

Sathwik Reddy Majji

Scientist/Engineer

Indian Space Research Organisation (ISRO)

VSSC, Thiruvananthapuram 695022, India

[✉ sathwikreddymajji@outlook.com](mailto:sathwikreddymajji@outlook.com)

[🌐 srmajji.com](http://srmajji.com) [🎓 Google Scholar](https://scholar.google.com/citations?user=sathwikreddymajji)

[🌐 linkedin.com/in/srmajji](https://www.linkedin.com/in/srmajji)

EDUCATION

Degree/Qualification	Institute/School	Year	CGPA/%
B.Tech in Electronics and Communication Engineering	Indian Institute of Space Science and Technology	2018–2022	8.02
Intermediate (11th & 12th Standard)	FIITJEE Junior College	2015–2017	92%
Secondary School (10th Standard)	FIITJEE World School	2015	9.3

EXPERIENCE

Vikram Sarabhai Space Centre (VSSC), ISRO

Scientist/Engineer, Cloud Computing Section

Thiruvananthapuram, India

Feb. 2025 – Present

- Worked on designing and developing a Proxmox-based cloud workstation infrastructure using NVIDIA vGPU technology with Delegated License Service (DLS) and Amazon DCV for remote visualization, enabling concurrent CAD/CAE workloads for over 10 users per workstation with GPU and reducing workstation procurement costs by nearly 90%.
- Worked on the project of man-rating of pyros for Gaganyaan missions by creating machine learning workflows for defect detection in pyro modules and setting up cloud computing systems to run ImageJ efficiently for high-volume evaluation tasks.
- Collaborated with Hitachi team in the design and implementation of a 2 petabyte unified enterprise storage solution at VSSC, enhancing data availability and performance across mission-critical systems.
- Led a team in developing a personalized local AI system with multi-modal LLMs for heterogeneous documents.
- Engaged in developing quantum-encrypted ground and satellite communication links using QKD technology as part of India's National Quantum Mission.

Vikram Sarabhai Space Centre (VSSC), ISRO

Scientist/Engineer, Machine Learning and Data Analytics Section

Thiruvananthapuram, India

Nov. 2022 – Jan. 2025

- Worked on quantum processing of SAR imagery using datasets from “Quantum Processed SAR and Optical Images for Scene Classification”, exploring quantum-assisted noise de-speckling and digital beamforming techniques.
- Led a team in developing computer vision algorithms for automated detection of solder joint and component placement defects in space-grade PCBs, leveraging state-of-the-art deep learning and image inspection techniques to improve reliability and quality assurance in avionics hardware.
- Worked in a multidisciplinary team to develop an AI based defect detection system for high-pressure gas bottles used in liquid propulsion systems, analyzing temperature, pressure, and vibration parameters to identify structural anomalies and enhance launch vehicle safety.
- Worked on satellite image data compression using quantum techniques to enable efficient transmission and communication, developing amplitude embedding algorithms that achieved exponential compression scaling.
- Developed and deployed Red Hat OpenShift Container Platform (OCP) for containerized applications in an isolated intranet setup, enabling application scalability and persistent storage using ODF.
- Been part of the operation team managing SAGA supercomputing facility (current capability 3.0 PetaFLOPS, India's largest until 2012) and VSSC's on-site data center comprising of over 500 servers, implementing Prometheus-Grafana monitoring for GPU and CPU resources along with robust backup and recovery workflows for Red Hat OCP and RHV environments ensuring high availability and zero data loss.

- Developed quantum based image fusion techniques integrating SAR and optical imagery using eight quantum processing methods, improving CNN classification accuracy from 82.64% to 95.36% on land-use datasets acquired via Google Earth Engine.
- Developed a remote sensing dataset comprising 3,800 SAR and optical images from Sentinel-1 and Sentinel-2 missions, acquired from Google Earth Engine and preprocessed using quantum algorithms for deep learning and scene classification.

PROJECTS

SAR Image Analysis Using Multimodal LLMs

Prof. Deepak Mishra, IIST

Research Project

May 2025 – Present

- Development of LLM workflows for SAR image interpretation by integrating speckle statistics and scattering signature analysis to generate refined feature representations through controlled prompting, with the approach designed to scale to NASA-ISRO Synthetic Aperture Radar (NISAR) mission imagery.

Debris Capture Robotic Manipulator

VSSC & IISU

Development Project: POEM-4 / SpaDeX Mission

July 2023 – Oct. 2024

- Developed a MATLAB-based simulator for free-floating spacecraft manipulators using a Lagrangian formulation, with configurable links, inertias, joints, DH parameters, and end-effectors. The simulator was independently validated against MuJoCo, demonstrating accurate zero-gravity multi-body dynamics.

Quantum Image Data Compression

Prof. Manoj B.S., IIST

Research Project

Nov. 2022 – June 2023

- Designed quantum image compression methods using scalable amplitude embedding, proposed four strategies, and showed that key image patterns were preserved at up to 75% compression for effective subsequent processing.

Quantum Image Fusion

Prof. Manoj B.S., IIST & Dr. Raghavendra Kune, ADRIN

Research Project

Jan. 2022 – Oct. 2022

- Implemented a quantum-circuit-based image fusion approach to enhance SAR image quality, developing eight quantum processing techniques to fuse SAR and optical data and improve CNN land-use classification accuracy from 82.64% to 95.36%. Demonstrated the effectiveness of data-centric enhancement using quantum methods.

Quantum Big Data Analysis

Prof. Manoj B.S., IIST

Summer Internship Project

June 2021 – Nov. 2021

- Processed and collected remotely sensed data from Bhoonidhi and Google Earth Engine to build a custom multi-sensor dataset. Designed quantum circuits to embed SAR and optical images into quantum states. Generated quantum-encoded records and organized them into a repository for further research and experimentation.

Scene Text Detection and Recognition

Prof. Deepak Mishra, IIST

Mini Project

April 2021 – May 2021

- Designed and implemented a text detection and recognition model combining classical computer vision and deep learning using OpenCV, EasyOCR, and PyTorch, with hands-on experience building end-to-end systems.

Solar Tracking System

Control Systems Lab, IIST

Internship Project

July 2020 – Nov. 2020

- Designed and implemented a dual-axis solar tracking system using LDR sensors, op-amps, servo motors, and an L293D motor driver. The system dynamically adjusts the panel orientation based on real-time light intensity, improving solar energy capture and overall efficiency compared to fixed position panels.

Implementation of Home Security System using FPGA

VLSI Design Lab, IIST

Internship Project

May 2020 – Sept. 2020

- Implemented a home security system on a Xilinx Spartan-6 FPGA using Verilog HDL. Designed and modeled the system's sensing, control, and alert mechanisms directly in hardware, demonstrating efficient real-time operation and showcasing FPGA based implementation of embedded security applications.

REVIEW ASSIGNMENTS

Served as a reviewer for the following journals and conferences.

- IEEE Transactions on Geoscience and Remote Sensing (1)
- IEEE INDISCON 2025 (4)
- IEEE SPACE 2024 (1)

PUBLICATIONS

C = Conference, J = Journal, P = Preprint, T = Thesis

Updated list of my publications with datasets and software repositories is available at: [link](#)

- C1** 2025 Satvik Raghav, Sathwik Narkedimilli, **Sathwik Reddy Majji**, Msvpj Sathvik. [Enhancing Image Restoration with Quantum-Integrated Contrastive Adversarial Networks](#). *IEEE INDISCON 2025*. DOI: 10.1109/INDISCON66021.2025.11251964
- C2** 2024 Anumandla Sukrutha, Gopalakrishnan L, Pallabi Sinha, Pranay Pallav Tripathi, Raghav Hariharan, **Sathwik Reddy Majji**, Shikhar D, Sreelatha A. [Spacecraft Manipulator System Simulator](#). *IEEE SPACE 2024*. DOI: 10.1109/SPACE63117.2024.10667890 Authors in alphabetical order.
- J1** 2023 **Sathwik Reddy Majji**, Avinash Chalumuri, B. S. Manoj. [Quantum Approach to Image Data Encoding and Compression](#). *IEEE Sensors Letters*. DOI: 10.1109/LSENS.2023.3239749
- J2** 2022 **Sathwik Reddy Majji**, Avinash Chalumuri, Raghavendra Kune, B. S. Manoj. [Quantum Processing in Fusion of SAR and Optical Images for Deep Learning: A Data-Centric Approach](#). *IEEE Access*. DOI: 10.1109/ACCESS.2022.3189474
- P1** 2022 **Sathwik Reddy Majji**, Avinash Chalumuri, Raghavendra Kune, B. S. Manoj. [Data Acquisition and Utilization of Quantum Processed SAR and Optical Images for Scene Classification](#). *TechRxiv*. DOI: 10.36227/techrxiv.19672845.v2
- T1** 2022 **Sathwik Reddy Majji**. [Quantum Assisted Image Fusion Techniques for Processing SAR and Optical Images](#). *Institution: Indian Institute of Space Science and Technology*. DOI: 10.13140/RG.2.2.27379.75042

PUBLICATIONS IN PREPARATION

- **Sathwik Reddy Majji**, Anand Choubey, Deepak Mishra. Multimodal LLM-Driven Feature Enhancement for SAR Image Interpretation
- Sathwik Narkidimilli, **Sathwik Reddy Majji**, Nischay Kondai. Advancing Telugu-NLP with Novel Sentiment Dataset, Pre-Group Grammar, & Q-NLP Experimentation
- **Sathwik Reddy Majji**, Anand Choubey, Deepak Mishra. Neura-IQ: An On-Site Multimodal LLM System for Secure Document Intelligence and Retrieval.

ACHIEVEMENTS, SCHOLORSHIPS AND GRANTS

- Awarded the Department of Space (Govt. of India) Merit Scholarship for academic performance in B.Tech study.
- Additional DoS Book Grant of Rs. 3000 per semester awarded for academic excellence during undergraduate study.
- Scored 99th percentile on the Joint Entrance Examination (JEE) 2018 among 1.2 million candidates.
- Secured full 5-year scholarship (8th - 12th standard) based on merit performance in the FIITJEE Talent Reward Exam (FTRE).
- Achieved School Rank 2 and International Rank 297 in Level-1 of the 17th SOF National Science Olympiad (2015). Awarded Silver Medal and qualified for Level-2.

INVITED TALKS AND WORKSHOPS

- Invited Speaker at the seminar on 'Quantum Computing: The Future of Technology and Innovation', GH Raisonni College of Engineering, Nagpur, India Aug 2025.

ROLES OF RESPONSIBILITY

- Judge in student competition, HackBattle at Gravitas'25 (VIT Vellore): Evaluated projects in AI, Quantum Computing, Cybersecurity, and Systems Engineering.

- Internship guide for an undergraduate student: Guided an internship carrying credits, providing technical mentorship, project direction, and evaluation support.
- Presiding Officer, Indian General Election 2024: Overseeing polling operations, voter verification, and booth management while ensuring strict adherence to Election Commission of India (ECI) protocols in the Thiruvananthapuram constituency.
- Graduate internship guide for a project “Localized AI for Heterogeneous Space Research Documents” at VSSC.

OUTREACH

- **World Space Week 2025:** Contributed as a Committee Member (Website, Logistics and Resource Materials) for World Space Week 2025 – Kerala, supporting event planning, logistics management, website updates, and development of outreach materials.
- **Yuvika 2024 – ISRO Student Outreach Program:** Coordinated programme activities and guided more than 100 high school students during lectures, workshops, and facility tours at ISRO centres in Thiruvananthapuram.

TECHNICAL SKILLS

- **Programming Languages:** Python, C/C++, MATLAB, VHDL, Verilog, Bash, HTML/CSS, LaTeX
- **Embedded & Electronics Tools:** LTSpice, Arduino, FPGA design and debugging, PCB defect inspection
- **Quantum Computing:** Qiskit, PennyLane, quantum state encoding, quantum image processing, quantum feature extraction, QKD fundamentals
- **AI/ML & Data Processing:** Deep learning (PyTorch, TensorFlow), computer vision, quantum machine learning, image processing
- **Virtualization & Cloud Platforms:** Red Hat OpenShift (OCP), Red Hat Virtualization (RHV), Proxmox VE, VMware vSphere/ESXi, NVIDIA vGPU & vWS, Delegated License Service (DLS), NICE/Amazon DCV
- **High-Performance Computing & Data Center:** Linux server administration, GPU cluster configuration, Supercomputing environment, Prometheus–Grafana monitoring, storage systems (NAS/SAN)
- **Networking & Security:** Secure key distribution, firewall administration, SSH/VPN access management

COURSES AND LABS

Electrical and Electronics Engineering

Analog Electronic Circuits, Semiconductor Devices, Network Analysis, Electromagnetic and Wave Propagation, Digital Electronics and VLSI Design, Instrumentation and Measurement, Signals and Systems, Control System, Communication Systems, Power Electronics, VLSI Technology, Navigation System and Sensors, Satellite and Optical Communication, Antenna Theory and Design, Analog VLSI Circuits, RF and Microwave Communication Electrical and Electronics Engineering Lab, Analog Electronic Circuit Lab, E-CAD Lab, Digital Electronics and VLSI Lab, Instrumentation and Measurement Lab, Control System Lab, RF and Microwave Communication Lab, Power Electronics Lab, Communication System Lab, Navigation Systems and Sensors Lab.

Computer Science and Engineering

Computer Programming and Applications, Computer Architecture and Organization, Digital Signal Processing, Computer Networks, Machine Learning for Signal Processing, Microprocessor and Microcontroller Lab, Digital Signal Processing Lab, Computer Networks Lab.

Mathematics and Engineering Sciences

Calculus, Vector Calculus, Ordinary Differential Equations, Linear Algebra, Complex Analysis and Fourier Series, Integral Transforms, PDE and Calculus of Variations, Probability, Statistics and Numerical Methods; Physics, Chemistry, Introduction to Aerospace Engineering, Material Science and Metallurgy, Engineering Graphics, Integrated Design of Space Vehicles, Physics Lab, Chemistry Lab, Engineering Lab.

Languages, Humanities and Economics

Communication Skills, Introduction to Social Science and Ethics, Introduction to Economics, Environmental Science and Engineering, Principles of Management System, Science Fiction, Space Economics and Policy.

PROFESSIONAL ASSOCIATIONS

Member, Institute of Electrical and Electronics Engineers (IEEE), Membership ID: 98009044

Nov. 2021 – Present