

RAHUL ROY

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Education

Northwestern University

M.S. in Robotics

Sep. 2023 – Dec. 2024

Evanston, IL

Manipal Institute of Technology

B.Tech. in Mechatronics Engineering | Minor in Robotics and Automation

Jun. 2018 – Jul. 2022

Manipal, India

Experience

Walt Disney Imagineering (Advanced Development)

Robotics Localization and Control Intern

Jun. – Sep. 2024

Glendale, CA

- Prototyped and built underwater robotic technologies as part of an early-stage team.
- Set up sensors and implemented Kalman Filter-based sensor fusion for underwater navigation in Python.
- Implemented controls and algorithms to enable autonomous underwater navigation using Python and C++.

Centre for Artificial Intelligence and Robotics (DRDO)

Robotics Project Intern

Jan. – Jun. 2022

Bangalore, India

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

Central Research Laboratory, BEL

Robotics Intern

Jul. – Aug. 2021

Bangalore, India

- Implemented algorithms in MATLAB for robotic navigation, including Trilateration, Triangulation, and GPS.
- Manipulated UDP packets in MATLAB for inter-system communication.

Projects

Explainable AI(XAI) for Hand Gesture Recognition

Python, Pytorch, Deep Neural Networks

Sept. – Dec. 2024

- Improved gesture classification by 2% using SHAP feedback for base and DANN models using Python and Pytorch.
- Developed a transfer learning pipeline adapting models across users and days with SHAP value based Explainable AI.
- Enhanced model transparency by identifying key EMG channels critical for gesture classification.

Autonomous Exploration Using 3D SLAM in Unknown Environments

C++, Python, ROS 2

Jan. – Mar. 2024

- Programmed a quadruped to explore unknown environments autonomously using ROS 2, Python and C++.
- Implemented 3D SLAM with RTAB-MAP and custom exploration integrated with Nav2 for obstacle avoidance.
- Trained a YOLOv8 model for human detection and developed a facial recognition package using DeepFace.

Extended Kalman Filter SLAM from Scratch

C++, ROS 2

Jan. – Mar. 2024

- 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

Python, ROS 2

Dec. 2023

Collaboration

- Programmed a 7 DOF Franka Arm to autonomously detect and knock down colored bowling pins using ROS 2.
- Trained a YOLOv8 model for pin detection and visualized results in Rviz2.
- Co-developed a Python API for ROS 2 MoveIt to control the robot's movements.

Skills

Programming: Python, C++, C, Linux, Bash, MATLAB, CMake, Git, Unit Testing

Robotics: ROS/ROS2, SLAM, Computer Vision, Motion Planning, Kinematics, Machine Learning, Nav2, MoveIt 2, Gazebo, Ignition Gazebo, ArduPilot, Simulink, Pytorch

Hardware: 3D Printing, CAD (SolidWorks, Onshape), Nvidia Jetson, Raspberry Pi