Saumya Vilas Roy

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Education

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

Research Experience

- 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

- **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).

- **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. (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. (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. (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