SHYAMSUNDAR PRABHAKAR INDRA

Interests: *Computer Vision, Robotics, Autonomous Vehicles, Machine Learning, Vision Language Models, Software Engineering, Sensor Fusion, Path Planning*

+1(240) 398 0284 | shyampi@terpmail.umd.edu | shyam-pi.github.io | shyam-pi | shyam-pi

EDUCATION

University of Maryland, College Park — *MD, USA*

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

- Research on **3D GANs and NeRFs** with Dr.Jia-Bin Huang in his Vision & Learning Lab
- **Graduate Teaching Assistant**, ENME272 - Computer Aided Design, Spring 2023 | **Student Athlete**, Collegiate Badminton Team
- **Key Courses:** 3D Vision, Adv. Computer Vision, Perception in Robots, Foundations of Deep Learning, Cognitive Robotics, C++ Robot Programming

BITS Pilani, Pilani campus — *Rajasthan, India*

Bachelor of Engineering (Hons.) in Mechanical Engineering | **GPA : 8.20/10.00** — *Aug 2016 - May 2020*

- Bachelor's Thesis on **Pedestrian Path Prediction** for Autonomous Vehicles with Dr. BK Rout at the Centre for Robotics & Intelligent Systems | link
- **Student athlete**, Collegiate Track and Field team | **President**, PTM - Tamil Cultural Association | **Team member**, Pixxel - Nanosatellite building team
- **Key Courses:** Machine Learning, Object Oriented Programming using JAVA, Intro. to Programming using C, Intro. to Robotics

SKILLS

Programming	**Advanced:** Python (PyTorch, PyTorch3D, Keras, Scikit, NumPy, OpenCV, Pandas) | **Beginner:** C/C++, C#, Java, Matlab.
CV Applications	Generative Modeling, 3D Reconstruction, Object Detection and Tracking, 2D to 3D modelling, Depth Estimation
Dev Utilities	ROS, Unity, Gazebo, Simulink, RViz, Carla, Colab, Java Server Pages, HTML

EXPERIENCE

Renesas Electronics America Inc. — *Columbia, MD, USA*

Artificial Intelligence Engineer Intern — *May 2023 - Present*

- Contributed to end-to-end **software engineering** on **Machine Learning and CNN pipelines** for the company's automated AI deployment software.
- Researched and implemented **pyTorch model size optimization** through weight matrix decomposition, achieving a **52% reduction** on average.
- Implemented **rigorous testing procedures** to validate the robustness and reliability of the software, including **unit tests and integration tests**.
- Developed a **SVM-based anti-spoofing model** which rejects spoof inputs within voice authentication systems with an **accuracy of 96%.** | website
- Spearheaded the **embedded deployment** of the anti-spoofing model on a **Renesas Edge device**, enabling real-time inference testing.

Robert Bosch Centre for Cyber Physical Systems - IISc Bangalore — *Karnataka, India*

Robotics Research Intern — *Jan 2022 - Aug 2022*

- Designed a **LIDAR based 3D object detection model** to enhance the autonomy of a **level-3 Autonomous Vehicle** sponsored by WIPRO.
- Developed a **low-level python control package** working with the perception stack using **Control Barrier Functions (CBFs)** for obstacle avoidance.
- Verified the controller and the 3D object detection model in **Carla** - an autonomous driving simulator. | video

International Institute of Information Technology, Bangalore — *Karnataka, India*

Computer Vision Research Intern — *Jan 2021 - Aug 2021*

- Developed a **YOLO-based object detection model** for **plant leaf counting**, enhancing crop health monitoring for a farm robot. | website
- Led the development of deep learning models to **detect and track fast-moving objects**, such as **coins in a carrom game**.
- Designed and 3D-printed essential parts for the farm robot, contributing to **prototype development**.
- Mentored a team of five interns in modeling an **autonomous robotic assembly line**.

KEY PROJECTS

- **Multi-Mesher**: A Diffusion Driven single 2D image to 3D Mesh Reconstruction model using Zero123 and PointNet architecture (Python) | website
- **TerpBot**: Custom RaspberryPi based Mobile Robot (website) with Path Planning (website) & Leader-Follower capabilities (website) | (Python, C++)
- **Masked Autoencoder Inpainting**: A Transformer-based Autoencoder for Collaborative Perception by Image Inpainting (Python) | paper
- **American Sign Language Detection**: CNN and LSTM based American Sign Language (ASL) Detector for Letters from video feeds (Python) | website
- **Neural Radiance Fields (NeRFs)**: Implicit 3D representation and novel view synthesis using NeRFs and Volume Rendering (Python) | github
- **Point Cloud Classification & Segmentation**: PointNet based architecture for classification and segmentation of point clouds (Python) | github
- **Aruco based Maze Navigation**: ROS project for navigating a TurtleBot through a maze environment using Aruco markers (C++) | github

ACHIEVEMENTS

2016 **All India Rank 1073**, JEE Mains, out of 1.2 million candidates

2016 **Top 0.04 percentile**, JEE Advanced, entrance exams to the prestigious Indian Institutes of Technology

PUBLICATIONS

Control Barrier Functions in UGVs for Kinematic Obstacle Avoidance: A Collision Cone Approach
T. Phani, G.G. Bhavya, T. Manan, S. Neelaksh, P.I. Shyamsundar, M.G. Shyam Sundar, S. Suresh, K. Vaibhav, K. Shishir
Indian Control Conference. 2023

Analysis of Vibration based Windmill Coupled Micromachined Energy Harvester
R. Pavan, P.I. Shyamsundar, K.P. Venkatesh
Journal of Vibroengineering. 2019