CHARMIN PRITESH DESAI

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EDUCATION & SKILLS

The State University of New York at Buffalo (UB), NY, USA **Aug 2021 – May 2023**

- Master of Science in Robotics (Robotics & Artificial Intelligence)
- ✓ Python, ROS, Gazebo, SLAM, AI/ML, OpenCV, Computer Vision, Engineering Mathematics, Git

Sardar Vallabhbhai Patel Institute of Technology (SVIT), Gujarat, India **Aug 2016 – Aug 2020**

- Bachelor of Engineering in Instrumentation & Control (Industrial Automation)
- ✓ C, Embedded C, Arduino, MATLAB & Simulink, PLC, PID Control, Electrical/Electronics, Embedded Systems

ACADEMIC PROJECTS

Autonomous Plant Watering Robot (ROS) **Sept 2022-Present**

1. **Objective :-** Development of a robot to water household plants autonomously. It explores an unknown environment. Builds a map, while also scanning for plants. The robot localizes itself and navigates autonomously.
2. **SLAM :-** Applied SLAM Gmapping algorithm on a TurtleBot3 robot in a ROS gazebo to generate am image of size 383x383 pixels.
3. **Mapping :-** Performed image processing on the image to generate an occupancy grid matrix of 400x400 pixels.
4. **Path Planning :-** Optimized A* algorithm from scratch and planned a 95% improved shortest path for the robot.
5. **Perception :-** Deployed Apriltags in gazebo for plant perception, executed AprilTag continuous detection node and calculated the transform from robot's camera frame to different AprilTags.
6. **Localization :-** Fetched data from Apriltag detection, implemented a ROS TF Broadcaster and Listener node to program a TF tree.
   Calculated the pose of robot in the world frame (localizing the robot) with 99% accuracy.
7. **Navigation & Control :-** Executed a robot controller node, driving it 80% faster from start to goal location.
8. **Recognition :-** Programmed a mathematical algorithm that can estimate the correct position of a plant from continuously updated robot to plant transform and robot localization data.

Analysis of Fanuc LR Mate 200-iD Robot Manipulator **Sept 2021 - Nov 2021**

1. Standardized position of 6-DOF manipulator's end-effector in base frame and world frame.
2. Used Denavit-Hartenberg methodology and Forward Kinematics for calculations.
3. Derived 6x6 Jacobian Matrix to generalize linear and angular velocities of end-effector using DH Table.

PLC Process Automation (Ladder Logic) **Aug 2019 - Dec 2019**

1. Automated Bottle Filling System (Silo Process)
   - A conveyor belt run by 1-phase motor running empty bottles until detected by a photo-switch sensor.
   - Sensor stops the motor to start a LFM (liquid filling machine) for 3 seconds. Level sensor stops the LFM.
   - The conveyor begins running again for filling new empty bottles repeating each cycle for 6 seconds.
2. Batch Mixer Process Control
   - Two pumps pouring different fluids into 1 container until detected by a level switch sensor.
   - Fluid mixture is heated and processed by heater and spinning motor for a set timer of 30 seconds.
   - Finally, an output valve opens and with third pump supplying the resultant fluid out in 10 seconds.

INTERNSHIP AND WORK EXPERIENCE

Teaching Assistantship, University at Buffalo **Feb 2023 – May 2023**

- Teaching assistant for professor Dr. Vojislav Kalanovic (Program Director) in the course MAE594 Robotics 2.

Grader Assistantship, University at Buffalo **Sept 2022 – Dec 2022**

- Grader assistant for professor Dr. Minghui Zheng in the course MAE340 Dynamic Systems.

Internship at Tara Mechons Pvt. Ltd. **Apr 2020**

- ✓ Devised an Automatic Turn-Off Electrical Cutting Machine for operator safety in a team of 4 members.
- Used a 4-pole relay contactor to interface 3-phase induction motor that powers the machine.
- NC contact switch breaks the circuit when the lever arm of the machine is released, turning it off.
- When the level arm is pulled, NC switch closes completing the circuit, powering the machine.

Internship at Larsen and Toubro Power Training **Jun 2019**

- ✓ Engaged in Training on Industrial Instrumentation & 3 popular Automatic Control Systems (PLC, DCS, SCADA).
- Learnt about PLC and Ladder Logic programing. Recognized various control valves and industrial sensors.
- Learnt about 6 motor starters: 2-3-4 point, VFD's, Soft starter and DOL starter.