit on a **STAR-based fibre optic network** to enhance quantum communication security under the Quantum Computing Lab.
- **Developed hybrid neural networks** trained to identify and correct quantum errors, achieving a 24% increase in time efficiency compared to traditional methods.

Software Engineer Intern (Gemini Team) — May 2023 - May 2024
Google — California, USA (Remote)

- **Implemented a data-driven approach** with the help of XAI methods and LIME technique to refine inappropriate question detection, leading to a **20% reduction in false positives** based on user feedback.
- Worked with chain-of-thought prompting, specifically a **template-based approach**, to enhance the reasoning capabilities of large language models for multi-step tasks; **Improved the F1 score by 24%** compared to baseline models without CoT prompting.
- **Conducted a research study** with Google's Quantum AI team implementing POVMs to extract multiple information states from trapped ion qubits; leveraged insights to develop an **optimized chain-of-thought algorithm** for efficient token utilization in prompt engineering, achieving **63% measurement correlation**.

Machine Learning Engineer — December 2022 - February 2023
SuperImage — Tamil Nadu, India

- Contributed to the development of an image up-scaling app by utilizing the MNN DeepLearning Framework and Real-ESRGAN algorithm for **4x image resolution improvement achieving a PSNR value of 38dB**.
- Achieved a **30% reduction in inference time** by harnessing **MNN's quantization** capabilities along with **hardware based acceleration** on Vulkan/OpenCL based devices.

PUBLICATION

[1] **Kumar A R**, Kavitha V, Gayathri M. "Scaling Multi-Party Quantum Key Distribution Through Understanding System Attacks" (*Under review by Design Automation Conference (DAC) 2025*).

SKILLS

Programming Languages	Python, C++, JavaScript, TypeScript, Dart, CUDA, Rust
ML Frameworks	PyTorch, TensorFlow, JAX, SciPy, OpenCV, LangChain
Quantum Computing Frameworks	Qiskit, Cirq, PennyLane, Tensorflow-Q, CUDA-Q, QUBO, Mitiq
Web & App Development	React.js, Node.js, Django, Flutter, MySQL, PostgreSQL

PROJECTS

ReportEase | Python, Flask, Pytorch, Docker, Huggingface | Project Link
Won third place overall in Rajasthan Police Hackathon. An automated legal insight platform using a Mistral-AI LLM fine-tuned on BNS & BNSS datasets to analyze FIRs and generate insightful reports.
Surge Protector | Python, PyTorch, React.js | Project Link
Won "Best Track using AI/ML" in Stanford Treehacks. An AI-driven drone and dashboard system that detects stampedes by marking heads in crowds using a convolutional neural network
Shadow | Python, Langchain, Hugginface, JAX | Project Link
A multimodal LLM trained to analyze various crime data, providing police officers with a deep understanding of the underlying factors and potential drivers of criminal activities.