Joseph Thomas

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Education

University of Maryland - College Park **May 2024**
M.Eng. in Robotics – Computer Vision, Robot Algorithms, Machine Learning, Data Science *GPA: 3.38/4.0*
Maryland, USA

Maharashtra Institute of Technology - Pune **May 2022**
B.Tech. in Mechanical (Robotics and Automation) – Robot Modelling, Perception, IoT *GPA: 3.5/4.0*
Maharashtra, India

Technical Skills

Programming Languages: C++, Python, Matlab, SQL

Interests: SLAM, Vision, Perception & Navigation, Large Language Models (LLMs), Model Fine-Tuning (PEFT, LoRA, Quantization), Prompt Engineering, Deep Learning, Data Science, Sensor Fusion, Reinforcement Learning

Technologies/Frameworks: Linux, ROS/ROS2, OpenCV, Git, AWS, Docker, PyTorch, NumPy, CUDA, Solidworks, Gazebo, Fusion 360, Docker, MoveIt, FastAPI

Professional Experience

Health4theWorld **Feb 2025 – Present**
AI Applications Developer *Carmel, CA, USA*

- Exploring FastAPI for deploying AI services and integrating trained models into real-time applications.
- Researched and evaluated state-of-the-art LLMs, including LLaMA 3, GPT-4o, and Copilot.
- Fine-tuned JSL MedLlama3v2 using PEFT with quantization and tokenization for LoRA to optimize memory efficiency and inference speed.

Void Robotics **Aug 2024 – Jan 2025**
Robotics Software Engineer *Marathon, FL, USA*

- Optimized waypoint navigation algorithms in Gazebo simulations for TurtleBot3 by addressing sensor and actuation uncertainties, resulting in enhanced mapping, localization, and overall navigation accuracy.
- Automated parameter management by integrating YAML-based configuration into Bash scripts, enabling seamless updates and reducing manual intervention.
- Diagnosed and resolved sensor data inconsistencies in satellite view tests, documenting design considerations and test results to boost algorithm reliability to a 90% pass rate.
- Implemented and validated a systemd-based automated restart solution for daily maintenance of a Linux-based desktop, elevating restart reliability from intermittent to near 100% uptime.

Defense Research and Development Organization (DRDO) **Nov 2021 – Apr 2022**
Robitcs R&D Intern *Pune, MH, India*

- Developed a high-precision remote-controlled mounting system for automated positioning and tracking applications.
- Utilized CAD and control systems to prototype and test the design in real-world scenarios.
- Integrated Arduino and stepper motor control to achieve precise motion control, improving positioning accuracy and repeatability.

Select Projects

Vehicle Speed Estimation using Optical Flow **Apr 2023 – May 2023**

- Implemented optical flow algorithms (Lucas-Kanade, Farneback, RAFT) for vehicle speed estimation on embedded hardware (Raspberry Pi 4, Pi Camera), integrating sensor calibration techniques to mitigate noise and ensure real-time accuracy.
- Integrated YOLO for vehicle detection with RAFT for optical flow analysis to convert pixel velocities into real-world speed metrics, delivering live demonstrations and detailed video analysis.
- Achieved real-time performance by processing live video streams at 30 FPS with an average frame latency under 33 ms, ensuring on-the-fly vehicle speed estimation during live demonstrations.

Implementation of Informed RRT* for optimal trajectory **Apr 2023 – May 2023**

- Developed and executed the Informed RRT* planning algorithm in Python, utilizing libraries such as rospy, matplotlib, and NumPy. Successfully conducted simulations in ROS and Gazebo on a custom obstacle map, achieving faster convergence and cost-effective trajectory planning for mobile robots.
- Designed and tested a custom obstacle map for 2D and 3D simulations, enabling TurtleBot to follow optimal paths using the Informed RRT* algorithm. Demonstrated practical application in Gazebo simulation environment, facilitating efficient navigation and trajectory optimization for autonomous systems.
- Achieved a quantified performance boost by reducing convergence time by 30% and lowering the overall path cost by 20% compared to traditional RRT* methods, as validated through extensive simulations in ROS and Gazebo.