

# Mahesh Rajarapu

Integrated M.Sc. In Mathematics

Department of Mathematics

Sardar Vallabhbhai National Institute of Technology

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Location: Surat, Gujarat, India

## Objective

Driven to tackle challenging industry problems through advanced machine learning and deep learning techniques. Focused on developing practical solutions in computer vision and image analysis to improve processes and deliver innovative results. Aiming to bridge the gap between research and real-world applications.

## Research Experience

- **KAI-X Summer Research Internship** (Jun 2024 - Present)  
**Korea Advanced Institute of Science and Technology, Daejeon, South Korea** | **PI: Prof. Chang-Ock Lee.**
  - Focused on simulating computed tomography (CT) and developing advanced image reconstruction algorithms, including classical methods like Filtered Back-Projection (FBP) and deep learning techniques.
  - Aimed to enhance image quality and reduce artifacts by integrating deep learning techniques with a deep understanding of CT physics and data acquisition simulation.
- **Summer Internship Program** (May 2024 - Jun 2024)  
**National Institute of Technology Calicut, Kozhikode, Kerala, India** | **PI: Dr. Pranesh Das.**
  - Developed the Dynamic Batch Size Adjuster (DBSA) algorithm to optimize batch sizes dynamically during training, enhancing convergence and stability in deep learning models.
  - Improved model performance and minimized computational resources by adjusting batch sizes in real-time based on training dynamics, including loss and gradient magnitude.
- **Equity Research Analyst Intern** (Jun 2024 - Present)  
**Future Sight, Remote.**
  - Conduct research on stocks, sectors, and market trends; analyze historical stock data, assist in portfolio management, and create financial models.
  - Apply technical analysis, assess and manage portfolio risks, prepare market reports, and collaborate with team members.
- **Research Internship** (Ongoing)  
**Sardar Vallabhbhai National Institute of Technology, SVNIT, Surat** | **PI: Dr. Praveen Kumar Chandalia.**
  - Spearheaded innovative research on child face aging using advanced AI, with applications in forensics and healthcare.
  - Striving to develop cutting-edge explainable AI algorithms to assess facial image quality, revolutionizing image processing techniques across diverse domains.
- **Research Internship Program** (Sept 2023)  
**Technical University of Munich, Department of Informatics, Virtual – Munich, Germany** | **PI: Dr. Nassir Navab.**
  - Currently working on 3D Ultrasound Compounding for Volume Estimation in Thyroid Diagnostics.
  - Applied PyTorch on Image Computation to develop cutting-edge solutions for improving Multi-model Thyroid Registration.
- **IAS-INSANA Summer Research Fellowship Program** (May 2023 - July 2023)  
**Indian Institute of Technology Ropar, DoCSE, Ropar, Punjab, India** | **PI: Dr. Sudarshan Iyengar.**
  - Utilized expertise in machine learning & Deep Learning to work on auto image enhancement, employing advanced techniques and models with optimal gamma values.
  - Applied proficiency in TensorFlow, PyTorch, and JAX to develop cutting-edge solutions for improving image quality and visual appeal.
- **Summer Workout in Mathematics & Programming** (June 2022)  
**TATA Institute of Fundamental Research - CAM, Bengaluru, Karnataka, India.**
  - Studied statistical learning techniques for data analysis, regression, classification, and dimensionality reduction, alongside Python programming proficiency.
  - Developed a solid foundation in real analysis and linear algebra for mathematical and computational problem-solving.

## Key Projects

- **CT Simulation and Image Reconstruction Algorithms** Source Code  
Mentor: Prof. Chang-Ock Lee
  - Simulating CT data acquisition and implementing reconstruction algorithms like Filtered Back-Projection (FBP).
  - Exploring deep learning techniques to enhance image quality and reduce artifacts in imaging.
- **Real-time Object Detection with Deep Learning** Source Code
  - Developed a real-time object detection system using advanced deep learning techniques.
  - Leveraged YOLOv8 architecture for accurate detection of objects in video streams.
  - Created a solution for real-time visual assistance across various applications.
- **Image CompressNet using Encoder-Decoder Architecture** Source Code
  - Designed an autoencoder architecture for binary image reconstruction using the Keras Functional API.
  - Developed an encoder-decoder structure with convolutional and upsampling layers to enhance image reconstruction and model performance.
- **Auto Image Enhancement using Optimal Gamma Values** Source Code
  - Applied Power Law Transformations, CLAHE, and Scaling methods for image enhancement.
  - Developed CNN models for automatic image enhancement, improving contrast, brightness, and saturation.
- **Chronic Kidney Disease Prediction using ML Techniques** Source Code
  - Evaluated various machine learning algorithms to predict kidney disease, identifying the most accurate algorithm.
- **Automated Face Recognition and Attendance Management System** Source Code
  - Developed a face recognition system for entry gate operations.
  - Implemented a deep learning model for accurate identification and attendance logging.

## Academic Qualifications

- **Integrated Master of Science in Mathematics** (Dec 2020 – June 2025)  
**Sardar Vallabhbhai National Institute of Technology, Surat, Gujarat, India**  
CGPA: 7.5/10.0
- **Board of Intermediate Education** (June 2018 – Feb 2020)  
**Sri Sarada Educational Institutions, Vijayawada, Andhra Pradesh, India**  
CGPA: 8.82/10.0
- **Board of Secondary Education** (March 2018)  
**Bhashyam E.M High School, Bhavanipuram, Andhra Pradesh, India**  
CGPA: 9.80/10.0

## Technical Skills

- **Programming Skills:** Python, C, SQL, Matlab
- **Deep Learning Frameworks:** TensorFlow, PyTorch, JAX, Flax
- **Machine Learning Frameworks:** Scikit-Learn, XGBoost, LightGBM, Keras
- **Version Control Tools:** Git, GitHub
- **Web Development:** HTML, CSS, JavaScript
- **Other Skills:**  $\text{\LaTeX}$ , Excel, Power BI, MS Office

## Scholastic Achievements

- Awarded the prestigious **KAI-X Summer Internship 2024** at **Korea Advanced Institute of Science and Technology (KAIST)**, South Korea, selected as one of 16 interns from a competitive global pool.
- Awarded fellowship to work under Dr. Sudarshan Iyengar, Dept. of CSE, IIT Ropar by **Indian Academy of Sciences along with INSA, NASI – Summer Research Fellowship**.
- Secured rank in the merit list: Top 53,000 among 1 million candidates in **NIT-JEE Mains 2020**.
- Secured 7th rank in **National Talent Search Examination (NTSE)** conducted in Andhra Pradesh.
- Secured Zonal 6th rank in **National Mathematics Olympiad**.

## Technical Courses/Electives

Data Structures and Algorithms Computer Networks Ethical Hacking Block-chain Technology Computer Graphics	Artificial Intelligence Graph Theory Natural Language Processing Computer Vision Database Management Systems
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## External Short Term Courses

- **MaLICO-N**
  - One Week Online Short Term Course (e-STC) organized by National Institute of Technology, Hamirpur on "Machine Learning and its applications in Information Security, Computer Vision, and Natural Language Processing (MaLICO-N-2023)" during 13-17 March 2023.
- **Advanced and Technical Computing with MATLAB**
  - Participated in the 5 Days Online Faculty Development Programme on Advanced and Technical Computing with MATLAB organized by the Department of Mathematics, School of Engineering, Presidency University, Bengaluru from 25th to 29th July 2023.

## Talks Delivered/Presentations

- About "Low Cost Sanitary Pad Product Manufacturing Machine" in **Indian Institute of Technology, Delhi** ("UNNATI" MAHOTSAV) and this Project/Machine designed under the UNNAT BHARAT ABHIYAN.

## Positions of Responsibility

- **Convener, Unnat Bharat Abhiyan**, SVNIT Surat during A.Y. 2022-23.
  - Inspired by the vision of transformational change in rural development processes by leveraging knowledge institutions to help build the architecture of an Inclusive India.
- **Convener, National Mathematics Day (NMD) 2022**, DoMH, SVNIT Surat.
  - Organized 11 events at the national level as part of the celebrations of NMD.
- **Head, Media and Designing Committee**, Academic Affairs Council (Student's Council) during A.Y. 2022-23.
  - Managed media, designed posters, and created videos for all programs conducted under the AAC Student Council.
- **Co-Head, Media and Designing Committee**, General Student Council during 2022-23.
  - Secured the media, designed posters, and created videos for various programs conducted under the General Student Council.
- **Designer**, Departmental Brochure, Handbook, Pramiti.
  - Designed and developed the departmental brochure, student handbook, and Pramiti magazine, ensuring high-quality design and content presentation.

## Languages

**Telugu:** Bilingual Proficiency

**English:** Working Proficiency

**Hindi:** Conversational

*"I believe that "Experience" is the force driving our entire world and universe. Every action, movement and endeavor of humanity is ultimately motivated by the desire to gain new experiences."*

*- Mahesh Rajarapu*