

CHARMIN PRITESH DESAI

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EDUCATION

University at Buffalo, The State University of New York

Master of Science, Engineering Science (Robotics)

Courses : Robot Control, Robot Algorithms & ROS, Machine Learning, Computer Vision

Buffalo, NY, USA

Aug 2021 – May 2023

Sardar Vallabhbhai Patel Institute of Technology

Bachelor of Engineering, Instrumentation & Control

Courses : Process Control, Industrial Measurement, Electrical Machines, PLC, Embedded, Power Electronics & Drives

Vasad, Gujarat, India

Aug 2016 – May 2020

SKILLS

Languages : Python, C , C++, Embedded C, PLC Ladder Logic

Libraries : NumPy, Pandas, Matplotlib, OpenCV, TensorFlow, Sklearn, Keras

Software : MS Office, MATLAB & Simulink, ROS & Gazebo

Hardware : PLC, PID Control, Electrical/Electronics, Embedded Systems

WORK EXPERIENCE

University At Buffalo : Graduate Assistant

Sept 2022 – May 2023

- **Taught :** Control systems and mathematical modelling of robot mechanisms.
- **Fanuc LR Mate 200-iD Robot Arm :** Standardized position of 6-DOF manipulator's end-effector in robot base-frame and world frame. Formulated calculations by Denavit-Hartenberg methodology and Forward Kinematics. Derived 6x6 Jacobian Matrix to generalize linear and angular velocities of end-effector.
- **Laboratory :** Simulated a 6-DOF robot arm on ROS-Gazebo and ran robot hardware via ROS1 commands and program nodes. Worked with different end-effectors and interfaced various sensors to the robot arm. Localized the end-effector using apriltag. Performed operations such as object stacking, color sorting, etc. [View](#)

Niyantras Automation : Automation Engineer

June 2020 – July 2021

- **Indoor Air Quality Monitoring System :** Prototyped the device using Arduino with different gas sensors to detect particulate matter, N2O, SO2, H2, LPG, CH4, CO, and alcohol.
- **Electrical Cutting Machine :** Developed an automatic turn-off functionality in the machine for operator and field personnel safety using NC switch and 4-pole contactor. [View](#)
- **Industrial Temperature Measurement Transmitter :** Designed and devised a signal conditioning circuit working for RTD PT100 sensor and calibrated temperature range of 0-100 °C to 0-5 VDC output using IC741 Op-Amp.
- **Home Automation :** Developed Indoor lighting system controlled via IR detection. Using 8051 MCU and relay. [View](#)

Larsen and Toubro : Control & Instrumentation Intern

Jun 2019

- Engaged in Training on industrial control systems, valves, and transmitters.
- Studied various motor starters. e.g., 2-3-4 point, VFD's, Soft starter and DOL starter.
- Made an industrial visit to Wanakbori thermal power station and control panel manufacturing company.

ENGINEERING PROJECTS

Autonomous Robot, ROS1-Gazebo : [View Project](#)

1. **SLAM :-** Used Gmapping on a TurtleBot3 robot in ROS gazebo to generate an image of size 384x384 pixels.
2. **Occupancy Grid :-** Performed image processing to generate an occupancy grid matrix of 400x400 pixels from SLAM.
3. **Path Planning :-** Used homogenous transformations to formulate coordinate frame transformations between world frame and occupancy grid frame. Optimized A* algorithm and planned a 95% improved shortest path.
4. **Perception :-** Executed AprilTag continuous detection node to derive the transform from robot camera to apriltag.
5. **Localization :-** Improved robot pose estimation with nearly 100% accuracy through apriltag detection and parallelly calculating position using robot's linear and angular velocity.
6. **Recognition :-** Programmed a mathematical algorithm which estimates the true position of an object from continuously updated robot's pose and robot to apriltag transform.
7. **Exploration :-** Robot explores the environment searching for candidate targets and saves their position in its memory.
8. **Navigation & Control :-** Executed a controller node, driving the robot 80% faster from start to goal location. Enabled the robot to navigate the shortest path in the least possible time.

Automatic Water Management System : [View Project](#)

1. **Level Control :-** The level of water in overhead and underground tanks is measured through ultrasonic sensor, that constantly sends data to MCU which displays the level on LCD screen. Underground water pump turns automatically ON & OFF based on the level of water in overhead tank.
2. **Measurement :-** Flow sensor in pipeline continuously measures flow rate and measured consumption. It is interfaced to microcontroller giving it live data that is displayed on LCD screen.
3. **Wastage Detection & Prevention :-** Flow sensor detects water wastage in open unmonitored taps, then sends feedback to MCU. MCU commands solenoid valve to turn OFF in a particular pipeline shutting off water supply.
4. **Notification :-** MCU sends message to the user's phone using GSM technology notifying the user of an open water tap in the premises. User can later close the tap and restore the water supply.

Programmable Logic Controller (Ladder Logic) : [View Project](#)

- Empty bottles run on a conveyor belt by a 1-phase induction motor until identified by a photo-switch sensor.
- This halts the motor and starts a liquid filling apparatus for 4 seconds. Finally, the level sensor ends the filling.
- The conveyor is commenced again to fill new bottles; this repeats each cycle for 12 seconds.