

# DEV PANKAJBHAI GOTI

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## EDUCATION

### Texas A&M University

College Station, TX

Master of Science in Electrical Engineering | GPA: 4.0/4.0

May 2027

Courses: Robotics and Spatial Intelligence, Linear Multivariate Systems, Probability and Random Processes for Information Science, Reinforcement Learning. Visual Navigation and Foundation Models of Autonomy, Computer Vision and Robot Perception

### National Institute of Technology Karnataka, Surathkal

Mangalore, India

Bachelor of Technology in Electrical and Electronics Engineering | GPA : 8.70/10

May 2025

## EXPERIENCE

### Indian Institute of Space Science and Technology

Thiruvananthapuram, India

Summer Research Intern, IASc Summer Research Fellowship Programme 2024

May 2024 – July 2024

- Developed a deep reinforcement learning-based trajectory planner for a 7-DOF robotic arm, enabling dynamic, goal-directed motion in continuous state and action spaces
- Implemented and trained a PPO-based policy with neural network function approximation and custom reward shaping, learning collision-aware, smooth joint trajectories without explicit motion planning models
- Evaluated learned policies in simulation by tracking reward convergence, target accuracy, and trajectory smoothness, demonstrating reliable motion generation for high-DOF manipulators

## PROJECTS

### LiDAR and Camera Fusion for 3D Obstacle Detection

October 2025 – December 2025

- Developed a 3D obstacle detection pipeline using KITTI LiDAR data, incorporating RANSAC for road segmentation and voxel down sampling to reduce point cloud size by 73% for efficient processing
- Applied DBSCAN clustering to segment vehicles, pedestrians and real objects from point clouds and transformed ground-truth 3D bounding boxes between camera and LiDAR coordinates for precise evaluation
- Evaluated detection performance using IoU-based TP, FP, and FN metrics, enabling hyperparameter optimization, reproducible Python workflows, and seamless integration for future multi-sensor fusion

### PRM-Nav

September 2025 – October 2025

- Designed and implemented a ROS2-based PRM autonomous navigation system using k-NN graph construction and Dijkstra's algorithm to generate near-optimal (10%), collision-free paths
- Improved system robustness and observability by handling unreachable goal cases and integrating RViz visualization of robot trajectories, obstacle maps, and planned paths for effective debugging and validation.
- Implemented stable closed-loop execution by developing collision checking, path smoothing, and lookahead-based control, enabling smooth and accurate tracking of multi-turn trajectories in dense obstacle scenarios.

### Autonomous Navigation of a Differential Drive Robot using DRL

November 2023 – March 2024

- Built an autonomous navigation system using Deep Deterministic Policy Gradient (DDPG), integrating ROS2 and Gazebo and fusing LIDAR and encoder data for enhanced perception and decision making
- Implemented noise injection and randomized actions near obstacles to improve exploration and avoidance
- Designed a reward function balancing goal, obstacle avoidance, and path efficiency in dynamic settings

### Low Light Image Enhancement using MIR Net

October 2022 – March 2023

- Developed MIR Net for low-light enhancement with multi-scale residual learning and channel attention
- Enhanced model with multi-scale residual learning and attention fusion to boost sharpness and suppress noise
- Refined model by optimizing Residual Blocks and Groups to enhance speed efficiency and feature extraction

## SKILLS

**Programming Languages:** Python (Advanced), C (Intermediate), C++ (Intermediate)

**Tools & Software:** ROS, ROS2, MATLAB, Simulink, Gazebo, VS Code, Rviz, Conda, Jupyter

**Libraries & Frameworks:** NumPy, Matplotlib, Pandas, OpenCV, sci-kit-learn, Keras, TensorFlow, PyTorch

**Technologies & Platforms:** Docker, Linux, GitHub

**Hardware & Embedded Systems:** Raspberry Pi, Arduino, Sensors, Motor Drivers, PCB design

## EXTRACURRICULAR

### CSD Robocon NITK

Mangalore, India

Vice Captain

Jun 2022 – April 2025

- Managed overall team operations for 40+ members, coordinating technical, finance, and media activities while overseeing budgets, sponsorships, and outreach for ABU Robocon International competition
- Engineered a four-wheel holonomic autonomous robot, integrating Raspberry Pi, Arduino, ESP32, IMU, encoders, odometry, and computer vision for precise navigation, object detection, and manipulation tasks