Mihir Deshmukh

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*Seeking full time opportunities from May 2025

Education

Worcester Polytechnic Institute **Aug 2023 - May 2025**
Master of Science, Robotics Engineering (3.87/4.0) *Worcester, MA*

College of Engineering, Pune **Aug 2018 - May 2022**
Bachelor of Technology, Electronics and Telecommunication Engineering (8.86/10) *Pune, India*
Minor in Computer Engineering

Technical Skills

Languages: C, C++, Python, MATLAB, C#, TypeScript
Developer Tools: ROS/ROS2, OpenCV, PyTorch, Tensorflow, PCL, GIT, MATLAB, Linux, CI/CD, ARM Keil, Cuda, LaTeX, Machine Learning, Altium Designer, Angular
Network Architectures: ResNet, VGG, YOLO, RCNN, ViTs
Hardware: Jetson Nano, RaspberryPi, STM32, Arduino, STM32, KinectV2, Zed camera 2i, Franka panda

Experience

Magna Electronics **Jun 2024 - Dec 2024**
Software Algorithms Intern *Lowell, MA*
- Processed CAN bus data to extract GNSS information for HD map queries, enabling real-time location spoofing, lane profile reconstruction, and hardware-independent debugging setups.
- Benchmarked Autoware's planner in Carla simulation and contributed to the system design of landmark-based localization.

Manipulation and Environmental Robotics Lab - WPI **Aug 2022 - Present**
Research Assistant *Worcester, MA*
- Performed instance segmentation using Mask R-CNN to identify dexterous skills (sliding, pushing, flipping) for objects in a scene, achieving over 90% accuracy.
- Designed task planning framework using scene graphs to prioritize skill execution and locate grasp candidates for each object.

Bajaj Finserv **Jul 2022 - Jul 2023**
Software Engineer *Pune, India*
- Managed the migration of the RBL bank collection web portal, driving the strategic planning and technical execution to enhance operational efficiency and data integrity.
- Created robust Web APIs using .Net Core, ensuring seamless integration with backend databases using Ado.Net, significantly improving the collection process's reliability and speed.

McMaster University - Mitacs Globalink Research Internship **May 2021 - Jul 2021**
Research Intern *Online*
- Worked under Dr. Gary Bone on the project "Collaborative Robot Arm Software Development."
- Applied concepts of Ransac segmentation, clustering, and Transforms in Webots and MATLAB. Simulated PR2 for collaboratively picking objects by processing the point cloud.

Academic Projects

Structure from motion(SfM) & NeRF [link] | *Python, Epipolar Geometry, Volume Rendering*
- Utilized chirality for valid 3D point triangulation and improved scene precision by adding more views with Perspective-n-Points (PnP) followed by Bundle Adjustment for optimal alignment and precision of 3D points.
- Implemented Neural Radiance Fields (NeRF) to synthesize novel views of scenes from a sparse set of input images, leveraging differentiable volume rendering for photorealistic image generation.

Deep Learning based Robotic Grasping of unknown objects. [link] | *PyTorch, OpenCV, MoveIt!*
- Developed a pipeline to optimally Grasp objects of variable shape, size, and orientation using vision capabilities.
- Applied VGG16 and ResNet50 architectures through Transfer Learning in PyTorch. Adapted this to a custom 3D-printed 5-DoF robotic arm with MoveIt and the KinectV2 depth camera.

Visual Slam and Object Recognition using Kinect v2 & ROS | *Python, ROS, Gazebo, YOLO*
- Implemented RTAB map in gazebo simulator and tested the same using Kinect V2.
- Employed the YOLO v3 framework for real-time object detection in tandem with map generation.

Reducing latency for Monocular Depth estimation [link] | *PyTorch, Transformers*
- Implemented efficient attention within the Skip Attention module to enhance the PixelFormer baseline model, resulting in a 1.24% improvement in RMSE performance.
- Achieved 3.07% decrease in inference time by optimizing FLOPS despite transitioning from 7x7 local attention to global attention.

Papers & Publications

- A. R. Dangle, **M. P. Deshmukh**, D. Boby and B. Calli, "Leveraging Dexterous Picking Skills for Complex Multi-Object Scenes" 2024 IEEE-RAS 23rd International Conference on Humanoid Robots (Humanoids), Nancy, France, 2024, pp. 250-257, doi: 10.1109/Humanoids58906.2024.10769789. [paper]

- M. Kulkarni, P. Junare, **M. Deshmukh** and P. P. Rege, "Visual SLAM Combined with Object Detection for Autonomous Indoor Navigation Using Kinect V2 and ROS," 2021 IEEE 6th International Conference on Computing, Communication and Automation (ICCCA), Arad, Romania, 2021, pp. 478-482, doi: 10.1109/ICCCA52192.2021.9666426. [paper]