Sumukh Porwal

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Education

Worcester Polytechnic Institute — **Massachusetts, USA**
Master of Science in Mechatronics, Robotics and Automation Engineering — *Aug 2024 - May 2026 (expected)*

Indian Institute of Technology Tirupati — **India**
Bachelor of Technology in Mechanical Engineering (CGPA: 8.69/10) — *July 2020 - June 2024*

Experience

SeiAnmai Technology Pvt. Ltd. — **May 2023 – July 2023**
Project Lead
- Spearheaded the development of an autonomous robot using ROS2 and micro-ROS for communication.
- Integrated SLAM, autonomous navigation, and teleoperation for seamless performance.
- Implemented ArUco marker detection to achieve accurate autonomous docking.
- Optimized robot performance by integrating mechanical design and control, utilizing Docker for micro-ROS in C.

Projects

Trigger Word Detection — **Jun 2024 – Aug 2024**
- Developed a deep learning model to detect the trigger word ”activate” in audio streams.
- Synthesized and processed diverse audio datasets for training and evaluation.
- Utilized a neural network with a 1D convolutional and 2 GRU layers to achieve high accuracy

Semantic Image Segmentation — **May 2024 – Aug 2024**
- Implemented a U-Net CNN for pixel-level semantic image segmentation on CARLA self-driving car dataset.
- Achieved precise object segmentation, crucial for autonomous vehicle navigation and safety.
- Implemented, trained, and evaluated the model, demonstrating high accuracy with detailed mask predictions.

Face Recognition using Siamese Network — **Jun 2024**
- Developed a face recognition system using Multi-Task Cascaded Conv Neural Networks (MTCNN) and Inception ResNet.
- Implemented a triplet loss function to use 128-dimensional encodings generated by a deep learning model from face images to effectively distinguish between similar and dissimilar faces.

Navigation and Control of Cooperative Mobile Robots — **Jan 2023 – May 2024**
- Developed omnidirectional 3-wheel mobile robots with laser sensor for seamless SLAM and self-guided navigation.
- Integrated Cooperative Navigation system with linear and triangular formations for collaborative tasks.
- Utilized Raspberry Pi 4, Raspberry Pi Pico, and ROS2 as micro-processor, micro-controller and communication framework respectively.

Sentinel Drone — **Sep 2022 - Feb 2023**
- Engineered an surveillance drone for accident, fire, and anomaly detection, utilizing computer vision algorithms.
- Integrated ROS Noetic for communication and Gazebo for detailed simulation.
- Conducted hardware testing using a nano drone, implementing PID control for stable navigation.

Alexa-controlled Robotic Manipulator — **Oct 2022 - Dec 2022**
- Simulated a 3-DoF robotic manipulator, enabling autonomous task execution through Alexa voice commands.
- Utilized ROS, Gazebo, RViz, and MoveIt to manage simulation and control.
- Planned to build a hardware model using Arduino UNO, linking it to ROS for communication.

Skills

Programming Python, C, C++, MATLAB, Bash, LaTeX, Git
Framework ROS 1 & 2, TensorFlow
Libraries OpenCV, OMPL, Keras, PyTorch
Software Tools Gazebo, RViz, MoveIt, Nav2
OS Windows, Ubuntu

Hardware Raspberry Pi, Raspberry Pi Pico, Arduino, RP LiDAR
CAD DS Solidworks, Fusion 360, PTC Creo
CAE DS Abaqus, Ansys

Achievements

- Ranked in the top 1% of over 1.6 million students in JEE-Mains and in the top 5% in JEE Advanced, a highly competitive national examination to get admission in Indian Institute of Technology.
- Awarded a merit-based scholarship of $\$9,660$ at WPI in recognition of an exceptional academic record.