Saumya Roy

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Research interests: machine learning for health — medical imaging, clinical language models and physiological signals, especially learning from raw and limited data.

Education

KTH Royal Institute of Technology Aug 2025 – Jul 2027
M.Sc., Data-Driven Health (GPA 4.83/5.0) Stockholm, Sweden

- Coursework: Applied Machine Learning and Artificial Intelligence (A); Statistics for Medical Engineering (A); Databases and Data Models (A); Health Systems: Production and Logistics (A); Distributed Systems, Advanced Course; Introduction to Health Data; Healthcare Ethics, Legal and Social Impact.

Indian Institute of Space Science and Technology (IIST) Nov 2020 – May 2024
B.Tech., Electronics and Communication Engineering (CGPA 7.28/10) Kerala, India

- Coursework: Deep Learning for Computational Data Science; Machine Learning for Signal Processing; Digital Image Processing; Computer Networks.

Research & Professional Experience

Research Assistant, KTH Royal Institute of Technology Jun 2026 – Present
Future Well Ageing (Forte programme) — Advisors: S. Meijer, A. Darwich Stockholm, Sweden

- Designed and deployed *Aktivitetshjälpen* (v6.16), a bilingual agentic LLM assistant helping pre-frail older adults discover local activities; tool-calling agent over Qwen3-8B with hybrid semantic search, honesty guards, and 11-table data model scraping 26 municipalities daily. (live demo)
- CPU-only speech pipeline (KB-Whisper int8 + Piper, 4–7 s latency), WCAG AA accessible UI, consent-gated family sharing, admin analytics dashboard.

Annotator & Reviewer, Neko Health May 2026 – Present
Preventive-health technology company Stockholm, Sweden

- Annotation and quality assurance on RGB medical imaging; now also reviewing annotations produced by other team members to ensure labelling consistency.

Research Intern, Indian Institute of Technology (IIT) Delhi Jun 2024 – Dec 2024
Advisors: Dr. Ankur Miglani, Dr. Husain Kanchwala Delhi, India

- Developed convolutional neural networks to detect damage in high-magnification wheat-grain kernel images (99.82% accuracy) for crop-quality assessment.
- Designed and deployed an ESP32-based AI safety edge device that detects unsafe behaviour on construction sites and alerts users in real time (98.3% accuracy).

Summer Intern, National Remote Sensing Center (NRSC), ISRO May 2023 – Aug 2023
Advisors: Dr. Deepak Mishra, Ms. Haripriya S. Hyderabad, India

- Built a complex-valued U-Net to segment raw Polarimetric SAR (PolSAR) imagery using the Pauli decomposition, enabling processing without domain shift.
- Analysed the effect of dropout rate on overfitting in complex-valued networks.

Undergraduate Researcher, IIST Aug 2021 – May 2024
Advisors: Dr. D. Mishra, Dr. M. M. Raimundo, Dr. R. Sadanandan, Dr. Manoj B.S. Kerala, India

- Developed a semi-supervised medical image-registration method with spatial transformers, using a hybrid real/synthetic dataset to reduce training-data requirements (HybridMorph).
- Estimated non-uniform temperature profiles in combustion systems using Laser Absorption Spectroscopy and Multi-Output Gaussian Process Regression.
- Built an FFT/wavelet tool to localise combustion-instability oscillations in Schlieren and flame-luminosity time-series imagery.
- Modelled global crude-oil trade as a complex network to analyse time-series trends in price and demand.

Publications

1. **S. V. Roy**, D. Mishra, & M. M. Raimundo. *HybridMorph: Bridging the Gap between Synthetic and Real Data for Accurate MR Image Registration.* National Conference on Computer Vision, Pattern Recognition, Image Processing, and Graphics (NCVPRIPG), 2025. [doi]
2. **S. V. Roy**, R. Sadanandan, Satheesh K., & D. Mishra. *Estimating Non-Uniform Temperature Profiles in Combustion Systems using Laser Absorption Spectroscopy and Multi-Output Gaussian Process Regression.* Preprint, TechRxiv, 2025. [doi]
3. **S. V. Roy**, D. Mishra, & R. Sadanandan. *Combined FFT and Wavelet Analysis of Schlieren and Flame Luminosity Time-Series to Visualize Regions of Combustion Instability.* National Aerospace Propulsion Conference (NAPC), 2025. [doi]
4. **S. V. Roy** & Manoj B.S. *A Complex Network Analysis of the OPEC Crude Oil Trade Network.* Recent Advances in Intelligent Computational Systems (RAICS), 2024. [doi]

Selected Projects

Fine-Tuning NanoChat on MIMIC-IV Discharge Summaries 2026

KTH course project (with Yuxin Du) — clinical NLP / LLM adaptation

- Domain-adapted a transformer language model to clinical discharge notes, reducing held-out validation perplexity from 34.4 to $\sim$9.
- Designed a QA-style evaluation with Exact Match, token F1, and a heuristic hallucination proxy, quantifying the gap between language-modelling gains and reliable clinical QA.

HRV under Cognitive vs. Social-Evaluative Stress 2026

Applied Psychophysiology & Biofeedback capstone, Reykjavík University / NeurotechEU

- Designed and analysed a within-subject HRV experiment (Polar H10, 1,230 inter-beat intervals), computing time- and frequency-domain metrics with ANOVA, non-parametric tests, and Cohen's d effect sizes.

HybridMorph — Medical MR Image Registration 2025

Python, TensorFlow, Keras, Neurite • *github.com/CaffineAddic/HybridMorph*

- Automated alignment of medical images from hybrid data sources; 9.2% accuracy improvement under limited training data.

Research Training & Certifications

- **Applied Psychophysiology and Biofeedback: Translating Evidence into Practice** — Reykjavík University / NeurotechEU (EU co-funded), 4 ECTS, 2026.
- **Unite! Research School** (one-week research boot-camp, AI focus) — Grenoble INP, Université Grenoble Alpes / Unite! network (EU co-funded), 3 ECTS, 2025.

Technical Skills

Programming: Python, C++, MATLAB, R, SQL, JavaScript, HTML/CSS.

ML / DL: PyTorch, TensorFlow, Keras, OpenCV; CNNs, transformers, LLM fine-tuning, semantic search, image registration, signal processing.

Tools & Infrastructure: Git, Docker, AWS, KTH GPU cloud, LaTeX, GNU Octave, faster-whisper, Piper.

Professional Service

- **Reviewer**, International Joint Conference on Neural Networks (IJCNN), IEEE World Congress on Computational Intelligence (WCCI), Maastricht, Netherlands, 2026.

Awards & Honours

- 3rd place, Student Flash Talks, Frontiers Symposium in Data Science, IISER Trivandrum, 2024.
- Top 2% in the Joint Entrance Examination (JEE) Main & Advanced, India, 2020.
- Department of Space (Govt. of India) Scholarship for undergraduate studies at IIST, 2020.