Barathkrishna Satheeshkumar

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EDUCATION

Carnegie Mellon University — Pittsburgh, PA
Master of Science in Mechanical Engineering Research — May 2026
GPA: 4.00/4.00 | **Coursework:** Deep RL & Control, Optimal Control, Planning for Robotics, Deep Learning
Teaching Assistantship: Planning and Decision-Making in Robotics, Mechatronics Design

Indian Institute of Technology Bombay — Mumbai, India
Bachelor of Technology in Mechanical Engineering — May 2022
Coursework: Control of Nonlinear Dynamical Systems, Microprocessors & Automatic Control, Linear & Nonlinear Systems

PROFESSIONAL EXPERIENCE

PlusAI — Santa Clara, CA
Systems Engineering Intern — May 2025 – Aug 2025

- Designed and implemented a GUI-based tool to quantitatively score the difficulty of highway merging scenarios using headway time as the key determinant of difficulty, improving consistency and precision in evaluating AV performance
- Validated the scoring tool across 144 simulation scenarios of varying difficulty, achieving 81% classification accuracy and 78% recall
- Developed a centralized framework for performance and safety metrics management and standardized reporting
- Conducted detailed coverage analysis, expanding the simulation set by ~67%; established end-to-end traceability and developed a unified test plan aligned with SOTIF (ISO 21448) and functional safety standards

Jaguar Land Rover — Bengaluru, India
Graduate Vehicle Dynamics Engineer — Jul 2022 – Jul 2024

- Developed and deployed a Roll Stability Control Simulation Tool, reducing vehicle dynamics simulation time from 1.5 hrs to 3 mins
- Built a Simulink-to-Carmaker plugin generation tool, enabling rapid virtual testing of vehicle models in the Carmaker environment
- Performed comprehensive objective and subjective evaluations to benchmark steering feel, ride comfort, and handling performance

T-Cap Recycling Robot – Biorobotics Lab, Carnegie Mellon University — Pittsburgh, PA
Graduate Researcher, Advisor: Dr. Matthew Travers — Aug 2025 – Present

- Developing an end-to-end robotic system for automated removal of tantalum capacitors from PCBs, achieving 0.4s duty cycle
- Implemented a real-time monocular vision pipeline with YOLO and OCR models for high-accuracy capacitor localization
- Integrated a UR05 robotic manipulator with a custom air-chisel end-effector to enable precise, repeatable capacitor extraction
- Designed and programmed Arduino-based control of a solenoid-actuated pneumatic valve for automated chisel activatio

MMPUG – MattLab, Carnegie Mellon University — Pittsburgh, PA
Graduate Researcher, Advisor: Dr. Matthew Travers — Aug 2024 – May 2025

- Engineered aggressive trajectory-tracking strategies for autonomous robots in high-speed scenarios, leveraging advanced nonlinear control techniques to enhance precision and robustness in cluttered environments
- Integrated control barrier functions and regularization techniques to improve speeds from 3.5 m/s to 6 m/s

Raptee Energy Inc. — Chennai, India
Vehicle Dynamics Intern — Apr 2020 – Jul 2020

- Developed a traction control system for electric bikes, enhancing control on slippery surfaces by 25% and acceleration by 15%
- Optimized suspension parameters, ABS & Hill-Climb systems, leveraging a self-devised transient model constructed on Simulink

PROJECTS

Hierarchical Motion Planning — Jan 2025 – May 2025
Carnegie Mellon University, Advisor: Prof. Maxim Likhachev — Pittsburgh, PA

- Designed a hierarchical planner combining Dijkstra-based task-space search and configuration-space sampling for high-DoF arms
- Reduced planning cost by 53%, time by 35%, and vertex count by >50% compared to RRT, while matching RRT* in path quality
- Achieved near-optimal trajectories with **70% fewer samples** than RRT*, improving planning efficiency across diverse environments

RL-Adaptive MPC Control for Quadrupeds — Jan 2025 – May 2025
Carnegie Mellon University, Advisor: Prof. Zachary Manchester — Pittsburgh, PA

- Integrated L1 adaptive control into an RL-based controller, enhancing robustness to model uncertainties and payload variations
- Achieved 4× jump distance under doubled payload mass, outperforming the baseline controller in sim-to-sim transfer tests
- Validated on Go1 quadruped in MuJoCo and Isaac Gym, demonstrating enhanced stability and adaptability for high-dynamic tasks

FSAE / IIT Bombay Racing — Mumbai, India
Team Leader, Project Manager, Design Engineer — Feb 2019 – Jul 2022

- Led a team of 110 members to design and manufacture an electric race car, achieving 8th place at Formula Student UK 2022
- Engineered a planetary gearbox design, achieving 24% weight reduction while maintaining efficiency and performance
- Revamped dynamics models, cutting lap-time simulation time by 75%; fabricated double-wishbone rockers rated for 10kN forces

SKILLS

Programming: C ++, Python, MATLAB, Julia, CMake, CUDA, PyTorch, ROS 1/2, Git, Jenkins, LaTeX
Simulation & Modeling: Gazebo, MuJoCo, Isaac Gym, PyBullet, Simpack, ANSYS, SolidWorks, Fusion 360, AutoCAD, Carmaker
Systems & Safety: Functional Safety, ASPICE, SOTIF, Requirements Definition, Jama Connect, Lucidchart, JIRA, Confluence