

## EDUCATION

<i>Worcester Polytechnic Institute</i> <b>Master of Science in Robotics Engineering (In progress)</b> ■ GPA: 3.82/4.00	<b>Worcester, Massachusetts</b> <b>2022-2024</b>
<i>Sardar Patel College of Engineering (University of Mumbai)</i> <b>Bachelor of Technology in Mechanical Engineering</b> <i>Capstone Project: Design and Development of an Autonomous Cooking System</i> ■ CPI: 8.95/10.00 (Class Rep)	<b>Mumbai, India</b> <b>2018-2022</b>

## TECHNICAL SKILLS

- **Programming Languages:** Python, C/C++, Java, Arduino, MATLAB, Bash, Embedded C
- **Software:** ROS/ROS2, Gazebo, WeBots, ADAMS, SolidWorks, Creo, AUTOCAD, CURA (3D Printing), Excel
- **Important Libraries and Frameworks:** OpenCV2, Point Cloud Library, TensorFlow, OOP, Numpy, PyGame, Git, Linux/Unix, Windows
- **PLC/HMI Programming** (Siemens, Representation in STL, LAD and FBD),
- **Fast Prototyping, 3D Printing, Pneumatic/Hydraulic System Design, GD&T, Control System Design, Sensor Fusion, Deep Learning, Machine Learning, Reinforcement Learning, Computer Vision (Modern and Classical)**

## WORK EXPERIENCE

<b>Void Robotics</b> <i>Robotics Software Intern</i> ■ Enhanced autonomous delivery robot navigation accuracy by integrating NMEA and F9P GPS systems. ■ Leveraged Micro ROS for real-time communication, improving control and system reliability. ■ Collaborated effectively in a cross-functional team, contributing to the overall performance of the project.	<b>September-December 2023</b> <i>3 Months</i>
<b>The Innovation Story, Mumbai</b> <i>Robotics Teaching Intern</i> ■ Devised a robotics syllabus for 8th-10th graders in local schools including requisite physics and math along with robotics-specific knowledge. ■ Designed and fabricated a modular mobile pick and place robot for teaching purposes.	<b>October-December 2021</b> <i>2.5 Months</i>
<b>Bridgestone India Pvt Ltd</b> <i>Mechanical Execution System (MES) Intern</i> ■ Hands-on training experience in MES with emphasis on principles of IOT and Industry 4.0 ■ Prepared an internship report to be utilized for training future interns.	<b>June-July 2021</b> <i>1.5 Months</i>

## PROJECTS

<b>Grasp Generation using top surface Point Cloud data and Robot Control Using Visual Servoing</b> ■ Utilized Point Cloud library and ROS2 to process data from a simulated RGB-D camera, generating top surface point clouds for objects on a table. ■ Applied grasp quality metrics and grasp matrix to a parallel jaw gripper to synthesize effective grasping points for objects. ■ Implemented robot control using the analytical Jacobian for a 2D RRBot, and feedback using image features to achieve the generated grasp	<b>September-October 2023</b>
<b>RRT Based Motion Planner for pick and place on a UR5e robot</b> ■ Implemented a MATLAB simulation of RRT based motion planning on UR5e in the presence of obstacles ■ Used the robotics toolbox for importing an accurate robot model ■ Sampled points in Cartesian space and used inverse kinematics for pose estimation to perform collision detection	<b>March-April 2023</b>
<b>Parallel Parking Motion Planner using Hybrid A*</b> ■ Developed a 2D environment from scratch using PyGame to simulate a car moving in an environment with obstacles ■ Enabled convex polygon collision detection using separating axis theorem and introduced optimizations to speed up calculations ■ Developed a kinematically consistent motion planner to park the car between 2 obstacles using hybrid A*	<b>February-March 2023</b>
<b>Deep Q-Learning based model for controlling a car in a 2D Environment.</b> ■ Collaborated in a team of 4 to implement a deep reinforcement learning model involving driving a car on a racetrack with other cars present. ■ Used TensorFlow and OpenAI Gym to build the model and generate the environment respectively. ■ Devised a novel exploration strategy using q-values as probability measures for each action.	<b>November-December 2022</b>
<b>Pick and place on a UR5e robot using ROS.</b> ■ Collaborated in a team of 5 to implement pick and place operations on a real UR5e robot. ■ Used the ur_robot_driver ROS library to interface with the robot through a static network address. ■ Derived the forward kinematic equations from scratch using PoE notation and used Newton-Raphson method to numerically solve inverse kinematics.	<b>October-December 2022</b>
<b>Design and development of an autonomous cooking system (Undergraduate Capstone Project)</b> ■ Collaborated in a team of 3 to build a 5 DOF Robot arm from scratch including CAD Modelling, Electronic circuits, and Control algorithms along with subsidiary systems to enable cooking actions. ■ Applied different software at various levels of development including SolidWorks, Ansys and WeBots (to simulate the system along with the control algorithm).	<b>January-June 2022</b>

## ACHIEVEMENTS

- **Publications:**
  - Mepani, M. M., Gala, K. B., Mishra, T. A., Bhole, K. S., Gholave, J., & Daingade, S. (2022). Design of robot arm for domestic culinary assistance. *Materials Today: Proceedings*, 68, 1930-1945.
  - Bhoir, A. A., Mishra, T. A., Narayan, J., & Dwivedy, S. K. (2023). Machine Learning Algorithms in Human Gait Analysis. In *Encyclopedia of Data Science and Machine Learning* (pp. 922-937). IGI Global.
- **DD-Robocon:** Collaborated in a team of 20 students to earn National Rank 1 in Round 1 in 2019 and 2021. Rank 9 attained in the Final Round in 2019 and 2020, special prize for Best Solution Idea, 2019.
- **National Engineering Olympiad:** National Rank 8 in 2019.
- **NPTEL course 'Speaking Effectively':** Top 1% Nationally
- **AMCAT:** 99th Percentile in Quantitative Ability (Advanced), 97th Percentile in Logical Ability
- **FTC (FIRST Tech Challenge):** Achieved Rank 3 in the National robotics competition and participated in the Asia-Pacific Invitionals in 2015 held at Sydney, Australia.