Smit Dumore

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EDUCATION

University of Maryland, College Park, 08/2022 – Expected (05/2024)
Masters in Robotics (GPA 4.0/4.0) College Park, MD
Control of Mobile Robots, State Estimation and Visual Odometry, Introduction to AI.

Vishwakarma Institute of Technology, Pune, India, 2017 – 2021 | India
BTech. Mechanical Engineering (GPA 8.48/10.0)
Machine Design, Mechatronics, Kinematics of Mechanisms, Differential Equations.

PROFESSIONAL EXPERIENCE

Robotics Software Engineer, *Botysnc* 07/2021 – 06/2022 | India
- Developed a **Hyper Accurate Docking Algorithm** for an **AMR** (Autonomous Mobile Robot) for autonomous recharging in **C++14.** Experimented with **Iterative Closest Point** scan matching and reflective tape based docking. The docking accuracy obtained was ±2cm. **(video)** .
- Worked on Landmark based **Extended Kalman Filter** for localisation of AMR in long corridors. Obtained RMSE of 0.2m and 5 degrees.
- Successfully tuned and tested custom **Navigation Stack** for lifting and tugging applications upto 2 tonnes in various industrial sites.
- Developed a Teleoperator package in **C++** for controlling an AMR with a joystick.

Project Intern, *Cummins India Limited* 01/2021 – 05/2021 | India
- Implemented Lean Manufacturing Techniques to improve Overall Equipment Effectiveness **(OEE)** of a robotic arm production line.
- Simulated production workflow in CoppeliaSim to optimize a manipulation task with a KUKA kr-16 robot arm. Reduced cycle time of component by **6 minutes**.

PROJECTS

Autonomous Racing Planning and Control stack, 03/2022
Vishwakarma Institute of Technology, Pune, India
- Implemented real-time **RRT and RRT*** path planning algorithms using C++11 for local planning in a head-to-head autonomous racing car. Implemented optimization technique using **Kd-Tree** to improve the algorithm's performance (github)
- Implemented **Pure Pursuit** to follow waypoints on the racetrack.
- Developed a **Model Predictive Controller** based racing strategy for better path following and obstacle avoidance performance. *(github)*
- Utilised multi-lane switching and opponent motion prediction for **safely overtaking** the opponent.

Reinforcement Learning Pacman Agent, 01/2023
University of Maryland, College Park
- Implemented a **BFS , Best first Search, Astar, Dijkstra** path finding algorithm to search Ghosts in a Pacman environment. (github)
- Modelled the Pacman environment as a **MDP** (Markov decesion processes) and used Value Iteration to maximise score of Pacman against stochastic and adversarial ghosts.
- Used Q-learning to learn optimal actions in a state to maximise Pacman score.

Dynamic Window Approach Local Planner, 10/2022
University of Maryland, College Park
- Developed a kino-dynamic local planner for a turtlebot using the Dynamic Window Approach. (github)
- Planner is capable of dodging **dynamic obstacles**.
- Planner generates paths that are **kinematically feasible** and locally optimal.

SKILLS

Programming Languages
C++11/14/17 , Python, MATLAB, Julia

Tools
ROS, OpenCV, PCL, Rviz, Gazebo