RITIKA GHOSH

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EDUCATION

Northwestern University, *MS in Robotics* Dec. 2023
Relevant Courses: Machine Learning, SLAM, ROS 2, Robotic Manipulation and Machine Dynamics
Thapar Institute of Engineering and Technology, *BE Mechatronics* 2017- 2021

RELEVANT SKILLS

Programming: Python, C++, C (including embedded), MATLAB, Version Control (Git), Unit Testing, Linux
Robotics: ROS 2/ROS, Ignition Gazebo, Rviz, MoveIt!, Computer Vision (OpenCV), Machine Learning, CoppeliaSim
Mechanical/Electrical Design: Creo, SolidWorks, Abaqus, Siemens NX, AutoCAD, Eagle

WORK EXPERIENCE

Siemens Industry Software Pt. Ltd Gurgaon, India
Simulation and Design Intern Jan. - July 2020
- Collaborated with a team developing digital twin simulations of a rubber belt manufacturing plant in NX CAD/MCD.
- Established signal flow to the simulated digital twin with PLCsim advanced software and OPC UA communication.
- Developed programmable logic controller (PLC) ladder programs and built HMI applications in TIA portal software.

Thapar Institute of Engineering and Technology Patiala, India
Research Assistant 2019 - 2021
- Designed, simulated and analyzed a bone drilling module in Abaqus for an ongoing comparative study between the practical outcomes with the theoretical results from the software.
- Tested the drillbit in simulation while observing thermal and vibrational impacts on the bone with varying frequency.

TECHNICAL PROJECTS

Hand motion imitation Allegro Hand: C++, Python , ROS 2, Moveit! 2 Jan. - March 2023
- Created a ROS 2 package in python and C++ using OpenCV and mediapipe's machine learning framework for hand tracking with a visual feedback system to teleoperate a 4 finger 16 DOF robot hand to perform simple grasping tasks.

Franka Robot Playing Air hockey (HockeyBot): Python, ROS 2, MoveIt! 2, OpenCV Sept. - Dec. 2022
- Collaborated with a team of 4 to program a 7 DOF industrial arm to autonomously play air hockey in python ROS 2.
- Tracked a sliding puck by applying OpenCV and predicted its trajectory path with the help of Intel RealSense D435.
- Developed a python API wrapper for the ROS2 interface to MoveIt! 2 to get the desired trajectory of the Franka arm.

SLAM with Turtlebot3 from scratch: C++, ROS 2 March 2023
- Developed a ROS 2 SLAM package in C++ implementing Extended Kalman Filter (EKF) including C++ libraries for 2D transformation and kinematics calculations and visualization in rviz for the Turtlebot 3 differential drive robot.

Autonomous Quadrotor Control: C, Controls Jan.- March 2023
- Programmed a PID controller and user control system for a multi-DOF quadrotor with wifi enabled Raspberry Pico and on board IMU, capable of autonomous flight and maintaining position in space using a vive IR sensor.

4 DOF PincherX grabbing a Pen: Python, Realsense, OpenCV Sept. 2022
- Programmed a PincherX by utilizing the OpenCV library and an Intel RealSense D435i depth camera to identify the contour of the pen based on its color, find the center pixel, and translate the point to 3D coordinates.

Design of an Automated Dry Waste Segregation System: Creo, C++, Raspberry Pi Sept. 2020 - May 2021
- Designed and simulated an electromechanical system segregating dry waste into different categories with Creo.
- Identified different materials using proximity, triad spectroscopy sensors and an image recognition algorithm in C++.

Design and development of a line following Robocar: C++, Arduino Uno, Zigbee Aug. - Dec. 2018
- Built out an electronics subsystem and programmed a line following Robocar to sense obstructions and reroute its course in case of multiple cars on the same path using IR and Ultrasonic sensors with wireless Zigbee communication.

LEADERSHIP

- Joint-secretary and Sergeant at arms of Rotaract Club. 2018-19
- Sergeant at arms of Toastmasters Club at Thapar University of engineering and technology. 2018-19