Tanish Ambrishkumar Mishra

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GitHub: https://github.com/expert-amateur

EDUCATION

Worcester Polytechnic Institute — **Worcester, Massachusetts**

Master of Science in Robotics Engineering (In progress) — **2022-2024**

- GPA: 3.80/4.00

Sardar Patel College of Engineering (University of Mumbai) — **Mumbai, India**

Bachelor of Technology in Mechanical Engineering — **2018-2022**

Capstone Project: Design and Development of an Autonomous Cooking System

- CPI: 8.95/10.00
- Class Representative

TECHNICAL SKILLS

- **Programming Languages**: Python, C/C++, Java, Arduino, MATLAB
- **Software**: ROS/ROS2, Gazebo, WeBots, ADAMS, SolidWorks, AUTOCAD, CURA (3D Printing)
- **PLC Programming** (Representation in STL, LAD and FBD), **Fast Prototyping, 3D Printing, Control Circuit Design**

WORK EXPERIENCE

Void Robotics — **September-December 2023**

Robotics Software Intern — *3 Months*

- 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.

The Innovation Story, Mumbai — **October-December 2021**

Robotics Teaching Intern — *2.5 Months*

- 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.

Bridgestone India Pvt Ltd — **June-July 2021**

Mechanical Execution System (MES) Intern — *1.5 Months*

- 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.

PROJECTS

RRT Based Motion Planner for pick and place on a UR5e robot — **March-April 2023**

- 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

Parallel Parking Motion Planner using Hybrid A* — **February-March 2023**

- 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*

Deep Q-Learning based model for controlling a car in a 2D Environment. — **November-December 2022**

- 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.

SCARA Robot Control using ROS2 and Gazebo. — **November-December 2022**

- Collaborated in a team of 3 to implement a velocity-based and a position-based controller for a 3DOF SCARA Robot built from scratch.
- Used PID control to minimize error in the desired position/velocity.
- Used a ROS service to accept position/velocity values from terminal and apply it to the robot, using analytical inverse kinematics for the former and Jacobian for the latter, both evaluated from scratch.

Pick and place on a UR5e robot using ROS. — **October-December 2022**

- 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.

Design and development of an autonomous cooking system (Undergraduate Capstone Project) — **January-June 2022**

- 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).

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 Invitationals in 2015 held at Sydney, Australia.