Annamalai Muthupalaniappan

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EDUCATION

Masters in Robotics | *University of Delaware(UD), Newark, DE, USA* | ***GPA: 4/4*** **Sep 2023 - May 2025**

Bachelors in Mechatronics | *Anna University, India* | ***GPA: 8.77/10*** **Aug 2017 - May 2021**

TECHNICAL SKILLS

Programming : C++, Python, Matlab, Bash Scripting
Robotics : ROS, ROS 2, Gazebo, OpenCV
Software : Git, Docker, Linux, LaTex
Microcontrollers : Arduino, Raspberry Pi, Adafruit Feather M4 CAN, ESP8266
Hardwares : Sensors (Cameras, Encoders, IMU, Radar/Lidar), Motors, Linear Actuators

RESEARCH EXPERIENCE

Research Assistant | *Digital Agriculture Lab, UD (Advisor Dr. Yin Bao)* **Jun 2024 - Present**

- **Rivulet 2.0 *(GitHub)*:** Designed a control system and implemented a Finite-State Machine by integrating motors, sensors and actuators to teleoperate a mobile gantry system robot on a center pivot irrigation system.
- Integrated the MID-360 lidar data and used a fast-Lio SLAM package in ROS for environmental mapping, obstacle detection (Truss pockets) and localization for autonomous navigation.
- Simulated a motion planning for the robot and center pivot as a 2-DOF arm to get efficient and optimal crop coverage path for the given circular field. The results generated were accepted by **USDA** and granted **$150K** research funding.
- **The Amiga Bot(Farm-Ng)**: Developed and deployed a ROS-based teleoperation pipeline for the Farm-ng Amiga robot, capturing keyboard inputs on a Jetson platform and communicating linear and angular commands via an Feather M4 CAN Express micro-controller to control robot motors through CAN signals.
- Currently integrating autonomous navigation capabilities by incorporating GPS way-point navigation, camera-based object detection, and steering algorithms to enable precise and autonomous row-following behaviors.
- Led and represented the University of Delaware's Team (The Salty Blue Hens) in the **2025-Farm Robotics Challenge *(link)*** and won the **Judges' Choice Impact Award *(link)*** a cash reward of **$2.5K**.

PROFESSIONAL EXPERIENCE

Robotics Software Intern | *TRIC Robotics, San Luis Obispo, California,* ***USA*** **Feb 2025 - May 2025**

- Designed a modified TSP algorithm pipeline that generates an optimized path & an efficiency rating for the robot to treat the row crops for the given abstraction of the constrained farming fields.
- The algorithm maximized efficiency in terms of cost, time, labor, energy consumption by *20%* and increased treatment rate by *25%*. *(Advisor Dr. Herbert G Tanner)*

Graduate Teaching Assistant | *University of Delaware, Newark, DE,* ***USA*** **Feb 2024 - May 2025**

- *Subjects : Mechanics of Solids(Advisor Dr. Chelsea Davis), Introduction to Robotics(Advisor Dr. Panagiotis Artemiadis)*
- Instructed the (81) undergrad students during discussion and problem sessions and evaluated their homework/assignments on weekly basis. Also assisted the professor with their academic work and activities.
- Recipient of the **Graduate Teaching Assistant Award** in Mechanical Engineering for the academic year *2023-2024*.

Software Engineer - Analyst | *Accenture Solutions Pvt Ltd, Chennai,* ***India*** **Jun 2021 - Jul 2023**

- Automated *30%* of the web accessibility testing process for websites using WCAG Guidelines and Earned the **DHS Trusted Tester** for *Web Certification* from *U.S. Department of Homeland Security.*
- Trained a dozen of Associate Software Engineers in Git, Python, and SQL resulting in *40%* reduction of the project cycle.

PROJECTS

- **KUKA-LBR iiwa 7 R800 Manipulation *(GitHub)*:** Simulated and implemented a trajectory for the 7-DOF Kuka robot using Denavit-Hartenberg and inverse kinematics principles to position the end effector inside a prescribed area while accounting for potential singularities and self-collision.
- **Fire Fighting Robot *(GitHub)*:** Collaborated in developing an autonomous mobile robot with the purpose of detecting buildings on fire. I contributed to the design of path planning, telemetry, and control algorithms for the robot.
- **Path Planning of TurtleBot3 (Burger) :** Integrated and simulated multiple path-planning algorithms (Dijkstra, Greedy BFS, A*, RRT, Artificial Potential Field) into the pre-existing ROS Navigation stack on TurtleBot3, systematically evaluating their performance across diverse simulated environments.
- **Drone Operations & Path Planning (DJI Matrice 350, Hawk's Work F450):** Gained hands-on expertise in drone operations, encompassing both software configuration and hardware assembly. Working on autonomous and optimized flight path planning algorithms to enhance coverage efficiency and mission performance.