Dharun Kumar

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Education

Amrita School of Engineering Coimbatore, India

Bachelor of Technology – Electronics and Communication Engineering; GPA: 7.97/10 *July 2020 - July 2024*

Dissertation: *Machine learning enhanced smart hand wearable for speech impaired individuals*

Skills Summary

- **Languages** Python, C++, MATLAB
- **Development Boards** Arduino Uno/Mega, ESP8266, ESP32, Raspberry Pi, LPC2148
- **Frameworks** Robot Operating System (ROS), Real-Time Operating System (RTOS), TensorFlow, Keras, PyTorch, NumPy, Matplotlib, React, Node.js
- **Tools** Git, Docker, AWS, Google Cloud, MySQL

Experience

- **NIT Patna**
  Robotics Intern *April 2023 - Present*
  - Working on reconfigurable robot Smorphi in CoppeliaSim using python and Lua.
- **Bharat FIH, Chennai**
  Robotics Intern *Sept 2022 - Sept 2022*
  - Developed ROS packages for slam (g-mapping) and path planning (A* and Dynamic window approach) of AMR robot for use PCB transportation in manufacturing unit.

Projects

- **Sensor fusion and non-linear filtering** - Fused measurements from LiDAR and camera and track vehicles over time and used real-world data from the Waymo Open Dataset, detected objects in 3D point clouds and applied an extended Kalman filter for sensor fusion and tracking. (March 2024)
- **Autonomous drone navigation and fruit detection** - Autonomous drone navigation using ROS2, C++, and Gazebo. It implements visual ORB SLAM for SLAM, YOLO for object detection, and PID control for navigation. The drone is designed to fly over a predefined environment, detect and record the locations of fruits, and navigate to a specified goal location. (March 2023)
- **MPC based obstacle avoidance system** - Implemented a Model Predictive Control (MPC) strategy to navigate an ego vehicle through predefined lanes while avoiding obstacle while ensuring safe and efficient navigation in dynamic and complex environments (January 2024)
- **Motion planning and decision making for autonomous vehicles** - Implemented a hierarchical planner with Behavior and Motion Planners to avoid static objects and handle intersections using FSMs, cubic spirals, and cost function evaluation. Developed collision checking, path generation, and optimal trajectory selection for safe navigation. (April 2024)
- Wireless ECG signal transmission – Developed prototype of live ECG signal transmission to Blynk IOT cloud. Designed amplifier and filter stages utilizing TL084 OPAMPS, achieved a bandwidth of 0.05Hz to 103Hz. Designed Implemented in PCB and got CMRR of 96 dB and gain of 400. (July 2023)
- **Comparison of performance of different controllers in inverted pendulum** - Implemented MPC, LQR and PID based controllers in inverted pendulum on a cart control using MATLAB (December 2023)

Publications

- **Title:** "(SHWASI): Smart Hand Wearable Aid for Speech Impaired: Sign Language Communication using Flex sensor-based Fingerspelling"
  Authors: Dharun Kumar, Mithun E, Abirami, Mathiarasun, Harikumar ME
  Submitted to: INDICON, IIT Kharagpur 2024
  Status: Under Review

Upskilling and Certifications

- Self-driving Car engineer Nanodegree by Udacity
- Advanced Diploma in Industrial Robotics Training on Yaskawa Industrial Robots under Axis Global Institute of Industrial Training
- IMB AI engineer professional certificate