Shambhuraj Anil Mane

Email: samane@wpi.edu | Mobile: +1-774-535-0532 | Linkedin | Github | Portfolio

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, HTML
- **Developer Tools**: ROS/ROS2, Riz, Gazebo, MATLAB, Solidworks, CATIA, Linux, Git
- **Frameworks and Libraries**: nav2, ros2_control, moveit2, pandas/scikit-learn, Tensorflow, OpenCV

Professional Experience

- **Infosys Limited, Mysore, India — Senior System Engineer**: *January 2021 - July 2023*
  - Delivered 500+ CATIA production orders and SAP 3D visual simulations for manufacturing work instructions.
  - Developed 150+ engine manuals and service bulletins, analyzing technical data to clearly document maintenance procedures.
  - Created automated tool for consumables and spares used in inspection tasks to improve process efficiency by 15 percent.

Projects

- **Multi-agent path finding with CBS algorithms — Python, numpy, seaborn** : *August 2023 - Present*
  - Implemented Improved Conflict-Based Search (ICBS) algorithm, incorporating extensions like prioritizing conflicts and bypassing conflicts. This significantly reduced the number of nodes generated and expanded in the constraint tree search.
  - Combined ICBS with disjoint splitting for conflict resolution rather than standard splitting. Disjoint splitting led to further performance improvements over ICBS alone, reducing node generation/expansion by an additional 5-10% on test cases.
- **RL as a local planner for hierarchical motion planning — ROS2, Gazebo, PPO**: *August 2023 - Present*
  - Developed a custom OpenAI Gym environment to simulate a Pioneer 3AT robot with differential drive and laser scanner in a 3D hospital environment using ROS2 and Gazebo.Significantly increased simulation speed to 50x real-time using launch files.
  - Trained a Proximal Policy Optimization (PPO) reinforcement learning agent with over 12 million steps to accomplish short-range path planning goals. The agent learned to navigate targets within 10 meters while avoiding obstacles.
- **Kinematic planning under Nonholonomic Constraints— Ros2, nav2, scipy, Hybrid A***: *August 2023 - Present*
  - Tuned cost functions of a hybrid A* planner to meet real-time planning constraints.Generated smooth trajectories for vehicles navigating environments with obstacles and tight parking spaces, while satisfying task constraints.
  - Simulated car parking in Gazebo, Generating smooth trajectories with obstacle avoidance for vehicles parking in tight spaces.
- **Concentric Tube Robot (CTR) Educational Platform — MATLAB, 3D printing**: *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.
- **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 machine learning models using SVM and random forest algorithms to classify EMG signals for precise grasp.

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)