Aryan Mishra

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EDUCATION

University of Maryland College Park, Maryland
Master of Engineering – Robotics *Expected: May 2025*
Vellore Institute of Technology Vellore, India
Bachelor of Technology – Electronics and Communication Engineering *June 2023*

RESEARCH AND WORK EXPERIENCE

National Institute of Technology and Standards - *Gaithersburg, MD* November 2024 - Present
Generative AI Software Developer
Professional Research and Experience Program student from UMD, part of Retrieval Group, Information Technology Laboratory

- 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, vision transformer classifier, spatial based image for facial detection, recognition and verification on image and video inputs.

Department of Statistics, Uni of MD- *College Park, MD* August 2024 - Present
Machine Learning Researcher
Worked as a volunteer on Geometric Deep learning, currently took it as an independent study for Spring 2025 semester.

- Independent research on geometric deep learning for graphs, grids and data manifolds.
- Working on understanding and devising novel methods to harness the power of expressiveness in graph neural networks.

Department of Mechanical Engineering – *College Park, MD* January 2024 – December 2024
Machine Learning Research Volunteer
Part of two projects: Development of a soft robotic gripper, Medical Image analysis

- 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.
- 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.

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PROJECTS

Autonomous Scene Segmentation September 2024 – December 2024

PyTorch, Swin Transformer, Trans-UNET, Python

- 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 and attained the lowest cross-entropy loss of 0.27 among the compared approaches.

Vision Language Model August 2024 – December 2024

PyTorch, SigLip, Python, Google-Gemma, OpenCV

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

Multimodel Trajectory Prediction July 2024 – August 2024

PyTorch, Python, OpenCV

- 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 June 2024 – July 2024

PyTorch, RAG, Python

- 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 June 2024

PyTorch, OpenCV, PIL, Python

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

TECHNICAL SKILLS

- **Languages:** Python, C++, MATLAB, RUST
- **Frameworks:** TensorFlow, PyTorch, Keras, CUDA, OpenAI Gym, OpenCV, Jax, LORA, Hugging Face, Flux
- **Software/Tools:** AWS, ROS1/2, C-Make, Gazebo, Linux, Git/GitHub, Docker, Robot Perception, Localization, Deep Learning, Computer Vision, Artificial Intelligence, Microsoft Suite, Content Writing