

Chaitanya Sriram Gaddipati

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EDUCATION

Worcester Polytechnic Institute

2022-2024

Master of Science - Robotics Engineering

GPA: 4.0/4.0

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

Indian Institute of Technology Hyderabad

2018 - 2022

Bachelor of Technology - Mechanical Engineering (Major)

GPA: 9.29/10.0

Bachelor of Technology - Aerospace Engineering (Minor)

GPA: 9.25/10.0

EXPERIENCE

Temperature control for Robotic Laser Surgery

May 2023 – Present

Research Assistant

- Design various **robust**, **adaptive**, and **optimization** based controllers for **PDE system** (temperature control) in robotic laser surgery on tissues without prior knowledge of tissue material properties.
- Conduct experiments on animal tissues to test the controller performance using a Franka Emika robot arm mounted with a laser and a thermal imaging system.

Technology Innovation Hub on Autonomous Navigation (TiHAN)

May 2021 – Sep 2021

Research Intern

- Designed CAD models and conducted structural and fluid-structure interaction analyses to assess deflections, stresses, and aerodynamic properties of the models for micro aerial vehicle and passenger drone.

PROJECTS

Optical flow based structure-less gap detection for drone flight

[Github](#)

- Developed a minimalist sensori-motor framework for quadrotor flight through **unknown gaps** without 3D scene reconstruction, leveraging solely a **monocular camera** and onboard sensing.
- Employed robust deep learning **RAFT** network for **dense optical flow estimation**, facilitating identification of unknown-shaped, textured gaps.
- Created post-processing techniques for gap contour detection and center identification, integrated **visual servoing** methods to align the drone with gap centers for successful navigation.

Sim2Real Learning stack for Robust Gate Perception in Autonomous Drone Racing

[Github](#)

- Engineered a perception stack for DJI Tello EDU drone, enabling precise navigation through diverse drone racing gates.
- Used Blender to generate a robust synthetic dataset with **domain randomization** techniques.
- Trained YOLOv8 neural network for front gate identification and **segmentation** in complex environments.
- Performed corner extraction and used **PnP algorithm** to determine the relative pose of front gate, for drone navigation.

3D RRT* Drone Motion Planning

[Github](#)

- Developed Motion Planning Stack for a drone comprising cascaded velocity and position controllers, RRT* path planner generating collision free paths using **Bresenham's line algorithm** on given map, and **minimum snap dynamically feasible smooth trajectory** from these RRT* waypoints.
- Validated planner through Blender simulation and real drone testing.

IMU Quaternion based Attitude Estimation

[Github](#)

- Implemented a Complimentary, **Madgwick**, and **Unscented Kalman filters** for attitude estimation of a 6-DoF IMU and benchmarked it against ground truth data from Vicon motion capture system.

Real-time collision free navigation for multiple autonomous agents

[Github](#)

- Implemented a **model predictive controller** (MPC) for path planning of multiple autonomous vehicles in a 2D environment.
- **Dynamic Collision avoidance** is performed by utilizing acceleration velocity obstacle (AVO) and generalized velocity obstacle (GVO) methods.

TECHNICAL SKILLS

Programming Languages: Python, C, C++, BASH

Software: Linux, ROS, Gazebo, Blender, OpenCV, PyTorch, TensorFlow, SolidWorks, ANSYS, Git, Docker, LaTeX

Hardware: DJI Tello EDU drone, Jetson Orin Nano, Arduino, Franka-Emika

Deep Learning Architectures: YOLOv8, RAFT, SAM, UNet, VGG, ResNet

PUBLICATIONS

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.