

# MANDAR DESHMUKH

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## EDUCATION

**University of Colorado, Boulder** | M.S Computer Science (GPA: 3.8/4)

Boulder, USA

- **Graduation Date:** May 6, 2026 | Available to join immediately after graduation

**Pune Institute of Computer Technology** | B.E. Information Technology (GPA: 3.8/4)

Pune, India

## SKILLS

**Programming & Tools:** Python, C++, Bash, ROS2, Linux, Git, Docker, SSH, CUDA, TensorRT, NumPy, Pandas, MATLAB, Scikit-learn, Matplotlib

**ML & AI:** Deep Learning, Foundation Models, Reinforcement & Imitation Learning (PPO, SAC), Self-Supervised Learning (SimCLR, BYOL),

Parameter-Efficient Fine Tuning (LoRA, SoRA), Hyperparameter Optimization, Representation Learning, Gaussian Splatting

**Robotics & Autonomy:** Perception (Detection, Segmentation, Tracking), 3D Object Detection (YOLOv8, DeepSORT), Visual SLAM & State Estimation, Sensor Fusion (Camera, LiDAR, IMU), Motion & Trajectory Planning, Proprioceptive Modeling, Tactile Sensing, Autonomous Nav

**Frameworks & Simulation:** PyTorch, TensorFlow, JAX, OpenCV, Torchvision, RoboHive, MuJoCo, Isaac Sim, PyBullet, Open3D, HuggingFace Transformers, IMU & Radar Simulation, Sensor Noise Modeling

**MLOps & Infrastructure:** MLflow, Weights & Biases, Kubernetes, Cloud Deployment (AWS, GCP), Data Pipeline Optimization, Distributed Training & Evaluation Pipelines, Edge AI Deployment

## WORK EXPERIENCE

**Robotics SWE & ML Engineer, Human Interaction & Robotics (HIRO) Lab, CU Boulder**

May 2025 – Present

- Designed & implemented **robotics perception & learning systems** using vision, proprioceptive, & multimodal inputs for **high-DoF robotic platforms (14-DoF)**, enabling reliable policy execution across multiple task settings. Built **end-to-end data collection, logging, and evaluation pipelines** supporting training & validation of learning-based policies, improving experiment reproducibility & reducing iteration time by ~30%.
- Developed **ROS2-based integration layers** and custom robot models (**URDF/MJCF**), enabling rapid experimentation across different robot embodiments and configurations.
- Trained and evaluated **learning-based control policies** (imitation + RL) with emphasis on **robustness, real-time execution, and stable inference**, achieving consistent task success across repeated runs.

**ML Engineer, Big Data for Financial Applications, University of Colorado Boulder (Leeds School of Business)**

Aug 2025 – Present

- Engineered a **production-ready** transformer-based classification pipeline achieving **90.62%** document-level accuracy, using **RoBERTa** with sliding-window inference and weighted ensemble averaging to handle long documents and severe class imbalance (~88%).
- Designed a **two-stage hierarchical Longformer system** separating ESG categorization from activism detection, achieving **85–88% accuracy** while reducing model complexity. Built robust data preprocessing and leakage-prevention pipelines using Sentence-BERT clustering, stratified sampling, and tag-aware tokenization across 3,000+ highly similar documents, significantly improving generalization for deployment.

**Rajiv Gandhi Science and Technology Commission - Published results in the ICEEE Springer conference**

Pune, India

*Machine Learning, Computer Vision*

August 2023 – May 2024

- Designed and implemented a human sign language recognition system using **LSTM networks**, achieving a **97% accuracy rate** by optimizing temporal sequence modeling and improving gesture recognition.
- Modeled spatiotemporal intention recognition from gesture sequences and optimized for inference latency and domain generalization. **Processed and fine-tuned video datasets using TensorFlow**, improving model inference speed by **20%**.

**AptLogic Consultants**

Bangalore, India

*ML/Simulation Systems Intern*

June 2023 – November 2023

- Built large-scale data pipelines for ML training and evaluation, supporting controlled experiments and iterative model improvement.
- Developed internal tools for dataset generation, annotation workflows, and experiment tracking, improving reliability and reproducibility.

## PROJECTS

- **RL Locomotion Control:** Trained a Soft Actor-Critic (SAC) agent for continuous locomotion control on MuJoCo HalfCheetah-v5, achieving a mean reward of 7,648 with 85%+ success rate over 1M timesteps. Built an end-to-end RL experimentation pipeline with vectorized environments, hyperparameter tuning, and real-time tracking using Weights & Biases. Deployed the trained policy with sub-10ms inference latency
- **AutoBot: Autonomous Vehicle Simulation and Navigation Stack:** Building a fully functional Autonomous Stack using **LiDAR, IMU, Raspberry Pi, ROS2** to integrate perception, mapping, and control, with end-to-end latency under **100 ms**. Implemented **sensor fusion, SLAM, and motion planning**, achieving navigation accuracy within **±5 cm** and reducing collision rate by over **70%** compared to baseline methods.
- **Failure-Aware Multi-Object 3D Tracking System in ROS2**: Developed end-to-end perception pipeline for mobile robots using RGB-D sensors in Gazebo simulation. Implemented Kalman filter-based tracker with explicit failure detection and recovery for occlusions and sensor noise, achieving real-time performance (30 FPS) with <50ms latency across 3+ simultaneous objects.
- **Visual SLAM with Object-Aware Mapping:** Developed object-aware VSLAM by integrating ORB-SLAM3 and YOLOV8-seg for real-time semantic mapping and segmentation. Achieved **3–5 cm average localization error** and maintained **18 FPS** processing speed on KITTI and TUM datasets. Enhanced map utility by annotating **100% of static obstacles and 92% of dynamic objects** with semantic labels, improving autonomous navigation success rate in cluttered indoor/outdoor environments by ~27% over baseline SLAM.
- **3D Object Detection & Tracking for Avs:** Combined YOLOv8 + stereo vision to achieve 89.9% mAP on KITTI and 72.3% MOTA for multi-object tracking. Designed a real-time visualization and depth estimation dashboard. Integrated **synthetic LiDAR and RGB data generation** using NeRF-based scene reconstruction to enhance model robustness under unseen lighting and sensor noise conditions.
- **Time-Series Anomaly Detection for AI Simulations:** Built a forecasting model with LoRA/SoRA fine-tuning to detect anomalies in NVIDIA simulation logs. Deployed on AWS SageMaker with 95% precision