RAHUL ROY

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EDUCATION

Northwestern University   **Evanston, IL**
M.S. in Robotics   GPA 3.86   *Expected December '24*

Manipal Institute of Technology   **Manipal, India**
B.Tech. in Mechatronics Engineering - Minor in Robotics and Automation GPA 3.75   *June '18- July '22*
Relevant Coursework
ROS (Robot Operating System)/ROS 2, Robotic Manipulation, Mechatronics, Microprocessor System Design, SLAM for Robotics.

PROFESSIONAL EXPERIENCE

Walt Disney Imagineering, Research and Development - Advanced Development   **Glendale, California**
Localization and Control Intern   *June '24 - Sept '24*
- Part of an early stage team involved with prototyping and building underwater robotic technologies
- Worked on setting up sensors and implementing sensor fusion using Kalman Filters for Underwater navigation in Python
- Implemented controls and algorithms to enable autonomous underwater navigation in Python and C++

Centre for Artificial Intelligence and Robotics, Defence Research and Development Organisation   **Bangalore, 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 TEB and DWA motion planners for the proposed robot**.**

Central Research Laboratory, BEL   **Bangalore, 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.

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 3D SLAM with ICP Odometry using RTAB-MAP for autonomous navigation.
- Developed a custom exploration algorithm based on Frontier Exploration, integrated with the Nav2 stack for obstacle avoidance.
- Trained a YOLOv8 machine learning model to identify humans within the environment and display their position as markers in Rviz2.
- Developed a facial recognition package using DeepFace to store and compare faces of individuals.

Simultaneous Localization and Mapping from Scratch (EKF SLAM) | *C++, ROS 2*   *Jan '24 - March '24*
- Developed an EKF SLAM (2D SLAM) pipeline using ROS 2 and C++ for the Turtlebot3.
- Created 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.

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, PyTorch, Semantic Segmentation, Visual Odometry, PCL, OpenCV, Ignition Gazebo, MuJoCo, Reinforcement Learning, ArduPilot.
        Hardware: Microcontroller (nRF52833, PIC32), Sensors (GPS, IMU, Camera, Pressure, Encoders), Nvidia Jetson, Franka Emika Panda, Sensor calibration.
- **Manufacturing**: Circuit design, 3D Printing, CAD (SolidWorks, Onshape).