

# Chaitanya Sriram Gaddipati

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## EDUCATION

### Worcester Polytechnic Institute

Master of Science - Robotics Engineering

2022 - 2024

GPA: 4.0/4.0

- **Coursework** : Robot Control, Deep Learning, Motion Planning, Autonomous Aerial Robotics, Machine Learning

### Indian Institute of Technology Hyderabad

Bachelor of Technology - Mechanical Engineering (Major)

2018 - 2022

GPA: 9.29/10.0

## SKILLS

**Programming Languages:** Python, C++, JavaScript, SQL

**AI & ML frameworks:** PyTorch, TensorFlow, Scikit-learn, OpenCV, ONNX, MLflow, NumPy, Pandas, PySpark

**Software:** ROS2, AWS (SageMaker, S3), Docker, Git, React, FastAPI, Blender, MATLAB, Linux

## EXPERIENCE

### Find Me

Jan 2025 – Present

Deep Learning Developer

Charlotte, NC

- Designing and deploying a store navigation system utilizing fine-tuned **Object detection** models and **Vision Language Models** for retail environment understanding.
- Developed and maintained end-to-end ML pipeline using AWS SageMaker for model training, validation, and deployment, with S3 for scalable data storage and management.
- Optimizing the model through quantization and pruning to enhance inference speed while maintaining accuracy for real-time usage on Android devices.

### Void Robotics

Aug 2024 – Jan 2025

Robotics Software Engineer

Marathon, FL

- Developed a **localization** system using Nav2 with GPS sensor on a custom robot for navigation with ROS2 in C++.
- Incorporated Extended Kalman Filter for **sensor fusion** of the wheel odometry, IMU data, and GPS data, and simulated the robot in Gazebo.

### Comet Lab, WPI

May 2023 – Jun 2024

Research Assistant

Worcester, MA

- Designed and implemented Adaptive and **Model Predictive Controllers** with thermal diffusion **partial differential equation constraints** for optimal tissue surface temperature control in **robotic laser surgery** to minimize tissue damage.
- Conducted experiments on animal tissues to test the controller performance using a Franka Emika Panda robot arm mounted with a laser and a thermal imaging system for feedback.

## PROJECTS

### Instant NeRF with Multiresolution Hash Encoding | PyTorch, CUDA

Dec 2024

- Implemented NVIDIA's instant-NGP Neural Radiance Fields (NeRF) pipeline using PyTorch and CUDA, achieving average PSNR of 27.5 and SSIM of 0.943 on **3D scene reconstruction** of the lego dataset.
- Created the multiresolution hash encoding for density MLP inputs and additional direction input encoding with spherical harmonics for color MLP.
- Utilized a multi-cascade occupancy grid to accelerate **ray marching** with efficient sampling. - [Github](#)

### Probability based boundary detection | Python, NumPy

Oct 2024

- Implemented a probability of boundary detection algorithm that utilizes the color and texture discontinuities along with intensity for better edge detection. - [Github](#)

### Optical flow based gap detection for drone flight | Python, PyTorch, OpenCV, NVIDIA Jetson

Dec 2023

- Developed a sensori-motor framework for autonomous navigation through unknown gaps without 3D reconstruction and mapping, leveraging solely a monocular camera and onboard IMU sensing.
- Utilized the RAFT model which is a composition of CNN and RNN architectures for **dense optical flow estimation**, achieving a 99% IoU score for the **unknown-shaped gap detection**.
- Performed post-processing with OpenCV for gap contour detection and center identification, integrated **visual servoing** methods to align the drone with gap centers for successful navigation. - [Github](#)

### Sim2Real Learning for Autonomous Drone Racing | Python, PyTorch, OpenCV, NVIDIA Jetson

Oct 2023

- Engineered a perception stack for DJI Tello drone, enabling precise navigation through diverse drone racing gates.

- Utilized Blender Python API to generate a robust synthetic dataset of 14100 image-mask pairs using **domain randomization**.
- Fine-tuned **YOLOv8** neural network on generated dataset for real-time gate identification and **segmentation** in complex environments with latency of 30ms.
- Extracted corners with OpenCV and used **Perspective-n-Point(PnP)** for 3D pose estimation for navigation. - [Github](#)

### 3D RRT\* Drone Motion Planning | Python, Numpy, SciPy

Sep 2023

- Developed motion planning pipeline for DJI Tello drone using RRT\* path planner and generated smooth **minimum snap trajectories** by solving unconstrained quadratic optimization problem with NumPy and SciPy.
- Fine tuned the cascaded velocity and position PID controllers to ensure precise tracking of the optimal 3D trajectories.
- Validated planner through Blender simulation and real drone testing. - [Github](#)

### Quaternion based Attitude Estimation of IMU | Python, NumPy

Aug 2023

- Implemented a Complimentary, **Madgwick**, and **Unscented Kalman filters** for attitude estimation of a 6-DoF IMU in Python and benchmarked it against ground truth data from Vicon motion capture system for accuracy. - [Github](#)

### Path Planning for multiple autonomous agents | Python, NumPy

Apr 2023

- Implemented **model predictive control** (MPC) as local path planner of multiple autonomous vehicles in a 2D environment and performed **dynamic collision avoidance** by utilizing acceleration velocity obstacle (AVO) and generalized velocity obstacle (GVO) methods. - [Github](#)

### Robust Trajectory Tracking for UAV | ROS2, Python, Gazebo

Mar 2023

- Designed a robust **sliding mode control** for trajectory tracking in the presence of external disturbances. The quadrotor is simulated in Gazebo using ROS. - [Github](#)

### SCARA Robot Simulation | C++, ROS2, Gazebo, Docker

Dec 2022

- Simulated a SCARA Robot manipulator in Gazebo with ROS and created forward and inverse kinematics nodes in C++.
- Additionally designed custom velocity and position controllers for path tracking. - [Github](#)

## PUBLICATIONS

N. E. Pacheco, **C. S. Gaddipati**, S. Farzan and L. Fichera, "**Automatic Focus Adjustment for Single-Spot Tissue Temperature Control in Robotic Laser Surgery**", in IEEE Transactions on Medical Robotics and Bionics, vol. 6, no. 4, pp. 1386-1390, Nov. 2024, doi: 10.1109/TMRB.2024.3464670.

N. P. Babu M, P. Kumar Duba, **G. C. Sriram** and P. Rajalakshmi, "**Autonomous Bio-Inspired Micro Aerial Vehicle (MAV)**", 2022 IEEE IAS Global Conference on Emerging Technologies (GlobConET), Arad, Romania, 2022, pp. 661-666, doi: 10.1109/GlobConET53749.2022.9872352.