SHASHWAT MUDUGUR ASHOK KUMAR

West Lafayette, Indiana

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EDUCATION

Purdue University
West Lafayette, IN, USA
Master of Science in Autonomy and Robotics
Aug. 2024 – (Dec. 2025)
Relevant Coursework: Robotics, Autonomous Systems, Artificial Intelligence
Cumulative GPA: 3.77/4.0

Manipal Academy of Higher Education
Manipal, Karnataka, India
Bachelor of Technology in Mechatronics, Minor in Electric Vehicle Technology
Oct. 2020 – May 2024
Cumulative GPA: 8.54/10.0

SKILLS & INTERESTS

Technical Skills: ROS2, NAV2, MicroROS, OpenCV, PyTorch, Keras, Git, CAD, 3D Printing, PLC Programming.
Programming Languages: C, C++, Python, Embedded C and RTOS, CMSIS, MATLAB and Simulink.

WORK EXPERIENCE

Robotics Firmware Engineering Intern
May 2024 – July 2024
Algobotix
Bangalore, Karnataka, India
- Designed and developed a payload system for autonomous drone navigation, incorporating Raspberry Pi, IMU, battery, and converter, using CAD modeling and 3D printing techniques.
- Integrated MAVLink protocol with C++ and STM32 microcontroller for communication and control. ⍟ GitHub
- Developed a C++ ROS2 node that integrated PX4 flight controller using XRCE-DDS protocol to visualize the drone's position and orientation in real-time. ⍟ GitHub

Research Intern - Bachelor's Thesis
Jan 2024 – May 2024
Robert Bosch Center for Cyber-Physical Systems, Indian Institute of Science(IISc)
Bangalore, Karnataka, India
- Designed a drone flight controller using ESP32 integrated with Micro ROS to interface with a Motion Capture System. Implemented fail-safe mechanisms utilizing MPU-6050 and Lidar for autonomous safe landing in case of communication loss. ⍟ GitHub
- Devised a Prescribed Performance Control Algorithm for speed control of DC Motor, utilizing Teensy micrcontroller. ⍟ GitHub
- Implemented a Ball Catching Robot with an RX-200 Serial Manipulator, leveraging OpenCV and Python. ⍟ GitHub

Systems Engineering Intern
June 2023 – Aug 2023
Ola Electric
Bangalore, Karnataka, India
- Conducted simulations of 2W and 4W models using Gamma Technology Software to assess regenerative braking performance using supercapacitors.
- Designed a flight controller that utilizes PID control algorithms and integrates an MPU-6050 IMU sensor for precise drone stabilization and control.

RESEARCH EXPERIENCE AND PROJECTS

E-Powertrain Engineer
Nov 2020 – May 2023
Moto Manipal – E-Superbike Team
Manipal, Karnataka, India
- Designed the wiring harness of an electric superbike powered by 10kw PMSM Motor. Worked on calculation, design, and manufacturing the Li-ion battery pack also worked on MATLAB and Simulink for powertrain modeling and range calculations.
- Developed an interactive dashboard using Python and RaspberryPi3 and collected data from the motor controller using CAN (Controller Area Network) along with data logging system for monitoring and analysis through ESP32. ⍟ GitHub
- Explored methods to enhance electric vehicle range and battery life by integrating supercapacitor with battery and reviewed Adaptive Fuzzy Logic Controller for energy management.

Traffic Sign Classification using Cross Stage Partial Network
PyTorch, Python, Open CV , Matplotlib
- Developed a Traffic Sign Classification model utilizing the Cross Stage Partial Network (CSPNet) to identify traffic signs using the German Traffic Sign dataset with an accuracy of 87 percent. ⍟ GitHub

Ball-Following Robot using Kalman Filter
ROS2, Python, Open CV, Rviz, Gazebo
- Implemented a ball-following robot simulation utilising camera data, OpenCV for vision and Kalman filter for motion tracking. ⍟ GitHub

RRT* Path Planning and Following for Obstacle Avoidance on TurtleBot3
Python, ROS2, Rviz, Gazebo, Matplotlib
- Implemented RRT* algorithm for path planning and graph construction using KD-Tree; implemented path generation and tracking using a PID controller with simulations in RViz and Gazebo environments. ⍟ GitHub

A* Path Planning with PID Control on TurtleBot4 and Simulation on TurtleBot3
Python, ROS2, Rviz, Gazebo, Matplotlib
- Developed and tested an A* path planning algorithm with PID control on TurtleBot4, achieving optimized navigation and trajectory following. ⍟ GitHub

LEADERSHIP & ACTIVITIES

Team Leader at MotoManipal: Emerged victorious in Electric Bike Design Challenge organized by Mechatron Motors. Secured third place in National Online E-Bike Design Challenge hosted by the Fraternity of Mechanical and Automotive Engineers.

Captain and Team Member of Karnataka State Basketball Team: Participated in the U-16 and U-19 National tournaments.