SHYAMSUNDAR PRABHAKAR INDRA

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

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EDUCATION

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

Master of Engineering in Robotics | **GPA : 4.00/4.00** — *Aug 2022 - Current*

- 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
- **Courses:** 3D Vision, Adv. Geometric Computer Vision, Perception in Robots, Foundations of Deep Learning, Cognitive Robotics, Robot Programming using C++, 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, Computer Aided Design, Finite Element Methods, Solid Mechanics, Mechanical Vibrations, Calculus I, II, III and IV, Probability and Statistics, Linear Algebra

EXPERIENCE

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

Artificial Intelligence Engineer Intern — *May 2023 - Present*

- Developed a SVM based anti-spoofing model, that can reject spoof inputs in voice authentication systems with an accuracy of 96%. | LINK
- Worked on embedded deployment of the model on a Renesas Edge device for live inference testing.
- End-to-End software engineering for the company's automated AI deployment software.

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

Robotics Research Intern — *Jan 2022 - Aug 2022*

- Worked on implementation of a LIDAR based 3D object detection model for 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 in Carla - an autonomous driving simulator. | VIDEO

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

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

- Utilized a YOLO based object detection model for plant leaf counting in order to monitor crop health for a farm robot. | LINK
- Modelled 3D parts for the farm robot, and 3D printed the same to build a prototype.
- Mentored five new interns to model an autonomous robotic assembly line.

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
Development Tools	ROS, Unity, Gazebo, Simulink, RViz, Carla, Colab, Java Server Pages, HTML

KEY PROJECTS

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

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