

Manas Dixit

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Education

University of Minnesota-Twin Cities

Master of Science in Robotics

Minneapolis, MN

Expected May 2026

Courses: Machine Learning, Artificial Intelligence, Reinforcement Learning, Intelligent Robotic Systems, Computer Vision

BITS Pilani

Bachelor of Science in Mechanical Engineering

Goa, India

Courses: Kinematics and Dynamics of Machines, Control Systems, Machine Design, CAD/CAM

Jul 2017 – Aug 2021

Technical Skills

Programming & Development: C++, C, Python, MATLAB, MATLAB Simulink, Julia, Git, JIRA, Docker, WSL2

Sensor fusion & Controls: Kalman Filtering (EKF/UKF), Bayesian Filtering, Particle Filtering, PID, Optimal Control

Perception & AI: YOLOv8, SegFormer, OpenCV, SLAM (ORB-SLAM, GMapping), Monocular Depth Estimation, Point Clouds, PyTorch, TensorFlow, Reinforcement Learning

Robots & Sensors: Radar, Camera, LiDAR, IMU, Wheel Encoders, Force-Torque Sensors, TurtleBot3, Kinova Gen3

Middleware, Simulation and Data Logging: ROS/ROS2, IsaacSim, Rviz, Gazebo, CANoe, RTOS, LabVIEW

Work Experience

Sensor Fusion Intern, Magna Electronics

Auburn Hills, MI

Extended Kalman Filter, C++, CANoe, WSL2, Docker, CARLA, ROS2

Jun 2025 - Aug 2025

- Optimized multi-sensor fusion algorithm for tracking sharply turning vehicles in C++, achieving a 35% performance gain by integrating the Constant Turn Acceleration (CTRA) motion model over the CA model
- Implemented dynamic runtime switching between CA and CTRA motion models to balance computational cost with accuracy, improving adaptability of the sensor fusion algorithm in fusing and synchronizing multi-modal sensor data
- Streamlined software-in-the-loop testing by cutting CARLA environment setup from 6 hours to 30 minutes per workstation through a Dockerized Ubuntu + ROS2 workspace in WSL2, standardizing developer workflows

Research Position, Agricultural Robotics Lab

University of Minnesota, Twin-Cities

Navigation, Jetson Orin, YOLOv8, SLAM, SolidWorks, IsaacSim, C++

Nov 2024 - Present

- Engineering an imitation learning-based local navigation planner, trained from expert demonstrations, to achieve smoother obstacle avoidance and reduce path-tracking errors compared to baseline planners
- Implemented LiDAR-IMU-wheel encoder fusion using a Kalman filter for SLAM, improving localization accuracy by 30% and ensuring robust mapping performance during field tests in unstructured corn rows
- Designed and integrated a 3-DOF rover-mounted robotic arm in SolidWorks for corn stem grasping/cutting, enabling both teleoperation and YOLOv8-based autonomous control; reduced manual intervention by 40%

Motor Control Systems Engineer, SEDEMAC Mechatronics

Pune, India

PID Control, MATLAB, Simulink, Python, LabVIEW, CANoe, RTOS

Jul 2021 - Jul 2024

- Headed end-to-end development of an E-bike powertrain with a 250W Switched Reluctance Motor (SRM), reducing cost by 25% and space by 30% through a novel sensorless control algorithm using model based development in Simulink/Stateflow
- Led embedded system design by developing a custom 12V ECU with CAN/UART protocols, RTOS, and onboard sensors to enable robust SRM actuation
- Executed SIL/HIL validation in LabVIEW and formulated Python/MATLAB scripts to automate controls calibration, accelerating workflows by 35%

Projects

Dynamic Simultaneous Localization and Mapping | SLAM, ROS2, Semantic Segmentation

Jan 2025 - May 2025

- Developed a dynamic visual SLAM pipeline by integrating SegFormer-based semantic segmentation with ORB-SLAM in ROS2, filtering dynamic keypoints from humans and vehicles, reducing ATE by 23% for real-time localization

Real-time Object Tracking TurtleBot | ROS, Gazebo, RViz, RGB-D Camera, TurtleBot3

Aug 2024 - Dec 2024

- Crafted software solution for an Adaptive IBVS system (< 5% tracking error), enhancing Object tracking and visual servoing in complex environments such as occlusion and poor lighting; simulated using Gazebo-ROS, cutting project time by 25%
- Applied RL for dynamic Jacobian tuning and OpenCV-based vision processing, boosting servoing efficiency by 20%

3D Scene Reconstruction using Monocular Vision | CUDA, ViT, Point Cloud, PyTorch

Aug 2024 - Dec 2024

- Implemented a Vision Transformer model that extracts global and local features for generating depth map
- Generated 3D point-clouds using the depth map and created mesh for effective visualization of the reconstructed scene

Publication

- Modeling of a Transient VCRS and Virtual Optimal Charge Determination for Automobiles

<https://www.sae.org/publications/technical-papers/content/2021-28-0255>