Gokul M K

IDDD in Robotics

ed21b026@smail.iitm.ac.in Github Website LinkedIn

Education

Indian Institute of Technology, Madras (CGPA 8.94) **Nov. 2021 – Present**
Bachelor of Technology in Engineering Design, IDDD in Robotics (Interdisciplinary Dual Degree) *Chennai, Tamil Nadu*

GRD Public School (Grade 12 CBSE (97.2 %), Grade 10 CBSE (93.8 %)) **April 2007 – April 2021**
Primary, Seconday and Higher Secondary *Coimbatore, Tamil Nadu*

Relevant Coursework

- Optimization: Theory and Algorithms
- Reinforcement Learning (CS6700)
- Recent Advances in RL (DA7400)
- Introduction to Large Language Models
- Deep Learning for Imaging (EE5179)
- Introduction to Motion Planning (ED5215)
- Programming Data Structures and Algorithms
- Probability, Statistics and Stochastic Processes
- Optimal Control (EE6415)
- Non-Linear System Analysis (EE6412)

Research Experience, Projects and Competitions

Nanyang Technological University, Singapore **July 2025 – August 2025**
Global Connect Fellow, Assoc Prof. Arvind Easwaran

- Generalizable and Trustworthy Reinforcement Learning Agents for the F1Tenth Racing Car.
- An hierarchical framework for decision making which considers both high-level maneuver selection and low-level motion control for racing cases.

Qneuro India Pvt Limited, Chennai **Jan 2025 – May 2025**
AI Research Intern, CTO Dr. Rahul Bhardwaj *Chennai, Tamil Nadu*

- Developed Deep Learning models that capture spatio-temporal voltage patterns from EEG Signals to infer patient's stress levels, cognitive load.
- Built a PCG prototype for real-time heart sound capture, generating datasets to train an HMM for murmur classification.

Robert Bosch Centre for Cyber-Physical Systems (RBCCPS) - IISc Bangalore **May 2024 – July 2024**
Robotic Summer Intern, HiRo Lab, Dr.Ravi Prakash *Bangalore, Karnataka*

- Developed a Learning-Based Approach for **Bimanual Robotic Manipulation** to Toss Objects Efficiently.
- Worked on implementing one of the prominent research from Google AI, TossingBot, which is a deep learning based grabbing and throwing.

Team Anveshak, Mars Rover Team, IIT Madras **June 2022 – July 2024**
Embedded System Lead, Electronics and Software Engineer *Chennai, Tamil Nadu*

- Worked on embedded systems of the rover's manipulator, gaining experience in control systems and CAN integration. Worked with various **Visual SLAM** algorithms to address visual odometry and mapping.
- Coded the rover's manipulator in simulation to evaluate its functionality using the **Moveit** Framework for tasks such as obstacle avoidance with **OctoMap** and grasp planning.

Eyantra Summer Intern, IIT Bombay **May 2023 – July 2023**
Exploring Various Algorithms for Grasping Unknown Objects using a two finger gripper *Mumbai, Maharashtra*

- Conducted research on the **Point Cloud Library**, harnessing its robust features to devise a lightweight grasp detection method. This approach estimates grasp poses based on Euclidean Clustering and K-D Trees.
- Integrated various grasping algorithms, including Graspnet, HAF, and GPD, with the Industrial UR5 arm and 2-finger gripper using **ROS**. Implemented these algorithms in both simulation and in hardware setups.

Eyantra Robotics Competition 2022-23, IIT Bombay **Sep. 2022 – Mar. 2023**
AIR-4 Krishibot Theme *Mumbai, Maharashtra*

- Programmed an Autonomous Ground Vehicle (AGV) for greenhouse navigation and fruit harvesting, using LiDAR-based PD control for lane keeping and OpenCV-based centroid detection for target localization.

PROJECTS

Cooperative Payload Transport using Multiple Quadrupeds in Uneven Terrain **Aug. 2025 - Present**

- Working on proposing an heirarchical model-based controller for cooperative payload transport in uneven terrains.

Finetuning Large-Language Models to Reason using DeepSeek GRPO **Mar. 2025 - Present**

- Fine-tuned a pretrained open-source LLM to perform logical and mathematical reasoning on the Reasoning-Gym benchmark using Reinforcement Learning with Human Feedback (RLHF).
- Leveraged Group Relative Policy Optimization (GRPO) to align a base LLM with human preferences, optimizing its ability to generate logically sound responses enclosed in a $< reason >< /reason >$ format.

Model-Based Control, Koopman Learning for Quadruped Locomotion | *Prof. Anuj Tiwari* **Mar. 2025 - Present**

- Working on implementing a Convex Model Predictive Control framework for a quadruped robot based on a state-of-the-art formulation, enabling real-time gait optimization across varying terrains.
- Designing a modular control pipeline with plans to integrate Koopman operator-based learning for capturing nonlinear dynamics, enabling smooth transitions from model-based to data-driven control.

Denoising and Deblurring MVTEC AD Dataset | *EE5179 Course Project* **July. 2024 - Nov. 2024**

- This project was done in collaboration with KLA to develop deep learning models for denoising and deblurring MVTEC industrial images. The goal was to achieve the highest possible PSNR and SSIM scores, ensuring high-quality image restoration.
- RIDNet, a deep learning-based model, was employed for this task and achieved a PSNR of 32.8 on the training set and 34.78 on the test set, as evaluated by KLA.

Implicit Reinforcement without Interaction at Scale (IRIS) | *Prof. Balaraman Ravindran* **July. 2024 - Nov. 2024**

- The project deals with addressing sub-optimality and diversity challenges in large datasets for long-horizon manipulation tasks using **Offline Reinforcement Learning**.
- The project involves the basic implementation of IRIS in a few toy environments with dataset, and fine-tuning the architecture to process image-based datasets (like DREAMER) for running IRIS in latent space.

Trajectory Continous Optimal Planning using a Mobile Manipulator | *Prof. Nirav Patel* **Jan. 2024 - May. 2024**

- This project involves continuously tracing a trajectory using **RRT*** while minimizing deviation in the end-effector pose through an **optimal control** formulation. This project shares similarities with 3D printing tasks performed by mobile manipulators.

SCHOLASTIC ACHIEVEMENTS

- Achieved an **All India Rank of 6253** in the **JEE Advanced 2021** examination, surpassing a competitive pool of 1.5 lakh students nationwide.
- Attained the highest ranking within my school in the Grade 12 CBSE examination.

TECHNICAL SKILLS

Languages: Python, C, C++, Rust, MATLAB, AVR Assembly Language

Software Tools: ROS/ROS2 (Robot Operationg System), Simulink, Git, Docker, Fusion360, Abaqus, Ansys, Altium

Framework Libraries: Pytorch, Tensorflow, Scikit-learn, Mujoco, Bullet, FastAPI, Langchain, LangGraph