Ansh Bhansali

anshbhansali5@gmail.com | +1 (217) 402-1894 | anshbhansali.com | GitHub | LinkedIn

EDUCATION

University of Illinois Urbana-Champaign, IL, USA　　　　　　　　　　　　　　　Aug 2025 – Jul 2026
Master of Engineering in Autonomy and Robotics | GPA: 3.77/4.0
Coursework: Humanoids, Deep Learning, Computer Vision, Safe Autonomy, Control Systems

Sardar Patel Institute of Technology, Mumbai, India　　　　　　　　　　　　　　Dec 2021 – Jul 2025
Bachelor of Technology, Electronics and Telecommunication | GPA: 3.9/4.0

SKILLS

- **Languages:** Python, C++, MATLAB, Bash
- **Planning & Control:** ROS2, SLAM, MoveIt, Sensor Fusion, Motion & Path Planning, MPC, Control Barrier Functions
- **Learning & Perception:** VLMs, Transformers (CLIP, Whisper), RL, Computer Vision (SAM, YOLO), PyTorch, TensorFlow
- **Simulation & Tools:** Gazebo, MuJoCo, PyBullet, Isaac Sim, AI2-THOR, Git, Ubuntu, Docker, KiCad, Fusion 360

EXPERIENCE

Electronics Engineering Intern (Lead) - Dimension Six Technologies, Mumbai, IN　　　May 2024 – May 2025
Project: STM32-based E-Bike Conversion Kit

- Developed production-ready embedded firmware with battery optimization and regen. braking, achieving **40%** range increase.
- Designed and routed a 4-layer PCB in **KiCad** for a custom **ESC**, reducing real-time power losses by **15%** under peak load.
- Implemented IoT solution using **ESP32S3** with RFID sensor integration for remote monitoring and secure payments via MQTT.

Robotics Research Intern - Indian Institute of Technology, Bombay, Mumbai, IN　　　Jan 2024 – Jun 2024
Project: Autonomous Rugged Robot for Military Applications

- Developed **SLAM**-based autonomous robot, with path planning, achieving **95%** navigation accuracy in indoor environments.
- Improved localization by 20% through multi-sensor fusion (IMU, GPS, RGB-D cam) using EKF for state estimation.
- Integrated **YOLOv3** model for real-time human detection and adaptive gait controller for robust stair-climbing navigation.

PROJECTS

Embodied Vision-Language-Action (VLA) Kitchen Agent *(CLIP, Whisper, GPT-4V, AI2-THOR)* (GitHub)

- Built end-to-end VLA converting unseen **YouTube** cooking videos to robot commands, achieving **77-85%** accuracy.
- Trained **19M**-parameter Transformer, trained on 1.6k+ clips; generated novel Indian-cooking dataset.
- Attained **90%+** precision on key primitives, **60-70%** zero-shot transfer to Western cuisine, with **85-90%** success in AI2-THOR.

Pedestrian-Aware Autonomous Vehicle Safety System *(GEMe4, YOLOv11, LiDAR)* *(Demo)*

- Fused LiDAR clustering and RGB-D detection for real-time pedestrian tracking, deployed on **GEM e4** autonomous vehicle.
- Implemented **trajectory prediction** with Time-to-Collision estimation, enabling proactive speed adaptation.
- Achieved **90%** success rate in pedestrian scenarios using a state-machine safety controller with **Stanley control**.

Open-Vocabulary 6D Pose Estimation *(FoundationPose, SAM-3, Moondream2)* (Report)

- Developed **zero-shot** 6D tracking architecture with VLM-based **semantic inventory** and Gemini API query enrichment.
- Integrated **SAM-3** prompt segmentation with **Objaverse** mesh retrieval, achieving **76.5-100%** ADD-S AUC on YCBV dataset.
- Built RGB-D variant using **LangSAM** with **InstantMesh** and median-volume ensemble selection for mesh consistency.

Dynamic Object Handover System *(MuJoCo, MediaPipe, ROBOTIS AI Worker)* *(Demo)*

- Built a vision-based system with real-time dynamic hand tracking for adaptive **human-robot handover**.
- Implemented **Jacobian-based IK** with velocity limiting and command smoothing for stable object transport.
- Integrated **MediaPipe** gesture recognition enabling the robot to mirror hand movement and trigger release.

Humanoid Whole-Body Motion Planning *(RL, MPC, Unitree G1, MuJoCo)* *(Github)*

- Implemented motion planning stack using **ZMP** preview control, **A*** footstep planning, and **MPC** balance optimization
- Achieved **49%** lower energy use than PD control with MPC balance control, while remaining stable under **70-80N** perturbations.
- Integrated **RL**-based locomotion with Jacobian IK manipulation for coordinated walk-and-reach tasks, achieving **75%+** success.

RL Locomotion with Safety Layer *(PPO, Control Barrier Functions)* *(Github)*

- Trained a terrain-adaptive locomotion policy using **PPO** and integrated **CBF** as a real-time safety filter.
- Achieved zero-fall locomotion, with the CBF layer rejecting **99%** of unsafe actions proposed by the PPO policy.
- Maintained **90%** of the original PPO policy's traversal speed, demonstrating high efficiency with a verifiable safety guarantee

Terrain-Aware Locomotion Pipeline *(ROS2, Gazebo, MoveIt)* *(Github)*

- Developed a perception pipeline for a quadruped using a depth camera to generate an elevation map for terrain analysis.
- Integrated a terrain classifier with a footstep planner in **MoveIt**, successfully navigating **95%** of the tested complex terrains.
- Demonstrated a gait strategy that reduced fall rates by **50%** compared to a baseline blind-walking controller on uneven surfaces.