SHYAMSUNDAR PRABHAKAR INDRA

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EDUCATION

University of Maryland | *Master of Engineering in Robotics* | **GPA : 4.00 / 4.00** Aug 2022 - May 2024

- **Key Courses**: 3D Computer Vision (CV) | Multimodal ML | Adv. Deep Learning | C++ Robot Programming College Park, MD, USA

BITS Pilani | *Bachelor of Engineering in Mechanical Engineering* | **GPA : 8.20 / 10.00** Aug 2016 - May 2020

- **Bachelor's Thesis** : CV based Pedestrian Path Prediction using Bi-LSTM for L2 Autonomous Vehicle [link] Rajasthan, India

KEY SKILLS

Python | C++ | CUDA | PyTorch | TensorFlow | OpenCV | Docker | Kubernetes | ROS | Git | Carla | AzureML| AWS | Airflow | ONNX

EXPERIENCE

KPCS Systems | *Machine Learning Engineer* Oct 2024 – Present

Summary : Spearheading machine learning & full-stack projects for various high profile clients Fredrick, MD, USA

- Developing a web application with end-to-end ETL pipelines using Airflow & Elasticsearch grabbing data from AWS S3 server; visualization using Grafana dashboards embedded into an Angular + Node.js app, deployed on an AWS EC2 instance.
- Achieved 93% anomaly detection accuracy using sBERT, fine-tuned Llama 3 & Isolation Forests on National Institute of Health's (NIH) AccessGUDID dataset; It is in the process of getting productionized in NIH's system. [github]
- Fine-tuned LLaVA 1.5 7B for OCR of scanned question papers, and automating their conversion to LaTeX format.

Renesas Electronics America Inc. | *Machine Learning Engineer Intern* Jun 2023 – May 2024

Summary : Specialized in MLOps & developing software for automated AI deployment on Renesas edge devices Columbia, MD, USA

- Built Python backend & automated ML pipelines for Renesas edge AI platform, saving 80+ man-hours/month.
- Optimized PyTorch edge deployments by reducing memory usage by 42% with LoRA & inference times by 12% via ONNX.
- Built SVM voice authentication model with 96% accuracy, deployed on Renesas RA6E1 boards. [website]
- Delivered 92.6% accuracy for Deep Learning based surface detection on 4 surfaces for intelligent vacuums. [link]

UMD Vision & Learning Lab | *Graduate Student ML Researcher* Feb 2023 – Jun 2023

Summary : Conducted cutting-edge research on generative AI models for text-to-3D facial animation College Park, MD, USA

- Developed 3D text-to-facial animation models using Nvidia's EG3D, GAN Inversion, & CLIP under Dr. Jia-Bin Huang.
- Achieved realistic facial animation outputs with high CLIP scores for editing accuracy by training on the EmotiW dataset.

Robert Bosch Centre - IISc Bangalore | *Robotics Machine Learning Intern* Jan 2022 – Aug 2022

Summary : LiDAR 3D obstacle detection & lower level controller for WIPRO sponsored L3 autonomous vehicle Karnataka, India

- Built LiDAR 3D object detection (mAP: 73% cars, 72% pedestrians) using KITTI3D for an L3 autonomous vehicle.
- Developed CBF-based controller with 92% collision avoidance success in 50 Carla simulations.
- Deployed real-time obstacle avoidance on a Copernicus UGV & published findings at Indian Control Conference. [1] [video]

SELECTED PROJECTS

- **Vision Language Navigation Foundation model (Ongoing)** | *(Python, PyTorch)*

Building foundation model with Google's RT-2 backbone; training on 10K+ YouTube clips to improve task accuracy over baseline.

- **TerpBot : Autonomous Mobile Robot** | *(RaspberryPi (RPi), ROS2, C++, Python, PyTorch)* | [website]

Built RPi + ROS2 robot with wheel odometry & monocular camera, achieving 100% navigation success in 5 test environments.

- **Multi-Modal Masked Autoencoder Inpainting** | *(Python, PyTorch, AI2THOR)* | [paper]

Developed transformer-based multi-modal autoencoder for image inpainting using RGB & depth images, tested on AI2THOR.

- **Neural Radiance Fields (NeRF) based Implicit 3D Representation** | *(Python, PyTorch, PyTorch3D)* | [github]

Implemented NeRF and a differentiable volume renderer for 3D scene optimization using ML based image supervision.

- **Multi-Mesher : Single Image to 3D Mesh Generative Model** | *(Python, PyTorch, PyTorch3D)* | [website]

Designed a novel single images to 3D colored mesh genAI model using SDS loss & synthetic multi-view data from Zero123.

- **CUDA based Image Processing Pipelines** | *(CUDA, C++, OpenCV)* | [github]

Optimized image processing with CUDA, achieving over 6x speedup over CPU for Gaussian Blur, Sharpening, Edge Detection etc.

PUBLICATIONS

[1] "**Control Barrier Functions in UGVs for Kinematic Obstacle Avoidance: A Collision Cone Approach**", *Indian Control Conf.* 2023.

[2] "**Analysis of Vibration-based Windmill Coupled Micromachined Energy Harvester**", *Journal of Vibroengineering*, 2019.