Aryan Mishra

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Education

University of Maryland **Expected: May 2025**
Masters of Engineering in Robotics *College Park, Maryland, USA*

Vellore Institute of Technology **June 2023**
Bachelors of Technology in Electronics and Communication Engineering *Vellore, India*

Research and Work Experience

National Institute of Standards and Technology, US Dept. of Commerce **November 2024 - Present**
Software Developer - Generative A.I. *Gaithersburg, Maryland*

- Developing pipeline for testing of multi-modal inputs as authentic or fabricated.
- Generated images using diffusion and style gan models, fine tuned Flux models using LoRA.
- Deployed anti-spoof and transformer classifier for facial detection, recognition and verification on image and video inputs.

Department of Statistics **August 2024 – Present**
Machine Learning Researcher *College Park, Maryland*

- Independent research on geometric deep learning, Approximation of high dimensional data in lower dimensions.
- Generated high-dimensional data using intrinsic geometric processes and heat kernel maps.
- Developed our own regularization term, testing it for regression and classification task.

Tubaldi Lab, Dept. of Mechanical Engineering **January 2024 – December 2024**
Machine Learning Researcher *College Park, Maryland*

- Deployed VNET with Attention Mechanism on the Stanford Type B Aorta Dissection dataset, achieving a Dice Coefficient of 0.80, Jaccard Mean of 76.3, AsD Mean of 0.98.
- Developed a transformer-based encoder for the VNET architecture.
- Developed soft robotic grippers by 3D-printed bases
- Based on the gripping action force, deployed machine learning models to predict object size, shape, and material from Pressure-Volume curves.

Projects

Autonomous Scene Segmentation| *PyTorch, Swin Transformer, Trans-UNET* **September 2024 - December 2024**

- Devised and trained from scratch Trans-UNET, Swin-Trans-UNET and UNET. Performed pixel-wise segmentation of KITTI Images
- Achieved Dice coefficients of 0.88, 0.80, and 0.87 for three segmentation models, with the Swin Transformer-UNET architecture demonstrating superior performance. Swin Transformer-UNET attained the lowest cross-entropy loss of 0.27 among the compared approaches.

Vision Language Model| *PyTorch, Python, SigLip, Google-Gemma, OpenCV* **August 2024 - December 2024**

- Combined 400M SigLIP and 2B Gemma Models into a sub-3B VLM works for VQA, QA tasks and referring segmentation.

Multimodel Trajectory Prediction| *PyTorch, Python, OpenCV* **July 2024 - August 2024**

- Addressing the uncertainties faced by self-driving vehicles with a Multiple Trajectory Prediction (MTP) model by predicting multiple possible paths and the likelihood of each using probability adhering to geometric and angular meaning using the NuScenes Dataset.

Retrieval Augmented Generation - RAG| *PyTorch, Python* **June 2024 - July 2024**

- Implemented a Retrieval Augmented Generation (RAG) pipeline using the Gemma-2-9b-it LLM modeL.Achieved high efficiency for real-time query answering, optimizing for scalable performance and reduced latency.

Generative Adversarial Networks - GAN | *PyTorch, Python* **June 2024**

- Successfully deployed multiple GAN models, including Deep Convolution GAN, Cycle GAN, and Progressive GAN, on diverse datasets such as MNIST, CelebA, and the Summer to Winter Yosemite dataset.

Technical Skills

Languages :Python,C++, MATLAB, Rust
Frameworks: TensorFlow, PyTorch, Keras, CUDA, OpenAIGym, OpenCV, JAX, LangChain, Hugging Face
Software/Tools : AWS, ROS1/2, CMake, Gazebo,inux, Git/GitHub, Docker,Robot Perception, Localization, Deep Learning, Computer Vision, Artificial Intelligence, Microsoft Suite, Content Writing