Sunny Deshpande

sunnydeshpande9900@gmail.com | F-1 (UIUC), CPT eligible
Portfolio: sunnydeshpande.com | LinkedIn: linkedin.com/in/sunny-deshpande | GitHub: github.com/SunnyDeshpande

EDUCATION

University of Illinois Urbana-Champaign — Urbana-Champaign, USA
Master of Engineering in **Autonomy and Robotics** (**GPA: 3.75/4.00**) — Aug 2025 - Sep 2026
- Current Coursework: **Reinforcement Learning, Advanced Robotic Planning, Autonomous Vehicle Safe Autonomy**, **Humanoid Robotics**

Singapore University of Technology and Design — Singapore, Singapore
Bachelor of Engineering (Engineering Product Development), **Robotics Focus, Minor in Computer Science** — Sep 2021 - May 2025
- SUTD **Honours and Research Programme** (SHARP) with Global Distinguished **Scholarship**

TECHNICAL SKILLS

Perception & SLAM: 2D/3D Computer Vision, Visual Odometry, SLAM (GMapping, DROID-SLAM), 6D Pose Estimation, Object Detection & Tracking, Semantic/Instance Segmentation, Camera–LiDAR Calibration, Sensor Fusion (Kalman Filter), Depth/RGB-D Processing.
Vision ML: Deep Learning; PyTorch, TensorFlow; Vision Transformers, CLIP, VLM.
Sensors: LiDAR, Stereo, RGB-D, IMU, Ouster LiDAR, OAK-D.
Languages: Python, C++.
Robotics & Tools: ROS 2, OpenCV, rosbag, RViz, Linux, Git, CMake, Docker.
Acceleration & Deployment: CUDA, Jetson Nano/Orin.
Simulation & Data: Isaac Sim / Isaac Lab, Gazebo, MuJoCo, Virtual Test Drive (VTD).

RELEVANT RESEARCH & PUBLICATIONS

Evaluating Visual Odometry Methods for Autonomous Driving in Rain – **Published at CASE 2023** — May 2023 - Aug 2023
- Benchmarked classical and learning-based VO/SLAM across **Oxford RobotCar, 4Seasons, and internal Singapore rain dataset** using ATE.
- Proposed a **DROID-SLAM heuristic variant** with map priors to **improve long-horizon stereo localization** robustness **under rain**.

WORK EXPERIENCES

Hyundai Motor Group Innovation Centre Singapore — May 2024 - Sep 2024
Robotics Fleet Software Engineer Intern - Robotics Centre
- Overhauled **deployed** fleet communication pipeline for **logistics AMR fleet** using **REST and MQTT**, improving critical real-time reliability and latency.
- **Increased junction navigation speed by 40%** via redesigned motion planner and trajectory follower **using trajectory smoothing** and **pure pursuit-based controller**.
- Designed novel traffic path planner to **improve fleet routing of 200 AMRs** using congestion and time-of-arrival prediction, resulting in **10% increase in missions**.

Venti Technologies — Sep 2023 - Dec 2023
Autonomous Vehicle Simulation Engineer Intern - Planning & Control Team
- Built vehicle **dynamics-informed simulation pipelines** in Virtual Test Drive (VTD) to validate planning, control, and prediction algorithms.
- Developed **scenario scripts and agent behaviors** to stress-test MPC controllers, **expanding scenario coverage** involving various realistic pedestrian and pulk traffic.

Agency for Science, Technology and Research — May 2019 - Aug 2019
Robotics and Artificial Intelligence Research Intern - Perception Team
- Designed **end-to-end** CNN-based indoor navigation and obstacle-avoidance model **(10Hz frequency) using stereo RGB-D and robot-goal pose input**, deployed on **Pioneer P3-DX mobile robot** with **embedded Intense PC Pro Barebone** using with **95% success rate in obstacle course.**

SELECTED PROJECTS

AutoShield - Real-Time Pedestrian-Intent Prediction with Safety-Filtered Autonomous Driving — Oct 2025 - Dec 2025
- Developed **end-to-end ROS2**-based predictive autonomous driving control pipeline on **Polaris GEM e4 Autonomous Vehicle**, achieving **91% success rate** across diverse pedestrian scenarios.
- Implemented **LiDAR/RGB-D multi-sensor fusion** (0.8 distance, 0.7 direction) to power a TTC-driven decision state machine for risk-aware behavior planning.
- Integrated **YOLOv11** with **DBSCAN** clustering for pedestrian **behavior tracking** and **trajectory prediction**, enabling proactive motion planning using a **Stanley Controller** and PID-based velocity regulation, reducing emergency braking events.

Vision-Language-Action Model for Language-Guided Humanoid Loco-Manipulation with Navigation — Oct 2025 - Dec 2025
- Developed a **CLIP-based Vision-Language-Action (VLA) architecture** extending **HumanVLA**, achieving **62.1% success** on unseen tasks by **jointly aligning visual and language encoders** for improved cross-modal reasoning with instruction.
- Designed a **Teacher–Student distillation** pipeline using **Behavior Cloning** and **DAgger** to compress expert RL policies, enabling successful execution of 615 long-horizon rearrangement tasks in the **HITR simulation** environment within **Isaac Lab** using a **humanoid agent** with **reliable navigation**.

C.A.R.E. - Companion Autonomous Robotic Entity Humanoid Robot — Oct 2025 - Oct 2025
- Developed **full-stack** AI-powered embodied robotics pipeline integrating a **Gemini VLM API**-driven task planner with a **ROS2 Navigation2 backend** for semantic goal navigation on **Booster K1 Humanoid Robot**, synchronizing Snap AR Spectacles **Teleop** via WebSocket communication architecture with **sub-100ms latency**.

Lane-Tracking and Object Detection of Outdoor Scaled 4WD Race Car — Jan 2025 - Apr 2025
- Optimized **vision-based lane perception pipeline** on **NVIDIA Jetson Nano**, utilizing **adaptive thresholding** and **radial-scan** algorithms to handle **variable outdoor lighting**, with **45+ FPS inference** for **high-speed lane keeping** with lateral controller.