SHYAMSUNDAR PRABHAKAR INDRA

Interests: Computer Vision, Robotics, Autonomous Vehicles, Machine Learning, Speech Recognition, Software Engineering, Vision Language Models, NLP

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EDUCATION

◆ University of Maryland, College Park
MD, USA

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

- **Graduate Teaching Assistant**, ENME272 - Computer Aided Design, Spring 2023 | **Student Athlete**, Collegiate Badminton Team
- **Courses:** 3D Vision, Adv. Computer Vision, Perception in Robots, Foundations of Deep Learning, Cognitive Robotics, C++ Robot Programming Human Robot Interaction, Extended Reality (XR), Path Planning in Robots, Control of Robotics Systems, Robot Modelling

◆ 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

KEY SKILLS & CERTIFICATIONS

Certifications	Getting Started with Accelerated Computing in CUDA C/C++ Scaling Workloads Across Multiple GPUs with CUDA C++
Programming	**Advanced:** Python | **Intermediate:** C/C++, C# | **Beginner:** Java, Matlab
ML/DL Libraries	PyTorch | PyTorch3D | TensorFlow | Keras | Scikit | Open3D | OpenCV | Numpy | Pandas
CV Applications	Generative Modeling | 3D Reconstruction | 2D to 3D modelling | Depth Estimation | Image Segmentation | Object Detection
Dev Utilities	ROS | Git/GitHub | Linux | Unity | Gazebo | Blender | Docker | SolidWorks | Carla | Java Server Pages | Google Colab

EXPERIENCE

◆ Renesas Electronics America Inc. (Reality AI before acquisition)
Columbia, MD, USA

Artificial Intelligence Engineer Intern *May 2023 - Present*

Summary : TinyML development and deployment for 1D vibration & acoustic data on edge devices.

- 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 hardware deployment** of the anti-spoofing model on a **Renesas Edge device**, enabling real-time inference testing.

◆ Vision & Learning Lab - University of Maryland, College Park
College Park, MD, USA

Graduate Student Researcher | Guide : Dr. Jia-Bin Huang *Feb 2023 - Aug 2023*

Summary : Ideation & modeling for 3D animations genAI project using 3D GANs, CLIP & GAN inversion.

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

Robotics Research Intern | Guide : Dr. Shishir Kolathaya *Jan 2022 - Aug 2022*

Summary : 3D obstacle detection and lower level control package development for autonomous vehicle.

- 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 | Guide: Dr. G.N. Srinivasa Prasanna *Jan 2021 - Aug 2021*

Summary : Perception stack and prototype development for autonomous farm robot.

- Developed a **YOLO-based object detection model** for **plant leaf counting**, enhancing crop health monitoring for a **farm robot**. | website
- Led the development of a deep learning model 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
- **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
- **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
- **Aruco based Maze Navigation**: ROS project for navigating a TurtleBot through a maze environment using Aruco markers (C++) | github

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