Vignesh Ravikumar

+1 (617) 447-6585 | E-Mail | LinkedIn | Portfolio | Github

Education

Northeastern University, Boston, MA *May 2023*
Master's in Electrical and Computer Engineering

Sri Sivasubramaniya Nadar College of Engineering, Chennai, India *Apr 2020*
Bachelor of Engineering in Electrical and Electronics Engineering

Relevant Courses: Robot Sensing & Navigation, Algorithms, Mobile Robotics, Applied Probability and Stochastic Processes, Control Systems, Advanced Control Systems, Applied Soft Computing

Technical Skills

Languages: Python, C/C++, SQL
Frameworks: PyTorch, Tensorflow, FastAI, Scikit, Gym
Tools: Git, ROS, ROS2, Gazebo, CARLA, MATLAB
Libraries: Pandas, NumPy, Matplotlib, PCL, OpenCV

Experience

Robotics & Advanced Development Intern, Vecna Robotics *May 2022 – Present*

- Worked on 3D pose estimation using ArUco markers for the Autocharge Stewart platform to charge autonomous forklifts and achieved 1-millimeter level accuracy
- Integrated Zephyr RTOS with micro-ROS and ROS2 for communicating between vision, kinematics and firmware of the system

Graduate Teaching Assistant, Northeastern University *Jan 2022 – May 2022*

- Assisting students to develop digital designs that run on DE1-SoC FPGA board in Linux using C++ to control a robotic arm in the course ***EECE2160 Embedded Design: Enabling Robotics***

Co-Founder, Eleckthron LLP *May 2020 – Aug 2021*

- Co-founded a healthcare start-up with a seed-funding of **13,000 USD** from Government of India for developing a biomedical device that uses machine learning to predict Glucose and Hemoglobin values non-invasively using Near-Infrared Spectroscopy
- Performed signal processing of photoplethysmography waveform on STM32 microcontroller and machine learning multi-variable regression to improve prediction accuracy of device to **80%** calibrated for **1000** people

Summer Research Fellowship, IIT-Madras *May 2019 – Jul 2019*

Design and Control of Real-Time Inverted Pendulum System with Force-Voltage Parameter Correlation Springer International Journal of Dynamics and Control

- Modelled the inverted pendulum system mathematically using Lagrangian Mechanics and designed a double PID controller with state-space feedback to control in inverted position
- Deduced a novel Force-Voltage Parameter Correlation experiment and reduced settling time by **0.2 secs** to improve efficiency
- Formulated a Deep-Q network in simulation using OpenAI Gym to stabilize inverted pendulum

Research Assistant, Sri Sivasubramaniya Nadar College of Engineering *Jan 2018 – Apr 2019*

Design of Imitative Control Modalities for a 3 Degree of Freedom Robotic Arm IEEE Xplore

- Designed and studied an inertial sensor IMU-based and vision-based motion tracking system to control a 3 DOF robotic arm using Arduino Nano Microcontroller
- Addresses IMU drift problem solved by sensor fusion techniques; 3D object-motion tracking using mono-vision and Inverse kinematics

Priority Scheduling based Dynamic Path Planning System with Encoder-based Motion Feedback IEEE Xplore

- Implemented dynamic A* algorithm for a multi-robot system communicating via HC05 Bluetooth module in the robot with waypoints generated using OpenCV packages in Python
- Devised a novel priority scheduling algorithm and encoder-based motion feedback to reduce robot drift from configuration space by **48%**

Projects

Visual SLAM using ORB-SLAM3 *Apr 2022*

- Implemented Visual SLAM using ORB-SLAM3 on a custom Monocular and Stereo camera dataset
- Computed real-time camera trajectory and sparse 3D reconstruction of the scene and compared the keyframes with GPS ground truth

3D Object Detection based on LiDAR Point Clouds *Jan 2022*

- Implemented a **ResNet-based Keypoint Feature Pyramid Network** in PyTorch for 3D object detection using LiDAR Point Clouds
- Detected cars, pedestrians and cyclists using Bird's Eye View input and calculated the center heatmap using L1 loss and bounding box dimensions using Balanced L1 loss

Industrial Warehouse Automation using ROS *Jan 2022*

- Configured a behavioral state machine using **FlexBE** to automate a simulated industrial warehouse using ROS and Gazebo
- Performed pick and place operations of robotic arm using **MoveIt** and autonomous TurtleBot3 navigation utilizing move_base

Autonomous Reconnaissance Robot for a Simulated Disaster Environment *Sep 2021 - Dec 2021*

- Created a 2-D occupancy grid map utilizing slam_gmapping from a LiDAR input and implemented greedy frontier-based exploration on a simulated disaster environment using explore_lite package in ROS
- Integrated detection and pose estimation of apriltags with exploration to find victims in environment