Dev Soni

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Education

Worcester Polytechnic Institute   **Aug 2023 – May 2025**
MS in Robotics Engineering   Worcester, MA
Courses: Deep Learning, Motion Planning, Robot Control

ITM Vocational University   **Aug 2018 – May 2022**
B.Tech in Mechatronics Engineering || CGPA: 9.8/10   Gujarat, India
Courses: Robotics and Machine Vision, Design of Mechatronics System, Artificial Intelligent System

Publications

Learning-based NMPC Framework for Car Racing Cinematography Using Fixed-Wing UAV [(Link)](#)
Dev Soni, Amith Manoharan, Prakrit Tyagi, PB Sujit
IEEE International Conference on Unmanned Aircraft Systems, 2022

Experience

[**Perception And Autonomous Robotics Group (PeAR)**](#), Worcester   **Sep 2023 – Present**
Graduate Researcher   [Dr. Nitin J. Sanket](#)
- Engaged in enhancing the perception stack of a quadrotor to execute agile vision-based actions, such as ball-catching, exclusively relying on onboard sensing.

[**Mowito Automation Pvt. Ltd**](#), Bangalore   **Feb 2023 – May 2023**
Computer Vision Engineer Intern
- Implemented Mask-RCNN model, trained on AWS EC2 and Jetson AGX, to find masks and pick points for SKUs handled by UR5
- Managed a dataset of over **2000 SKUs** on an S3 bucket, performing data manipulation using bash and Python scripts for various training and operational needs
- Implemented/Ported ROS1 custom purposes stack into ROS2

[**Indian Institute of Science Education and Research Bhopal (IISERB)**](#), Bhopal   **Jan 2022 – Dec 2022**
Research Intern   [Dr. P. B. Sujit](#)
Learning-NMPC Framework for Multi-Car Racing Cinematography Using Heterogeneous AAVs
- Enhanced L-NMPC framework for filming multiple racing cars with various AAVs, employing Multi-tabular Q-learning for training
- Achieved a **32%** overall error reduction through this approach [(GitHub)](#)

Learning-based NMPC Framework (Q-Learning + Nonlinear Model Predictive Controller)
- Developed a Nonlinear Model Predictive Controller (L-NMPC) for filming racing cars using a fixed-wing AAV, incorporating Q-learning Reinforcement Learning for training
- Created a custom RL environment in OpenAI Gym, employed CasADi library for NMPC optimization, and validated the proposed algorithm through simulations, resulting in a remarkable **70%** error reduction [(Paper)](#) [(GitHub)](#)

Projects

Powered Lower-Limb Exoskeleton Robot [(Web-Page)](#)   **Jan 2021 – Mar 2022**
- Analyzed human gait with Kinovea, generated torque trajectory in OpenSim, and employed geared motors with SolidWorks-designed spur gears
- Utilized PID controllers on Arduino for precise motor control, ensuring accurate tracking of gait using encoders

Factory Automation Using ROS In Simulated Environment [(Web-Page)](#)   **Oct 2020 – Dec 2020**
- Developed ROS nodes, achieved autonomous navigation, and implemented a pick-and-place pipeline with MoveIt
- Designed a state machine for a production line with UR-5 arms and a TurtleBot using FlexBe

Technical Skills

Languages: Python, C++, MATLAB
Software & Tools: ROS, Git, Docker, LaTeX, Gazebo, Carla, V-REP, Blender
Libraries: PyTorch, OpenCV, CasADi, OpenAI Gym, NumPy, Matplotlib

Awards

- Secured first place in [Robofest–2.0](#) competition for the Powered Lower-Limb Exoskeleton Robot among 8 out of 300 teams, with total funding of 750,000 INR (approximately $9,200) [(Web-Page)](#)