Dhruv Agrawal

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OBJECTIVE

Secure a summer internship where I can leverage my technical skills and gain hands-on knowledge.

EDUCATION

Worcester Polytechnic Institute, MS in Robotics — August 2024 – August 2026

- GPA: 4.0
- **Coursework** Motion Planning, Robot Control, Foundations of Robotics

Visvesvaraya National Institute of Technology, B.Tech in ECE — July 2018 – May 2022

- GPA: 8.7/10
- **Coursework:** Computer Vision, Digital Circuits & Microprocessors, Signal Processing, Machine Learning

SKILLS

Languages: C, C++, Python, MATLAB, LaTeX

Tools: ROS2, Gazebo, OMPL, RViz, Octomap, EDT3D, OpenCV, TensorFlow, PyTorch, Arduino, MediaPipe

Software: VS Code, Docker, Git, Simulink, PX4Autopilot, S32Design Studio, LabView, ModelSim, Keil, STM32Cube

Development boards: NXPs S32K144, Syntiant's Edge AI EVB, Raspberry Pi, ESP32, Arduino Uno, STM32 Nucleo

EXPERIENCE

Firmware Engineer, Jio Platforms Ltd. – Bengaluru, India — June 2022 – May 2024

- Developed and implemented State of Charge and State of Health estimation algorithms using model-based methods for battery management systems, both in MATLAB Simulink and on microcontroller hardware.
- Executed state-of-charge and state-of-health estimation techniques on edge AI devices using data-driven methods, including Deep Neural Networks, with TensorFlow, while collaborating effectively within a team.
- Created custom Python code for SREC generation to facilitate firmware flashing through the bootloader.
- Collaborated on the design and development of firmware for an EV charger system using the OCPP protocol.

PROJECTS

Real-Time Obstacle Avoidance & Path Planning with Kinodynamic Constraints — November-December 2024

- Developed an autonomous navigation system for drones that can operate in unknown environments.
- The project specifically addresses the challenge of incorporating kinodynamic constraints for planning the path of a drone considering both kinematic limitations and dynamic constraints and solving the state-space equation.

Quadrotor control using LQR — December 2024

- Implemented an LQR controller to track the trajectory of a quadrotor in simulation using MATLAB.

Robotic Arm Manipulation — November-December 2024

- Programmed a robotic arm to grasp and pick up simple objects using hard-coded object positions.
- Implemented motion control for the arm to move at a constant velocity in a specified direction.
- Formulated a PD controller for precise motor control, minimizing the error between desired and applied current.

Out of Control Planning — October 2024

- Planned the path of a non-holonomic system with dynamic motion constraints using the RG-RRT algorithm. The performance of the planner was evaluated through benchmarking against the RRT and KPIECE algorithms, with comparisons based on metrics such as computation time, path length, number of tree nodes, and success rate.

Suntracker on Rocker-Bogie mechanism — May-July 2019

- Engineered an all-terrain robot that features a 3D printed Rocker Bogie suspension system and a stabilized platform with a differential gear mechanism. Adjustable solar panels are built that are driven by servomotors and light-dependent resistors (LDRs) for precise sunlight tracking, improving solar energy absorption efficiency.

Sign Language Recognition — December-May 2022

- Developed a Deep Neural Network (DNN) in Python for Sign Language Recognition, leveraging MediaPipe for

dataset pre-processing. Designed a word prediction system by combining individual letters and integrated a correction mechanism using PyEnchant to improve the accuracy of the predictions.

Self Covid Detection March-April 2022

- Designed and implemented a neural network that uses advanced machine learning algorithms to detect the presence of the Covid-19 virus in patients. Developed and integrated the CoviSelf app as a comprehensive self-detection tool, utilizing Flutter for app development to create an intuitive and user-friendly interface.

RELATED COURSES

Coursera: Foundations of Robot Motion, Robot Kinematics, Robot Dynamics, Motion Planning and Control

PUBLICATIONS

Suntracker on Rocker-Bogie mechanism Jan 2020
Advances in Mechanical Engineering: Select Proceedings of ICAME 2020, 719-726, 2020

Improved American Sign Language Recognition and Correction Using Inception Network, MediaPipe and PyEnchant April 2023
2023 2nd International Conference on Paradigm Shifts in Communications Embedded Systems, Machine Learning and Signal Processing (PCEMS)

ADDITIONAL EXPERIENCE

Business Store Manager, Fashion World, India May 2021 - July 2021
Responsible for managing cash transactions, maintaining efficient store operations, including staff management and inventory control, and resolving grievances to improve customer satisfaction.

ACTIVITIES/LEADERSHIP

- Member of the WPI badminton team, competing in both singles and doubles events.
- Headed the IEEE Publicity Department during the sophomore year and handled promotional activities.
- Member of IvLabs, Robotics Club (VNIT), developing multiple projects including Suntracker on Rocker-Bogie.
- Skilled in playing the harmonium, with experience performing at various cultural events.
- Active blood donor in various camps organized by local NGOs and during emergency situations.