

# Ansh Bhansali

[anshbhansali5@gmail.com](mailto:anshbhansali5@gmail.com) | +1 (217) 402-1894 | [anshbhansali.com](http://anshbhansali.com) | [GitHub](#) | [LinkedIn](#)

## EDUCATION

<b>University of Illinois Urbana-Champaign</b> , IL, USA <i>Master of Engineering in Autonomy and Robotics</i>   GPA: 3.77/4.0 Coursework: Humanoids, Deep Learning, Computer Vision, Safe Autonomy, Control Systems	Aug 2025 – Jul 2026
<b>Sardar Patel Institute of Technology</b> , Mumbai, India <i>Bachelor of Technology, Electronics and Telecommunication</i>   GPA: 3.9/4.0	Dec 2021 – Jul 2025

## SKILLS

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

## EXPERIENCE

<b>Embedded Engineering Intern - Dimension Six Technologies</b> , Mumbai, IN <i>Project: STM32-based E-Bike Conversion Kit</i>	May 2024 – May 2025
---	---------------------

- Engineered production-ready firmware with battery management and regenerative braking, extending vehicle range by **40%**.
- Designed a 4-layer PCB in KiCad for a custom **ESC**, optimizing power stage layout to reduce losses by **15%** under peak load.
- Deployed IoT stack on **ESP32S3** with RFID authentication, enabling remote monitoring and contactless payments over MQTT.

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

- Built **SLAM**-based autonomous navigation stack with path planning, achieving **95%** accuracy in dynamic indoor environments.
- Fused IMU, GPS, and RGB-D camera data via **Extended Kalman Filter**, improving localization accuracy by **20%**.
- Deployed **YOLOv3** for real-time human detection and designed an adaptive gait controller for robust stair-climbing traversal.

## 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 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 **GEMe4** 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