

# DEVIKA GUMASTE

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## Education

### Columbia University

Expected May 2025

*Master of Science - Electrical Engineering (Machine Learning Research) (3.9987/4.0)*

*New York, NY*

- **Key Coursework:** Advanced Deep Learning, Deep Learning on the Edge, Applied Machine Learning, Mathematics of Deep Learning, Algorithms for Data Science, Natural Language Processing, Statistical Learning

### Birla Institute of Technology and Science

August 2021

*Bachelor of Engineering - Electronics and Communication Engineering (8.3/10)*

*Goa, India*

- **Key Coursework:** Digital Signal Processing, Digital Image Processing, Embedded System Design, Machine Learning for Communication Systems, Computer Architecture

## Technical Skills

**Languages:** Python, R, SQL, C, C++, HTML/CSS, Assembly x86, Shell Script

**Technologies/Frameworks:** Git, Amazon Web Services (S3, SageMaker, ECS, EC2, Lambda), Google Cloud Platform, PostgreSQL, MySQL, Access DB, Flask, FAST, ROS, RestAPI, Jenkins, Docker, Nexus, TeamCity, Excel, Jupyter Lab, ONNX, Nvidia Jetson SDK

**Libraries:** Tensorflow, PyTorch, NumPy, Pandas, TensorRT, CUDA, Dask, Matplotlib, Sklearn, SQLAlchemy, Geopandas, Seaborn

## Experience

### COSMOS Lab, Columbia University

May 2024 – Present

*Summer Researcher*

*New York, NY*

- Conducting cutting-edge research under the guidance of Prof. Zoran Kostic at Columbia University. Currently a member of the cosmos computer vision team. Research funded by Center for Smart Streetscapes (CS3) NSF grant.
- Investigating the deployment and performance of state-of-the-art vision-language models on NVIDIA edge computing platforms. This research focuses on optimizing real-time processing, computational efficiency, and resource management to enable advanced applications in constrained environments.
- Utilizing and refining pose estimation techniques to enhance the accuracy and robustness of 3D object detection systems. The research involves developing innovative modeling approaches and algorithmic strategies to improve 3D object detection performance.

### ISERP, Columbia University

January 2024 – May 2024

*Teaching Assistant*

*New York, NY*

- Assisted Professor Thomas Brambor in teaching Data Visualization for the QMSS department in Spring 2024. Provided one-on-one tutoring, led recitations, and supported students in mastering data visualization tools.
- Developed supplementary educational resources to support the curriculum objectives, graded assignments and projects, providing constructive feedback to students to promote academic growth.

### ZS Associates

June 2021 – July 2023

*Software Engineer— Associate Consultant*

*Pune, India*

- Led a team of developers to design and develop an application with RESTful APIs using Flask, integrating it with the frontend framework of Angular JS. Built, monitored, and maintained databases using PostgreSQL, writing optimized queries to ensure data integrity and security.
- Executed an Agile workflow with JIRA, gathered requirements, set up timelines, and ensured execution of the project towards a deliverable. Utilized Jenkins to create a continuous integration service to automate the production process.

*Software Engineer—Associate*

- Collaborated with a 5-member team on the Intelligent Layer of a pharmacy application, creating an Algorithm as a Service (AaaS) with Amazon SageMaker. Crafted and launched key analytics solutions with advanced capabilities pertaining to pattern recognition and forecasting.
- Generated a key analytics-focused solution in Python using machine learning techniques for pharma analysts to determine a two-dimensional review for an event impact.

### Asteria Aerospace

June 2020 – December 2020

*Embedded Software Intern*

*Bengaluru, India*

- Developed a solution for Autonomous Indoor Navigation in the absence of GPS Signals for Quadcopter drones with visual-inertial odometry and SLAM Algorithms on Intel T265 camera using NVIDIA Jetson Xavier NX edge device.
- Created a system to process and transmit spatial information from the RealSense camera to the simulation software to enable self-navigation utilizing ROS as an abstraction between the camera hardware and the simulation software.

## Projects

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### Arrhythmia Detection using Vision Transformers

January 2024 - Present

- Implemented vision transformers for arrhythmia detection from ECG images. Adopted knowledge distillation methods to condense the model from 12-lead ECG classification into one suitable for single-lead data while preserving accuracy.
- Conducted comprehensive experiments on Google-ViT, BEiT (BERT for image classification), Swin Transformer and Meta's DEiT to evaluate their performance on arrhythmia detection.

### Real-time Pose Estimation and Correction on edge devices

December 2023

- Designed and implemented a system for accurately identifying and analyzing yoga poses using computer vision techniques. Leveraged deep learning models to locate and track key body landmarks, providing real-time feedback on pose alignment and correctness.
- Deployed on NVIDIA® Jetson Nano™, the application provides real-time feedback and corrective guidance, with a user-friendly interface for seamless interaction.

### Semantic Segmentation of Brain Tumor MRI scans

December 2023

- Developed a deep learning model with U-Net neural network architecture for semantic segmentation of brain tumor MRI scans, enhancing feature extraction and precise localization through deep layers and skip connections.
- Augmented the dataset to increase variability, optimized training using SGD + momentum and dynamically adjusted learning rates, fine-tuning hyperparameters including dropout rates and batch sizes to achieve optimal performance.

### Leveraging Data Mining and Statistical Methods for Performance Prediction

December 2023

- Implemented XGBoost algorithm and K-Means clustering to predict student performance and attained an accuracy of 92.4% and 93.7% respectively.
- Produced Naive Bayes, Regression, SVM, Decision trees models having 18% increased performance. Investigated normalization, regularization, one-hot encoding and feature selection for 20% performance gain.

### MLP Mixer: Analyzing and Implementing an all-MLP Architecture for Vision

December 2023

- Implemented the MLP-Mixer Architecture in Tensorflow. Evaluated the performance of this architecture against convolution-based and attention-based models. Conducted a thorough analysis to estimate MLP-Mixer's performance as an alternative for image classification tasks.