

Manas Dixit

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Education

University of Minnesota-Twin Cities

Master of Science in Robotics

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

Minneapolis, MN

Expected May 2026

BITS Pilani

Bachelor of Science in Mechanical Engineering

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

Goa, India

Jul 2017 – Aug 2021

Technical Skills

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

Localization & 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, Rviz, Gazebo, CANoe, CANalyzer, Vector, LabVIEW

Work Experience

Magna Electronics

Algorithm Development Intern | EKF, C++, CANoe, WSL2, Docker, CARLA, ROS2

Auburn Hills, MI

Jun 2025 - Aug 2025

- Optimized state-estimation algorithm for sharp turning maneuvers in C++, achieving a 35% performance gain by integrating the Constant Turn-Rate and Acceleration (CTRA) motion model over the conventional 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

Agricultural Robotics Lab

Research Position | Sensor Fusion, Jetson Orin, YOLOv8, SLAM, SolidWorks, C++

University of Minnesota, Twin-Cities

Nov 2024 - Present

- 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%.
- 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.
- Engineering an imitation learning-based local navigation policy, trained from expert demonstrations, to achieve smoother obstacle avoidance and reduce path-tracking errors compared to baseline planners.

SEDEMAC Mechatronics

Control Systems Engineer | PID Control, MATLAB, Simulink, Python, LabVIEW, CANoe

Pune, India

Jul 2021 - Jul 2024

- Headed end-to-end development of vehicle control software modules for an E-bike powertrain, architecting a custom 12V ECU with CAN/UART protocols, RTOS, and integrated sensors to actuate a 250W Switched Reluctance Motor, reducing system cost by 25%
- Pioneered a novel sensorless control algorithm for SRMs using model-based development in Simulink/Stateflow, eliminating hall sensors, reducing system space by 30%, and improving reliability of drive-by-wire actuation
- Performed SIL/HIL validation and automated controls calibration with Python/MATLAB, ensuring robustness of actuation and trajectory-following control systems while accelerating deployment 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>