SHYAMSUNDAR PRABHAKAR INDRA

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ABOUT: Aspiring machine learning engineer with solid foundations in mathematics and software development. Extensive experience creating ML applications for 2D and 3D computer vision since 2020. Cross domain knowledge and experience in robotics, VR development, reinforcement learning, LLM and CUDA programming.

EDUCATION

◆ University of Maryland, College Park
MD, USA

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

- **Teaching : Graduate Teaching Assistant**, Computer Aided Design, Spring 2023 | **Student Athlete**, Collegiate Badminton Team
- **Courses:** 3D Computer Vision, Geometric Computer Vision, Extended Reality (XR), Perception in Robots, Foundations of Deep Learning, Cognitive Robotics, C++ Robot Programming, Human Robot Interaction, 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	Accelerated Computing in CUDA C/C++ | CUDA for Multi-GPU Workload Scaling | Generative AI using LLMs
Domain Skills	Computer Vision | Robotics | Machine Learning | VR/AR | LLMs | Software Dev. | Reinforcement Learning | CUDA programming
Programming	**Advanced:** Python | **Intermediate:** C/C++, C# | **Beginner:** Java, Matlab
ML/DL Libraries	PyTorch | PyTorch3D | TensorFlow | Keras | Scikit-Learn | Open3D | OpenCV | Numpy | PyBullet | OpenAI Gym | Pandas
Dev Utilities	ROS | Git/GitHub | Linux | Slurm | Unity | Gazebo | Blender | Docker | AWS SageMaker | Google Colab | Carla | LaTeX

EXPERIENCE

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

Artificial Intelligence Engineer Intern *June 2023 - Present*

Summary : Software development for automated AI deployment platform tailored for embedded devices

- End-to-end **development of ML and CNN pipelines** using PyTorch and Scikit for **automated embedded AI deployment Python software**.
- Researched and implemented **PyTorch model size optimization** using weights decomposition, achieving a **52% size reduction**.
- Implemented **rigorous testing procedures** like **unit tests**, integrated with **CI/CD pipelines using Git**, to ensure robustness & flexibility.
- Collaborated to **deploy & integrate** ML pipeline into cloud infrastructure within an **MLOps cycle**, following **Agile** development methodology.
- Developed **SVM-based anti-spoofing model** with **96% accuracy (in-house dataset)** and deployed it on a Renesas embedded device. | website

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

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

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

- Conducted literature survey for usage of **3DGANs, GAN Inversion and CLIP models** for **text-to-3D animation generation.**
- Setup a **PyTorch pipeline** for integration of **EG3D with GAN Inversion** for text-based manipulation of the latent space using CLIP.

◆ 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** and published conference a paper on the controller. | video | paper

◆ 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
- Contributed to the development of a deep learning model to **detect and track fast-moving objects**, such as **coins in a carrom game**.
- Led a team of 5 interns to design and **3D-printed** essential parts for the farm robot, contributing to **prototype development**.

KEY PROJECTS

- **Multi-Mesher**: Diffusion based Single Image to 3D Mesh generation model using Zero123 & PointNet architecture **(Python, PyTorch)** | website
- **VR Hostage Rescue Game**: A Virtual Reality game built on Unity engine, simulating a Hostage Rescue mission on Meta Quest 2 **(C#, Unity)** | website
- **Neural Radiance Fields**: Implicit 3D reconstruction and novel view synthesis using NeRFs and Volume Rendering **(Python, PyTorch3D** | github
- **Point Cloud Classification & Segmentation**: PointNet based architecture for classification and segmentation of point clouds **(PyTorch)** | github
- **KUKA Pick & Place using RL**: DQN, Dueling DQN and PPO RL implementations for KUKA pick & place in PyBullet **(Python, PyTorch)** | github
- **CUDA Image Processing**: CUDA Parallel Computing based Image Processing pipelines like Gaussian Blur, Edge Detection etc. **(C++, CUDA)** | github
- **TerpBot**: Custom RaspberryPi based Mobile Robot (website) with Path Planning (website) & Leader-Follower capabilities (website) | **(Python, C++)**
- **Aruco based Maze Completion**: ROS project for navigating a TurtleBot through a maze environment using Aruco markers in Gazebo **(C++)** | github

PUBLICATIONS

Control Barrier Functions in UGVs for Kinematic Obstacle Avoidance: A Collision Cone Approach | Indian Control Conference (Oct. 2023)

Analysis of Vibration based Windmill Coupled Micromachined Energy Harvester | Journal of Vibroengineering (Nov. 2019)