Shivang Agarwal

Juinor Undergraduate, IIT Kanpur
Department of Materials Science and Engineering
ashivang22@iitk.ac.in | :+91 7037805364
Shivang Agarwal | Shivang004

Academic Qualifications

Year	Degree/Certificate	Institute	Performance
2022 - Present	B.Tech, MSE	Indian Institute of Technology Kanpur	7.64/10
2022	CBSE (XII)	Shemford Futuristic School, Kasganj	93.8%
2020	CBSE (X)	Shemford Futuristic School, Kasganj	96.2%

Academic Achievements

- Secured an **All India Rank 8378** in the prestigious **JEE Advanced 2022** exam among 1.5 lakh candidates all over the country.
- Secured **All India Rank 19458** in the prestigious **JEE Mains 2022** exam among 1 million candidates all over the country.

Work Experience

Simulation and Edge Development for Autonomous Nano Drones Navigation *May'24 - Jul'24*

Mentor: Prof Tushar Sandhan | *Department of Electrical Engineering* | *Surge Research Project* | *IIT Kanpur*

Objective	• Develop and optimize **semantic segmentation** models on **RPi 0** for accurate, real-time processing in indoor environments.
Approach	• Simulated Crazyflie 2.1 in **Gazebo**, controlled via **ROS** for **waypoint navigation**, and acquired real-time camera feed. • Conducted a thorough literature review of **autonomous navigation** methods for nano drones using **visual perception**. • Fine-tuned **FastSCNN**, **ENet**, and **LRASPP MobileNetV3** models on a custom ADE20k indoor dataset for segmentation.
Results	• Achieved an inference time of **0.12 seconds** and **mIOU of 52.9%** with LRASPP MobileNetV3 Small on Raspberry Pi 0.

Key Projects

AI Voice Morph Companion | Summer Project Mentor | Electronics Club, IITK | *May'24- Jul'24*

- Guided 14 mentees to build an **LLM**-integrated interaction system on **Raspberry Pi** and **Arduino Nano**, ensuring user-friendliness.
- Developed a **Transformer-based** chatbot and an **RNN-based ASR** system trained on LJ Speech Dataset, achieving a **WER of 20%**.
- Implemented an **audio classification** system for keyword identification on **Arduino Nano BLE**, utilizing **256 KB SRAM** for processing.

Video Motion Saliency using SEGMENT ANYTHING MODEL 2 | Course Project | EE604 (Image Processing) | *Oct'24 - Nov'24*

- Developed a pipeline combining **YOLO**, **KLT**, **Background subtraction** and **SAM2** for efficient motion saliency detection in videos.
- Segmented moving objects using **bounding box prompts** in SAM2, achieving precise saliency maps with reduced computational overhead.
- Demonstrated applications in **real-time video surveillance** and **autonomous navigation** with high accuracy in salient motion detection.

ChatBot using RNNs | Google Developer Students Club, IITK *Dec'23 - Jan'24*

- Developed a **ChatBot** using advanced **NLP** techniques to answer questions based on a story, enhancing user interaction and experience.
- Utilized **NLTK** and **Spacy** for efficient text processing, implementing **attention** mechanisms and **LSTM** layers for sequential information.
- Achieved **83%** model accuracy by embedding story/question sequences with **softmax activation** for generating accurate responses.

MathData | Stamatics, IITK (*Apr'23-July'23*)

- Acquired proficiency in Python libraries including **Numpy, Pandas, Matplotlib, Seaborn**, and basics of **Machine Learning**.
- Applied **Linear Regression, Bagging, Boosting**, and **Gradient Boosting Decision Trees (GBDT)** for predictive modeling tasks.

Forecasting Algorithms for Energy Optimization | Self Project | *Jun'24 - Jul'24*

- Implemented forecasting algorithms to optimize cost and energy demands using **STL decomposition** and **ARIMA** models.
- Implemented **Exponential Smoothing** and **SARIMA** from statsmodels to capture **seasonal patterns** in energy consumption.
- Achieved **8.6% MAPE** using **SARIMA-GARCH** hybrid model for effective volatility capture in day-ahead load forecasting.

Auditory EEG Decoding Challenge | Electronics Club, IITK *Nov'23 - Dec'23*

- Implemented deep learning techniques to find similarities in **audio** and **EEG signals**, predicting which speech segments match EEG data.
- Preprocessed audio and **32-channel EEG** data with over 2000 instances in **PyTorch** using custom data loaders for effective analysis.
- Developed a **ResNET** architecture for audio and EEG data in PyTorch, utilizing **cosine similarity** for match/mismatch predictions.

Web Development

- Developed websites for **Public Policy and Opinion Cell, Policy Conclave, Electronics Club, and Adventure Sports Club** using **React, HTML/CSS and JavaScript,** ensuring that each site meets specific organizational needs and user engagement goals.

Technical Skills

Programming Languages	Libraries	Software
C++, SQL, Python, LaTeX, JavaScript	OpenCV, Numpy, Pandas, PyTorch, Keras	Matlab, Power BI, Edge Impulse, MS Excel, AWS

Relevant Courses

Image Processing	Fundamentals of Computing	Ordinary Differential Equations
Linear Algebra	Computational Methods in MSE	Introduction to Management

Positions of Responsibility

Coordinator | **Electronics Club** | **Science and Technology Council, IIT Kanpur** *Apr'24 - Present*

- Managed a two-tier team of **25** secretaries, organizing workshops and lectures, handling a budget of **1.70 Lakh+** effectively.
- Managed the logistics for successful completion of **6 Summer Projects** with **90+ Mentees** for a period of **2 Months**.
- Enacted **Group Discussion** as a part of team recruitment process, with over **100 people** participating in the exercise.