




RAHUL ROY

✉ rahulroy2024@u.northwestern.edu  linkedin.com/in/rahul-roy2909  github.com/roy2909  roy2909.github.io/

EDUCATION

Northwestern University

M.S. in Robotics GPA 3.85

Evanston, IL

Expected December '24

Manipal Institute of Technology

B.Tech. in Mechatronics Engineering - Minor in Robotics and Automation GPA 3.75

Manipal, India

June '18- July '22

Relevant Coursework

ROS (Robot Operating System)/ROS 2, Robotic Manipulation, Mechatronics, Microprocessor System Design, SLAM for Robotics.

PROJECTS

Autonomous Exploration and Detection in an Unknown Environment | C++, Python, ROS 2

Jan '24 - March '24

- Programmed a Quadruped (Unitree Go1) to autonomously explore unknown environments in ROS 2, Python and C++.
- Implemented Lidar, camera fused graph based SLAM with ICP Odometry using RTAB-MAP for autonomous navigation.
- Developed a custom exploration algorithm based on Frontier Exploration, integrated with the Nav2 stack.
- Trained a YOLOv8 machine learning model to identify humans within the environment and display their position as markers in Rviz2.
- Used DeepFace to create a facial recognition package to store and compare faces of individuals.

Simultaneous Localization and Mapping from Scratch (EKF SLAM) | Current | C++, ROS 2

Jan '24 - Present

- Programming an EKF SLAM (2D SLAM) pipeline using ROS 2 and C++ for the Turtlebot3.
- Creating a kinematics and odometry control library in C++ for differential drive robots.

Vision-based Autonomous Control of a 7 DOF Robot Arm | Group Project | Python, ROS 2

Dec '23

- Programmed a 7 DOF Franka Arm in Python and ROS 2 to autonomously detect and knock down colored bowling pins.
- Trained YOLOv8 machine learning model for classification and detection of the colored bowling pins, displayed as markers in Rviz2.
- Developed a Python API for the ROS 2 MoveIt package to control the robot's movements.

Motion Controlled Differential Drive Car with Infrared (IR) Gripper | Group Project | C

Dec '23

- Coded a microcontroller in C to control a differential drive car with an autonomously operated IR gripper.
- Transmitted Euler angles via Radio communication to direct the car's movement based on tilt and inclination.
- Integrated IR Grid-EYE sensor for object detection, triggering servo-controlled gripper manipulation within the car's range.

Automated Grasping: Pincher X100 4-DOF Robot Arm Grasps a Purple Pen | Python, ROS 2

Sept '23

- Programmed a Pincher X100 4-DOF robot arm to grasp a purple-colored pen.
- Utilized Intel RealSense D435i and OpenCV for object localization and HSV color space with depth mapping for orientation.
- Enabled Trossen PincherX 100 robot arm manipulation and object grasping using camera-detected coordinates.

PROFESSIONAL EXPERIENCE

Centre for Artificial Intelligence and Robotics, Defence Research and Development Organisation

India

Project Intern

Jan '22 - June '22

- Set up IMU and Velodyne LIDAR for the Husky A200 robot using C++ and Python in ROS 2.
- Achieved autonomous navigation using SLAM Toolbox (2D SLAM), Cartographer, and Nav2 (ROS 2 Foxy) in C++.
- Performed a comparative study of the TEB and DWA motion planners for the proposed robot.

Central Research Laboratory, BEL

India

Intern

July '21 - Aug '21

- Implemented algorithms in MATLAB related to Robotic Navigation including Trilateration, Triangulation, and GPS.
- Manipulated UDP packets in MATLAB to send from one system to another.

SKILLS

- **Software:** Python, C++, C, Git, Linux, Unit Testing, Bash, MATLAB
- **Robotics:** *Software:* ROS 2/ROS, Nav2, Computer Vision, Machine Learning, MoveIt 2, Gazebo, SLAM, Coppeliasim, YOLOv8, Path Planning, Sensor Fusion, RTAB Map, Visual Odometry, Pytorch
Hardware: Microcontroller (nRF52833, PIC32), Unitree Go1, Nvidia Jetson, Franka Emika Panda
- **Manufacturing:** Circuit design, 3D Printing, CAD (SolidWorks, Onshape)