

Ganga Nair B

M. Tech in Robotics and Autonomous Systems,
Indian Institute of Science, Bangalore
(On sabbatical from ExxonMobil Services and Technology)

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EDUCATION

- **Indian Institute of Science**, Bengaluru, India
Master of Technology - Robotics and Autonomous Systems; GPA: 8.80/10 July 2024 - June 2026
Relevant Courses: Non Linear Control, Reinforcement Learning, Robotic Perception, Motion Planning, Machine Learning
- **National Institute of Technology**, Calicut, India
Bachelor of Technology - Mechanical Engineering; GPA: 9.19/10 July 2018 - June 2022
Relevant Courses: Solid Mechanics, Machine Design, Manufacturing, Control Systems, Non-linear dynamics, Embedded Systems
- **Bhavans Vidya Mandir**, Eroor, India
All India Secondary School Examination (CBSE); Score: 96% June 2017 - May 2018

RESEARCH EXPERIENCE - ROBOTICS

Gait adaptation in Quadruped Locomotion March, 2025 - Ongoing

Under **Prof. Shishir N Y Kolathaya**, Robert Bosch Center for Cyber-Physical Systems, IISc

- Aim: To leverage the advantages offered by diverse gaits for different terrain and task requirements.
- Building a framework for gait selection in quadrupeds using MPC optimization on a gait-dependent RL policy.
- Employed a Dreamer module trained alongside the RL policy to support modular, lightweight deployment.
- Implemented on flat ground and can change gaits continuously to provide maximum energy and velocity tracking rewards.

iLQR Control with Neural Network for Dynamics Estimation January 2025 – April 2025

Under **Prof. Aditya Gopalan**, Department of Electrical Communication Engineering, IISc

- Addressed control of systems with unknown non-linear dynamics by integrating an iterative Linear Quadratic Regulator (iLQR) with a Neural Network for online dynamics approximation.
- No prior training required; the Neural Network is trained online during deployment.
- Implemented on MountainCar and CartPole benchmark environments. The control objectives were achieved, with additional time required for online dynamics learning. GitHub Repo

PATENTS AND PUBLICATIONS

- **Publication:** Ganga N.B., Prakrut K., Kolathaya S.N., **Real-Time Gait Adaptation for Quadrupeds Using Model Predictive Control and Reinforcement Learning**, Submitted to the 2025 Eleventh Indian Control Conference (ICC-11).
- **Publication:** Ganga N.B., Antony N.J., Mathew S.S., Jagadeesha T., **Modelling and Simulation of Magneto-Rheological Fluid in a Damper Using COMSOL**, Advances in Manufacturing, Automation, Design and Energy Technologies, ICoFT 2020, Lecture Notes in Mechanical Engineering, Springer, Singapore. [Link to paper](#)
- **Patent:** Jagadeesha T., Ganga N.B., et al., **Magneto-rheological Fluid-Based Dynamic Vibration Absorber**, Indian Patent Application No. 202241036483, filed Jun 24, 2022. Status: Patent pending.

PROJECTS - ROBOTICS

- **Comparison and SLAM implementation:** Metric-Semantic SLAM, Trajectory Evaluation, and Object-Level Segmentation implemented in an indoor environment using Intel RealSense Depth Camera. Performed a comparative study between Kimera and RTAB-MAP approaches. [Link](#)
- **Leader-follower formation control:** Leader-follower formation control for TurtleBot 4 on ROS2 and Gazebo, including incorporation of real-time control of the leader bot such that the followers converge to the desired trajectory.
- **Frontier exploration in gridworld:** Simulated multi-robot frontier exploration where robots coordinate to efficiently explore unknown areas. Also simulated single bot navigation in a gridworld and continuous spaces using potential fields. [Link](#)
- **Ball trajectory control on Stewart Platform:** Study comparing PID, SMC, and LQR on performance of ball control on Stewart platform for circular and helical trajectories. Simulation included hyperparameter tuning and inverse kinematics.
- **Clustering on demographic data of suburbs:** Geographical and demographic data of suburbs analysed to uncover inherent relationships and patterns. Focused on testing the hypothesis that geographic similarity strongly correlates with socio-economic well-being.

PROJECTS - HARDWARE

- **MR Fluid-Based Vibration Absorber:** Project under **Prof. Jagdeesha T**, Dept. of Mechanical Engineering. Dynamic vibration absorber using a magneto-rheological fluid damper - mathematical analysis, design, fabricating a test setup, experimentation and analysis.
- **BAJA SAE National All-Terrain Vehicle Design Competition:** Secured **1st place in Braking** and **2nd place in Design** for a self-designed All-Terrain Vehicle (ATV), *ZEUS*, developed for the All India E-BAJA SAE intercollegiate competition. Led the suspension team, focusing on performance-optimized design and fabrication under stringent cost and safety constraints.

EXPERIENCE

ExxonMobil Services & Technology, Bengaluru, India

Project Engineer

July 2022 – August 2024

- **Refinery Project Management:** Led end-to-end engineering and procurement for 10 multidisciplinary refinery projects with a combined estimated cost of up to \$25M. Projects spanned piping systems, civil structures, and instrumentation, with a strong focus on engineering management.
- **Innovation and Optimization:** Recognized within the company for introducing impactful innovations that improved project cost and schedule efficiency. Key contributions include integrating a lead-neutralizing paint remover and deploying 3D scanning in hazardous underground waste pits to eliminate the need for human entry.
- **Safety Leadership:** Led the safety initiative at the Bengaluru office, promoting safer engineering practices and raising awareness of project-specific safety risks across cross-functional teams.

ExxonMobil Services & Technology, Bengaluru, India

Execution Engineer (Intern)

March 2021 - July 2021

- **Regulatory projects:** Involved in Project Plan development, updating the team weekly, and creating tools for improving coordination for a project targeted at adhering to updated government regulations.

SKILLS SUMMARY

- **Languages:** Python, C++, MATLAB
- **Libraries:** PyTorch, JAX, NumPy, OpenCV, Matplotlib
- **Robotics & Simulation:** ROS2, Gazebo, IsaacGym, PyBullet
- **Tools:** Git, Linux, Simulink, SolidWorks, Ansys

EXTRA-CURRICULAR ACTIVITIES

- **Volunteer Work:** Provided academic support as a volunteer with 'Make a Difference', Science for Rural India, and other educational NGOs.
- **Talks and Presentations:** Delivered technical and non-technical talks at various events and won prizes for public speaking and presentation skills.
- **Writing:** Engaged in content writing and blogging on diverse topics.