Shambhuraj Anil Mane

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Education

- **Worcester Polytechnic Institute** — Worcester, MA
  Masters of Science in Robotics Engineering. — *August 2023 - Present*
  Courses: Foundation of Robotics, Motion Planning, Reinforcement Learning
- **Savitribai Phule Pune University** — Pune, India
  Bachelor of Mechanical Engineering, GPA: 3.71 (8.12/10.0) — *August2016 - November 2020*
  Courses: Mechatronics, Mechanical System Design, Product Design and Development

Skills Summary

- **Languages**: Python, C, C++, MATLAB, Java, HTML
- **Developer Tools**: OpenCV, Linux, pandas/scikit-learn, Tensorflow, Git, ROS/ROS2, MATLAB, Solidworks, CATIA

Professional Experience

- **Infosys Limited, Mysore, India — Senior System Engineer**: *January 2021 - July 2023*
  - Developed 150+ engine manuals and service bulletins, analyzing technical data to clearly document maintenance procedures.
  - Worked with a team to deliver 500+ CATIA production orders and SAP 3D simulations for manufacturing planning.
  - Completed training on emerging technologies including robotics, conveyance systems, computer vision, IoT, and AR to gain skills relevant for automating assembly operations.

Projects

- **Kinematic planning under Nonholonomic Constraints— Ros2, Gazebo, scipy, Hybrid A***: *August 2023 - Present*
  - Discretized configuration space and checked collision using occupancy grid and KD-tree for efficient state space representation.
  - Derived accurate kinematic models for differential drive, Ackermann, and articulated steering vehicles to encode steering constraints into cost functions of the planner along with euclidean distance heuristic cost.
  - Optimized hybrid A* algorithm by tuning cost functions to balance exploration vs. exploitation based on planning time and path optimality constraints and visualized parking maneuvers using matplotlib, and Gazebo for rendering and dynamics.
  - Evaluated planner performance by generating smooth trajectories minimizing length and direction changes for vehicles to avoid obstacles and to park in tight spaces with constraints satisfaction.
- **Concentric Tube Robot (CTR) Educational Platform — MATLAB, Kinematics**: *August 2023 - Present*
  - Built CTR consist of three curved tubes nested inside of each other resulting in a surgical instrument with a small diameter and high degree of dexterity with 3D printing, Laser cutting and Tube fabrication methods.
  - Implemented Forward and Inverse kinematics control for the robot using MATLAB and validated using optical tracking.
- **Path Planning — Python, ROS2**: *August 2023 - Present*
  - Developed a configurable grid world ROS2 simulator to implement and evaluate graph search motion planning algorithms.
  - Leveraged informed (Dijkstra's) and uninformed (BFS, DFS) search and analyzed trade-offs between optimality and speed.
  - Quantitatively assessed performance by plotting iterations vs. obstacle density and visualized planned paths in RViz.
- **Bionic Arm — Solidworks, Raspberry Pi, pandas/scikit-learn**: *August 2018 - March 2020*
  - Designed an 11 degree-of-freedom bionic arm with mechanisms to enable anthropomorphic finger motion and grasping.
  - Developed and validated machine learning models using SVM and random forest algorithms to classify EMG signals for controlling a robotic prosthetic arm.

Leadership

- **US Kids 4 Water, San Jose, CA — Robotics Team Lead**: *March 2023 - Present*
  - Led a team of 7 tutors and 6 supervisors to spread robotics awareness, allocating topics and students across 10 rural villages.
  - Conducted robotics, logic learning, and Arduino programming sessions for a group of 24 students from rural communities.
- **Product Innovation Lab, Pune, India — Project Manager**: *June 2018 - March 2020*
  - Represented the lab at several conferences and industry official visits and secured funding for 2 projects.
  - Organized 10 projects with professor and student allocation to provide suitable incubation for students interest.

Publications and Awards

- Co-authored and published a research paper 'REAL TIME CLOUD SENSING' in International Journal of Advanced Science and Technology in volume 29, (2020) (Special Issue)