
Saumya Vilas Roy

+91 8826433226 — saumyaroy@tutanota.com — [Website](#) — New Delhi, India

Education

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- Bachelor of Technology in Electronics and Communication Engineering,
Indian Institute of Space Science and Technology (IIST), Kerala **Nov 2020 - May 2024**
CG-PA: 7.28
 - High School, X+II (Central Board of Secondary Education),
Ryan International School, New Delhi **2018 - 2020**
Percentage: 90.6 %

Research Experience

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- Research Intern, **June 2024 - Current**
Indian Institute of Technology (IIT), Delhi
Advisors: Dr. Ankur Miglani (IIT, Indore) and Dr. Husain Kanchwala (IIT, Delhi)
 - Developed and implemented deep learning convolutional neural networks (CNNs) to detect damage on high-magnification images of wheat grain kernels.
 - Designed and deployed an Artificial Intelligence-driven safety edge device (esp32) to prevent accidents in construction environments by detecting unsafe behavior and alerting the end-user.
 - Summer Intern, **May 2023 - August 2023**
National Remote Sensing Center (NRSC), Indian Space Research Organization (ISRO)
Advisors: Dr. Deepak Mishra (IIST) and Ms. Haripriya S. (NRSC)
 - Developed and applied a U-net Complex Valued Neural Network for segmenting raw Polarimetric Synthetic Aperture Radar (PolSAR) images using the Pauli representation.
 - Analyzed the effects of different dropout rates on model overfitting and enabled raw processing of PolSAR image without domain shift.
 - Undergraduate Researcher, **Aug 2021 - May 2024**
IIST
 - Advisors: Dr. Marcos M. Raimundo (University of Campinas, Brazil) and Dr. Mishra
Developed a semi-supervised learning approach with spatial transformers for medical image registration, utilizing a hybrid dataset of real and synthetic images to reduce training data requirements.
 - Advisors: Dr. Mishra, Dr. Rajesh Sadananan (IIST) and Dr. Satheesh K. (IIST)
Developed a novel method for estimating non-uniform temperature profiles in combustion systems using Laser Absorption Spectroscopy (LAS) and Multi-Output Gaussian Process Regression.
 - Advisors: Dr. Sadananan and Dr. Mishra
Created a Schlieren/RGB Flame Images Analyzing Tool using Fast Fourier Transform and Wavelet Transform to analyze time-series flame images and identify spatial distribution of flame or flow density oscillations during combustion instabilities.
 - Advisor: Dr. Manoj B.S. (IIST)
Utilized graph theory to model global crude oil flows between nations, identifying key time-series trends and predicting potential fluctuations in price and demand accurately over time.

Publications

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- **Saumya Vilas Roy**, Husain Kanchwala & Ankur Miglani. Deep CNN-based damage classification of milled wheat grains using a high-magnification image dataset. (Manuscript in preparation).

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- **Saumya Vilas Roy**, Deepak Mishra, & Marcos M. Raimundo. HybridMorph: Bridging the Gap between Synthetic and Real Data for Accurate MR Image Registration. DOI: [10.36227/techrxiv.173273622.27560352/v1](https://doi.org/10.36227/techrxiv.173273622.27560352/v1). (Manuscript in preparation).
 - **Saumya Vilas Roy**, Deepak Mishra, Satheesh K. & Rajesh Sadananan. Estimating Non-Uniform Temperature Profiles in Combustion Systems using Laser Absorption Spectroscopy and Multi-Output Gaussian Process Regression. DOI: [10.36227/techrxiv.173273629.91677656/v1](https://doi.org/10.36227/techrxiv.173273629.91677656/v1). (Manuscript in preparation)
 - **Saumya Vilas Roy**, Deepak Mishra & Rajesh Sadananan (2025). Combined FFT and Wavelet Analysis of Schlieren and Flame Luminosity Time-Series to Visualize Regions of Combustion Instability. (Accepted to be published: National Aerospace Propulsion Conference 2025)
 - **Saumya Vilas Roy**, & Manoj BS. (2024). A Complex Network Analysis of the OPEC Crude Oil Trade Network. DOI: [10.36227/techrxiv.171169316.66809297/v2](https://doi.org/10.36227/techrxiv.171169316.66809297/v2). (Recent Advances in Intelligent Computational Systems International Conference 2024).

Conference Presentations

- "Complex Valued U-Net for Segmentation of PolSAR Images", ISG-ISRS 2023.
- "Meta-Learning for Space Applications for Advancements in Space Technology", Hindi Technical Conference 2023, held at IIST organized by the Indian Space Research Organization.

Technical Skills

- **Languages:** Python, C++, MATLAB, JavaScript, HTML/CSS, SQL.
- **Developer Tools:** Git, GNU Octave, LaTeX, AWS.
- **Libraries:** TensorFlow, PyTorch, Keras, OpenCV.

Awards/Recognition

- **3rd** place in the student's flash talks at the Frontiers Symposium in Data Science 2024, IISER Trivandrum.
- Top **2%** in the Joint Entrance Examination (JEE) Main and Advanced, a highly competitive national-level engineering entrance examination in India.
- **1st** place in Tinker Fest 2018 organized by ATAL tinkering labs for the project "Algae Based Air Purifier and Quality Sensor" at Ryan International School.
- Scholarship from Department of Space, Govt. of India for undergraduate studies at IIST.

Courses

- **Core Courses:**
 - Probability, Statistics and Numerical Methods
 - Computer Programming and Applications
 - Digital Signal Processing
 - Control Systems
 - Computer Networks
- **Electives:**
 - Deep Learning for Computational Data Science
 - Machine Learning for Signal Processing
 - Digital Image Processing
 - Computer Vision
 - Complex Network