Sourav Rout | **23M2152**
Centre for Machine Intelligence and Data Science | **M.S. by Research**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 13/06/1999

Examination	University	Institute	Year	CPI / %
Post Graduation	IIT Bombay	IIT Bombay	2026	9.14
Graduation	VSSUT Burla	VSSUT Burla	2021	9.04
Graduation Specialization: Electrical Engineering				

MASTER'S THESIS & R&D

- **Unknown Object Detection for Indian Road Scenes**
  *(M.S. Thesis | **Honda R&D Japan Collaboration** | Guide: **Prof. Rajbabu V.**)* *(May'25-Present)*
  - Established **baseline performance** using YOLOv12 on Indian Driving Dataset, achieving **MAP@0.5:0.95 of 0.511** for autonomous driving applications.
  - Currently developing unified framework combining **unknown object detection + zero-shot vocabulary expansion** for safety-critical road scenario recognition.
- **Attribute-Guided Prompt Learning for Vision-Language Models**
  *(M.S. Thesis | Guide: **Prof. Biplab Banerjee**)* *(Oct'24-Present)*
  - Developed **efficient** attribute-guided framework enhancing **CLIP-based VLM** prompt-tuning methods with semantic attributes, achieving **2-3% accuracy gains** on few-shot image classification benchmarks.
  - Implemented **cross-attention** based **vision conditional pooling** of attributes with LLM-generated tokens, significantly improving base-to-new class generalization.
- **Multi-Instance Learning and Graph-Based Methods for WSI Classification**
  *(M.S. R&D | Guide: **Prof.Amit Sethi**)* *(Jan'24-May'24)*
  - Implemented **DSMIL framework** on **Camelyon16 and TCGA datasets**, reproducing **94% accuracy** on breast cancer metastases detection.
  - Reproduced **GNN + Knowledge Distillation approach**, comparing **multi-scale analysis** with traditional MIL for **WSI spatial relationship modeling**.

WORK EXPERIENCE & INTERNSHIPS

- **Multi-Agent AI Hiring Pipeline for Resume-JD Matching**
  *(TIH Foundation for IoT & IoE | Technical Intern | **Client: Poonawalla Fincorp)*** *(May'25-Jul'25)*
  - Designed a **multi-agent AI hiring pipeline** using **LORA** finetuned **Qwen2.5-32B LLM** for client's **7,000+ employee expansion**.
  - Achieved ***Rs.*1 million+ total cost savings** by eliminating AWS Textract and GPT-4o API dependencies.
  - Engineered intelligent document processing system achieving **95%+ parsing accuracy** with domain customizable scoring framework.
- **Automated Financial Analysis Pipeline for Document Processing**
  *(TIH Foundation for IoT & IoE | Technical Intern | **Client: Godrej Agrovet)*** *(May'25-Jul'25)*
  - Developed end-to-end pipeline extracting **45 distinct financial fields** from low-quality scanned documents using **SuryaOCR + InternVL 3 7B**.
  - Designed **five-stage multi-pass AI workflow** powered by **Qwen2.5** with cross-verification capabilities.
- **Graduate Engineer Trainee | JSW Steel Limited** *(Aug'21-May'22)*
  - Implemented **moving average filter in DCS** to smooth sensor readings and eliminate spark-induced fluctuations, **preventing *Rs.*50,000 daily revenue losses**.
  - Implemented electrical automation solutions ensuring continuous mill operations and improved production reliability.

INDEPENDENT PROJECTS

- **MATHGPT : GPT-2 with Chain-of-Thought Mathematical Reasoning Pipeline**
  (Independent Project) *(Jul'25-Aug'25)*
  - Implemented **GPT-2 (124M parameters) from scratch** and fine-tuned on **GSM8K dataset** for mathematical reasoning tasks.
  - Built **end-to-end MLOps pipeline** with **FastAPI, Docker, Huggingface spaces** and **automated CI/CD testing via GitHub Actions**.

COURSE PROJECTS

- **MoCoV3 Implementation for SSL Deep Learning Library**
  *(GNR 650 Course Project | Guide: **Prof. Biplab Banerjee**)* *(Oct'24-Nov'24)*
  - Implemented **MoCoV3 from scratch** as a part of **25-person SSL library team** with **ViT/CNN backbones** and **MillionAID pretraining**.
  - Integrated custom **hyperparameter tuning** and **evaluation metrics** (t-SNE, loss curves) for model analysis.
- **FML Library : Machine Learning Algorithms from Scratch**
  *(CS 725 Course Project | Guide: **Prof. Sunita Sarawagi**)* *(Nov'23- Dec'23)*
  - **Worked in a 6-person team** to build comprehensive **ML library from scratch** implementing **Linear/Logistic Regression, CART, SVM, and Neural Networks** without external dependencies.
  - Designed modular architecture with **preprocessing utilities, evaluation metrics** (accuracy, MSE, confusion matrix), and **train-test split functionalities**.
  - **Deployed on PyPI** for public use, achieving **performance parity with Scikit-learn** while providing enhanced interpretability and algorithmic transparency.
- **Constrained Zero-Shot Learning using Non generative Approach**
  *(GNR650 Course Project | Guide: **Prof. Biplab Banerjee**)* *(Nov'24)*
  - Achieved **33.2% accuracy on unseen classes** by mapping **visual-semantic features to shared latent space** using **Word2Vec embeddings** without manual annotations.
  - Addressed **visual-semantic domain gap** in **non-generative ZSL** without human-annotated attribute dependencies.
- **Learning with Noisy Labels Using Vision Transformers**
  *(GNR 650 Course Project | Guide: **Prof.Biplab Banarjee**)* *(Sept'24)*
  - Achieved **near-SOTA accuracy of 83.7%** of **CIDAR-100** dataset despite **40% label noise** using **novel pseudo-labeling via unsupervised clustering** and **majority voting**.
  - Leveraged **selective layer unfreezing** and **advanced augmentation techniques** to outperform traditional clustering-based denoising methods.
- **Medical Image Deblurring with Residual Dense Spatial Asymmetric Attention**
  *(CS 736 Course Project | Guide: **Prof. Suyash Awate**)* *(Jan'24-May'24)*
  - Achieved **PSNR of 25+ dB** on brain MRI deblurring by implementing **DeblurGAN-v2 with Feature Pyramid Networks** and **RD-SAM attention modules**.
  - Applied **scale-recurrent architecture** to address motion blur in **multi-modal medical images** for enhanced diagnostic accuracy and clinical applications.

MACHINE LEARNING / DEEP LEARNING COURSES

- **CS 725: Foundations of Machine Learning**
- **GNR 650: Advanced Topics in Deep Learning**
- **CS 736: Medical Image Computing**
- **CS 601: Algorithms and Complexity**
- **GNR638:Deep Learning For Computer Vision**
- **EE 601: Statistical Signal Analysis**
- **EE 610: Image Processing**
- **SC 607: Optimisation**

TECHNICAL SKILLS

- **Programming Languages**: Python , C , C++ , Matlab
- **Tools & Frameworks:** PyTorch , Numpy , Pandas , OpenCV , Hugging Face , Matplotlib , Streamlit , FastAPI , Docker , GitHub Actions , LangChain
- **Other Skills:** Git and GitHub, LaTeX, Azure

ACHIEVEMENTS

- Achieved **AIR 82 (99.86 percentile)** in **GATE 2023 (EE)** and **AIR 40 (99.67 percentile)** in **GATE 2023 (IN)**, ranking among the top candidates nationwide. *(Mar'23)*
- Selected for **"National Science Exhibition"** representing Central India Region. *(Nov'15)*

POSITION OF RESPONSIBILITY

- **Teaching Assistant**, **Programming for Machine Learning and Data Science** (EPGD-AI-DS, IIT Bombay)
  Conducted tutorials for industry professionals. *(Jan '25–Jun '25)*
- **Teaching Assistant** for the course **DS 203: Programming for Data Science** *(Aug '24–Nov '24)*
- **Teaching Assistant** for the course **ME 228: Applied Data Science and Machine Learning** *(Jan '24–May '24)*