**Tanish Ambrishkumar Mishra**

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

**EDUCATION**

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| **Worcester Polytechnic Institute**  Master of Science in Robotics Engineering (In progress) | **Worcester, Massachusetts**  **2022-2024** |

* GPA: 3.82/4.00

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| **Sardar Patel College of Engineering (University of Mumbai)**  Bachelor of Technology in Mechanical Engineering (Class Rep) | **Mumbai, India**  **2018-2022** |

*Capstone Project: Design and Development of an Autonomous Cooking System*

* CPI: 8.95/10.00

**TECHNICAL SKILLS**

* **Programming Languages**: Python, C/C++, Java, Arduino, MATLAB
* **Software**: ROS/ROS2, Gazebo, WeBots, ADAMS, SolidWorks, Creo, AUTOCAD, CURA (3D Printing), Excel, Git, Bash
* **Important Libraries:** OpenCV2, Point Cloud Library, TensorFlow, Numpy, PyGame
* **PLC Programming** (Representation in STL, LAD and FBD),
* **Fast Prototyping, 3D Printing, Control System Design, Sensor Fusion, Deep Learning, Machine Learning, Reinforcement Learning, Computer Vision**

**WORK EXPERIENCE**

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| **Void Robotics**  *Robotics Software Intern* | **September-December 2023**   1. *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.

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| **The Innovation Story, Mumbai**  *Robotics Teaching Intern* | **October-December 2021**   * 1. *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.

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| **Bridgestone India Pvt Ltd**  *Mechanical Execution System (MES) Intern* | **June-July 2021**   * 1. *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**

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| **Grasp Generation using top surface Point Cloud data and Robot Control Using Visual Servoing** | **September-October 2023** |

* 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

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| **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

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| **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\*

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| **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.

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| **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.

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| **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.