

# MRIDUL PANDEY

4th year Undergraduate, Indian Institute of Technology Kanpur  
Major in Electrical Engineering | Minor in Computer Science & Engineering (Algorithms)

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## EDUCATION

Indian Institute of Technology Kanpur  
BTech, EE   *CPI: 9.41/10*  
2021 - Present   Kanpur, India

Amity International School Pushp Vihar  
XII, CBSE   *Percentage: 97.4%*  
2021   New Delhi, India

Amity International School Pushp Vihar  
X, CBSE   *Percentage: 95.4%*  
2019   New Delhi, India

## KEY ACHIEVEMENTS

- Received **Academic Excellence Award** for exceptional academic performance in 2021-22, 2022-23 & 2023-24 academic session
- Secured **global rank 2** in MADASR'23, conducted by ASRU , building Bhojpuri & Bengali ASR models
- Secured **rank 1 all over India** in BCG ideathon 2023, for the entrepreneurial idea of EV charging stations
- Secured **All India Rank 1015** in JEE Advanced 2021
- Secured **All India Rank 1026** in JEE Mains 2021
- Codeforces Rating: 1631 | Handle: ElectroNova**  
Secured **global rank: 432** in Codeforces Round 966

## COURSES

- Data Structures & Algorithms

Algorithms 2

Probability & Statistics
- Intro to Machine Learning

Probabilistic Machine Learning\*
- Reinforcement Learning\*

Computer Vision and Deep Learning\*
- Big Data Analytics\*

Linear Algebra & Differential Equations

## TECHNICAL SKILLS

- Programming Languages:** C++, C, Python
- ML frameworks & Libraries:** PyTorch, OpenAI, Sklearn, Tensorflow, HuggingFace-transformers
- Utilities:** Git, matplotlib, seaborn, L<sup>A</sup>T<sub>E</sub>X, QGIS

## POSITION OF RESPONSIBILITY

Leader, IITK Consulting Group   *May'23 - Apr'24*  

- Used **Machine Learning** and **Gen AI** for social good, worked with **startups & government organizations**
- Attended **National Geospatial Data Promotion and Development Committee** meet, analysing the applications of open source geospatial data using AI

## KEY COMPETITION

Inter IIT Tech Meet 11.0   *Silver Medal*  
*Automating Decisions with Bayesian Networks   Feb'23*  

- Built a **knowledge model** using **Bayesian Belief Networks (BBNs)** to automate infrastructural risk audit
- Created an **inference graph**, estimating **probability distributions** for 243 parameters using **BBNs**

## WORK EXPERIENCE

**Tourism and Investment Promotion in Rajasthan**  
*Summer Associate | Boston Consulting Group   May'24 - Jul'24*  

- Identified key sectors to **improve tourism in Rajasthan**, focusing on increasing **Rajasthan tourism marketing** & improving **connectivity** to Rajasthan
- Analysed **Air & Rail** connectivity of famous **tourist places** of Rajasthan using **QGIS**, identifying required **infrastructural & operational** changes
- Identified key **private partnerships** for Rajasthan across **9 buckets** to **promote & facilitate tourism**. Benchmarked private partnerships done by other states

**Automating nurse-patient interaction using Generative AI**  
*ML Intern (Remote) | Noora Health Organisation   Dec'23 - May'24*  

- Digitalised patient reports** by implementing **few-shot learning & chain of thoughts** with Google's **Vertex AI & multimodal Gemini**, achieving an **accuracy of 85%**
- Built a **multilingual query retrieval RAG model** for **maternal women**, answering **medical queries** in user's preferred language. **UI** built using **Streamlit**
- Implemented the RAG model using **OpenAI**, experimented with techniques like **vector RAG, graph RAG & agentic RAG** to improve response accuracy

## KEY PROJECTS

**Automated Speech Recognition (ASR) for Indic Language | Madhav Lab**  
*Prof. Vipul Arora, IITK   Feb'23-Jul'23*  

- Built a **Conformer** model for **offline Hindi ASR** equipped with **greedy CTC decoder, Beam Search & KenLM** obtaining a **WER of 11% & a CER of 7%**
- ASR model made compatible with **long-form audios** using **CTC decoder based chunking**, improving model accuracy with a **WER of 7% and a CER of 7%**
- Fine-tuned Wave-2-vec** model pre-trained for English ASR using a novel approach of **transliterating** Bengali, Bhojpuri to English with **AI4Bharat** library
- Deployed **Domain & Test Time Adaptation** methods, like **DUST & Active Learning** Techniques to make the model robust to different **domain audios**

**Low Cost PM2.5 Sensor Calibration | National Aerosol Facility (NAF)**  
*Prof. Vipul Arora, IITK | Prof. Sachchida Nand Tripathi, IITK   May'23-Present*  

- Calibrated **Low Cost PM2.5** sensors in Bihar and UP using a novel **Self Supervised Learning** algorithm. Paper in review for **IEEE Sensor Letters Conference**
- Obtained **geographical variations** of **PM2.5** from **500 un-calibrated sensors** in Bihar using the **Self-Supervised** algorithm, followed by **fine-tuning** on true data
- Implemented the algorithm with **Regression** techniques like **Support Vector Regressor, & Deep neural networks**, achieving an average **R2 score of 0.65**
- Designed a **dashboard** using **FIGMA** to represent the **PM2.5 time-series data** and **pollution levels** for all the **sensors deployed in Uttar Pradesh and Bihar**

**Failure Forecasting in Low Cost Sensors | National Aerosol Facility (NAF)**  
*Prof. Vipul Arora, IITK | Prof. Sachchida Nand Tripathi, IITK   Jan'24-Present*  

- Developed a novel **Low Cost Sensor Failure Prediction** algorithm using **Deep Time Series** models. Paper in review for **IEEE Sensor Letters Conference**
- Experimented with **deep time series forecasting** models based on **LSTM, GRU & WaveNet** architecture, achieving an **F1 score of 0.85** for **7 days of forecast**
- Developed and validated a **novel data-balancing** algorithm, enhancing **model performance** across all classes. Validated by trials on different sensor brands

**Poverty Estimation in Haryana using Open Source Data | CDIS**  
*Prof. Nisheeth Srivastava, IITK   Aug'23-Apr'24*  

- Fine-tuned** pre-trained models like **VGG16 & ResNet50V2** on **satellite images of Haryana** to extract **deep features** against **wealth index of Hararyana**
- Used **QGIS** software to extract local geographical features like types of nearby hospital, schools etc. from the **Open Street Map(OSM)** data of Hararyana
- Deep features & OSM** data were used to train regression models to predict household income, obtaining **R2 score of 0.88** using **Random Forest Regressor**
- Implemented **Explainable AI** libraries like **Shapash** to identify the **correlation** between different **open source geographic features & household income levels**