

ROHIT DEY

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SUMMARY

Mechanical/Robotics PhD candidate leveraging robot control and computer vision expertise to develop efficient and explainable solutions. Experienced in integrating classical techniques with deep learning algorithms. Eager to apply rigorous engineering fundamentals to the innovation and rapid bring-up of complex robotic systems.

EXPERIENCE

MEDICAL AND MANUFACTURING INNOVATION LAB RESEARCH ASSISTANT - Aug 2021 – Present

- Designed an intuitive teleoperated haptic interface for minimally invasive surgical robot, addressing latency and dexterity limitations. The design reduced operation time by 26% while maintaining sub-millimeter accuracy using **ROS2** and **micro-Ros** on **ESP32** over **UDP** connection.
- Implemented an adaptive **impedance control algorithm** for robotic polishing using **Reinforcement Learning** on a UR5 using **PyTorch** and **Moveit** with **ROS2**, achieving 96% surface contact time on curved surfaces with constant force.

PROCTER & GAMBLE ROBOTICS SOFTWARE ENGINEER - Jan 2021 – Jul 2021

- **Engineered** a production-ready dispenser system using a **UR10e** manipulator, integrating custom end-effectors and sensors through full-stack hardware and software implementation with interactive **UI** for control/monitoring.
- **Architected** real-time data exchange between sensors and the robotic controller by deploying **Modbus TCP/IP** and **RS485 communication protocols**.

COOPERATIVE DISTRIBUTED SYSTEMS LAB RESEARCH ASSISTANT - Aug 2019 – Dec 2020

- Developed an advanced **indoor localization** system for **UAVs** and **AGVs** by integrating ultra-wide band (UWB) **RFID sensors** with a monocular camera, enhancing accuracy by 20%
- Utilized gecko-bots to inspect scale deposits in water pipes using ultrasonic sensors facilitating region-specific maintenance and reducing the maintenance time by 17% for **DDAGW**.

PROJECTS

- **Vision-Based Manipulation System:** Enhanced robotic grasping precision by 35% using deep learning models (**YOLO**, **PoseCNN**) and **RGB-D** cameras for 3D object detection and pose estimation. - Oct 2024 – Jan 2025
- **Einstein Vision Board:** Developed 3D dynamic scene rendering pipeline with data from dashcam at a rate of 27 frames per second for enhancing the user-experience with **Unity3D** and **PyTorch**. - Feb 2024 – Aug 2024
- **3D Surface Reconstruction:** Implemented 3D car surface reconstruction pipeline using **Mip-NeRF** in **PyTorch**, achieving a 32.63 dB peak signal to noise ratio (PSNR). This marker-less approach enables automated extraction of curved surfaces from image sequences for applications like robotic polishing. - Feb 2023 – Sep 2023
- **MonoDepth-vSLAM:** Developed a Visual SLAM algorithm for autonomous vehicles leveraging monocular depth estimation, optical flow, and **EKF** with less than 10m mean error in **CARLA** using **C++**. - Aug 2020 – Jul 2021
- **AGV Navigation in Dynamic Environment:** Integrated navigation system in **Gazebo ROS**, using **RRT*** for path planning and constrained **MPC** for trajectory tracking of ground vehicle. - Jan 2020 – Jul 2020

SKILLS

PROGRAMMING	Python, C++, C#, MATLAB & Java
SOFTWARE / PROTOCOLS	ROS2/ROS, PyTorch, Open3D, OpenCV, Isaac Sim, Blender, Fusion360, CARLA, Unity, Eigen, Boost, PCL, Docker, Git, RS485, I2C, UDP, CAN-Bus
HARDWARE	Raspberry-Pi, Arduino, STM32, ESP32, Intel RealSense D435i, HoloLens 2, Polhemus EMT, fNIRs, Hokuyo LiDAR, Pixhawk PX4 & Vicon Motion Capture

EDUCATION

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|------------------------------------|--------------------------------------|----------------|---------------------|
| • Ph.D. (Mechanical Engineering) | Worcester Polytechnic Institute | GPA: 4.0/4.0 | Aug 2021 – Present |
| • M.Sc. (Mechanical Engineering) | University of Cincinnati | GPA: 4.0/4.0 | Aug 2018 – Jul 2021 |
| • B.Tech. (Mechanical Engineering) | West Bengal University of Technology | GPA: 8.39/10.0 | Aug 2013 – Aug 2017 |

AWARDS & PUBLICATIONS

- Experimental investigation of HydroFlex spindle polishing of metal additively manufactured channels - JMP, 2025
- An intuitive guidewire control mechanism for robotic intervention. - IJCARS, 2024
- Vibration control coupler design for robotic learning from human polishing. - IMECE, 2024
- HydroFlex spindle polishing for internal surfaces of complex channels with high aspect ratio - MFGLET, 2023
- MonoDepth-vSLAM: A Visual EKF-SLAM using Optical Flow and Monocular Depth Estimation - Thesis, 2021