

# Sahasrajit Anantharamakrishnan

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## EDUCATION

**Northeastern University**, Boston, MA

May 2024

*Master of Science in Robotics Engineering*

GPA: 3.939/4.000

**Courses:** Legged Robotics, Graph Theory, Deep Learning, Autonomous Field Robotics, Mobile Robotics, Computer Vision, Reinforcement Learning & Sequential Decision Making

**Anna University**, Chennai, India

May 2022

*Bachelor of Engineering in Electrical and Electronics Engineering*

GPA: 8.66/10.00

## WORK EXPERIENCE

**Autonomy & Intelligence Laboratory**, Boston, MA

January 2023 - May 2024

*Graduate Research Assistant, **Project:** High-Speed Off-Road Autonomy Robot*

[Lab Link](#)

- Developed an innovative 2.5D terrain model accommodating uncertainties in both the shape and properties of challenging off-road environment
- Crafted a custom cost function for MPC and MPPI controls, prioritizing speed in unstructured environments while considering the robot's kino-dynamics, terrain traversability, and safety constraints
- Optimized the custom MPPI algorithm and optimized it using JAX python, slashing average run time from 1000 ms to 1 ms
- Modified and Fine-tuned STEGO, a self-supervised semantic segmentation head for DINOv1 vision transformer, on RUGD, RELIS, and a custom dataset to achieve clear class clusters for RGB image semantic segmentation
- Employed sensor fusion techniques to combine 3D-LiDAR data with semantically segmented RGB images, resulting in a Semantic Point Cloud, essential for downstream perception, control, and motion planning tasks
- Utilized Fusion 360 to engineer and assemble a customized compute and sensor suite payload, designed to meet the distinct needs of AgileX's scout and Clearpath's Warthog robotic platforms, to enable high-speed offroad autonomy capability

**Rigbetal Labs LLP**, Pune, India

August 2021 - November 2021

*Robotics Engineer Intern*

- Created a novel algorithm, Road Anomaly Detection System (RADS), in C++ to detect road anomalies (Potholes, Speed Bumps, etc.) using normal estimation
- Reduced cost by 90%, by generating a 3D Point cloud from a series of moving 2D Laser scans
- Simulated a multi-agent (robot) mapping environment in Gazebo ROS to create a cohesive 2D map
  - Tested viability of the same in a cloud environment (AWS Robomaker) to enable multi-user control of an agent

**Capgemini Technologies Services**, Bangalore, India

July 2020 - December 2020

*Robotics (Medical Devices) Intern*

[Project Link](#)

- Designed in Fusion 360 a ROS-based autonomous ground vehicle to sterilize and sanitize offices from SARS-COV2 virus with Ultraviolet (UV-C) irradiation
- Managed Communications and task delegation between the team and the client

## SKILLS

**Languages / Libraries** Python, PyTorch, JAX, C++, CUDA, C, MATLAB, OpenCV, Tensorflow, PCL

**Software and Tools** ROS, Ubuntu Linux, Git, CMake, Docker, Gazebo, Nvidia Isaac Sim, PyBullet, MQTT, Simulink  
Fusion 360, Blender, LaTeX

## PROJECTS

**Stochastic Model Predictive Control for quadrupedal and bipedal loco-manipulation**

April 2024 - Present

*Stochastic MPC (SMPC) introduces probabilistic models to MPC, improving robustness against uncertainties like variable terrain and unexpected loads in robot dynamics*

- Spearheaded the adaptation of the SMPC framework to bipedal robots in simulation such as PyBullet and Gazebo
- Refined mathematical models and cost functions to optimize bipedal robot stability and efficiency

**Implementing Batch Informed Trees (BIT\*) Motion planning Algorithm**

March 2023 - April 2023

*Paper: [Batch Informed Trees \(BIT\\*\): Informed asymptotically optimal anytime search](#)*

[Project Link](#)

- Optimized the intensive calculations in the algorithm using hash-maps, parallelization, and pre-computation in python.
- Designed intuitive visualization techniques to better analyze the BIT\* algorithm.
- Tested the algorithm against baselines results such as RRT, RRT\*, FMT\*, and RRT Connect.