ANIRUDH RAGHAVAN

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EDUCATION

Purdue University, *West Lafayette, IN* – *MSE in Autonomy (GPA: 3.81 / 4)*   Aug 2024 – Expected May 2026
Relevant Coursework: Vehicular Cyber-Physical Systems, Embedded Systems, Autonomous Systems, Artificial Intelligence

Vellore Institute of Technology, *Chennai, India* – *B. Tech- Electronics and Communication Engineering (GPA: 8.11 / 10)*   2020 – 2024

SKILLS

- **Languages & Frameworks:** Python, C++, C, ROS2, OpenCV, YOLO, PyTorch, TensorFlow, MATLAB, NumPy, Pandas, Scikit-learn
- **AI/ML Specialties:** Object Detection, Semantic Segmentation, Video Object Segmentation, Model Fine-Tuning, CNNs, Transformers, Gesture Recognition, Research Paper Re-implementation
- **Technical Domains:** Computer Vision, Autonomous Perception, IoT, Embedded Systems, Real-Time Processing, Data Annotation, Sensor Fusion
- **Hardware & Tools:** NVIDIA Jetson Nano, STM32, ESP32, Arduino (UNO/Nano), Gazebo, RViz, Git, Linux (Ubuntu), Firebase

EXPERIENCE

Graduate Researcher (Independent) – *Purdue University,* West Lafayette, IN, USA   Aug 2025 – Dec 2025
- Architected a Python benchmarking framework to evaluate YOLOv8–v12 and Autoware YOLOX by converting Waymo Open Dataset 3D labels into standardized 2D YOLO bounding boxes.
- Developed a unified training and evaluation pipeline enabling fair comparison across perception models in autonomous driving scenarios.
- Achieved 0.65 mAP, outperforming the Autoware baseline by 20%, with 0.86 pedestrian recall in safety-critical conditions.

Internet of Things, Externship *(Remote)* – *SmartInternz*, Hyderabad, India | GitHub   May 2023 – Jul 2023
- Designed a cloud-connected smart parking system using ESP32 (Wokwi simulation), Node-RED, and Firebase with real-time state synchronization.
- Integrated ultrasonic sensors with validation logic for reliable occupancy detection in simulated environments.
- Reduced false availability reports by 85%, achieving 98% detection accuracy with sub-second update latency.

PUBLICATION

1. Abhishek Sebastian, R. Pragna, K. Vishal Vythianathan, Dasaraju Sohan Sai, U. Shiva Sri Hari Al, **R. Anirudh**, Apurv Choudhary; Design of rubble analyzer probe using ML for earthquake. *AIP Conf. Proc.* 2946 (1): 040003, Nov 2023. | Link

ACADEMIC PROJECTS

Weather-Invariant Object Detection | GitHub   **Python, YOLOv8, OpenCV, Data Augmentation**
- Designed a two-stage weather-adaptive object detection pipeline combining CNN-based weather classification with condition specific image preprocessing.
- Applied targeted preprocessing (dehazing, contrast adjustment, gamma correction) based on CNN weather classification.
- Reduced false negatives by 27%, achieving 0.931 mAP and 0.874 recall through adaptive preprocessing and model optimization.

Structured Slot Aggregation for Cross-Modal Video Object Segmentation | GitHub   **PyTorch, Transformers, SegFormer, RAFT**
- Designed a dual-stream RGB + optical-flow video object segmentation framework using Transformers and guided slot attention to maintain object-centric representations across frames.
- Implemented structured slot aggregation with a Feature Aggregation Transformer, enabling cross-modal fusion and reducing temporal drift under occlusion and fast motion.
- Reduced temporal mask drift to under 5% through a Guided Slot Attention, maintaining segmentation consistency across occlusions and rapid motion.

Exploring Object Detection and Semantic Segmentation on Road Scene Dataset | GitHub   **Python, YOLOv8, U-Net**
- Achieved 65% mAP@0.5 with YOLOv8 and 79% mean IoU with U-Net on the Waymo Open Dataset, demonstrating the trade-off between real-time object localization and pixel-level scene understanding.
- Conducted a controlled comparison by training YOLOv8 and U-Net on identically annotated urban road scenes, highlighting detection vs segmentation trade-offs.