

Surya Kiran Cherupally

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SUMMARY

Senior Perception Engineer with 6+ years delivering production multi-sensor fusion, 3D scene understanding, and real-time inference on NVIDIA Orin/Xavier. Architected falconeye — camera-LiDAR-4D radar state estimation and multi-object tracking stack from zero to production. 95% reduction in safety-critical false positives. Active research: BEV transformers, TensorRT deployment, DrivingGaussian neural reconstruction, Closed loop multi-agentic LLM systems. MS Robotics GPA 4.0/4.0;

TECHNICAL SKILLS

Languages: C++17, Python, CUDA

Perception & State Estimation: Multi-sensor fusion, multi-object tracking, camera/LiDAR/4D radar fusion, stereo depth, calibration, Bayesian filtering, EKF/UKF, GNN/Hungarian data association, BEVFormer, BEVFusion, 3D Gaussian splatting

Robotics & Planning: ROS/ROS2, Gazebo, SLAM, AMCL, Dijkstra, A*, Hybrid A*, Voronoi planning, VFH, PID control, UAV/UGV coordination

ML / AI: PyTorch, TensorFlow, OpenCV, YOLO, U-Net, MediaPipe, GAIL, DQN, PPO, GANs, StackGAN-v2, LangGraph, RAG, OpenAI-compatible LLM orchestration

Inference & Systems: TensorRT, FP16/INT8 quantization, layer fusion, NVIDIA Orin/Xavier, PCL, Eigen, Docker, Linux, Git, FastAPI, Neo4j, PostgreSQL, pgvector

PROFESSIONAL EXPERIENCE

Case New Holland (CNH), Scottsdale AZ — *Senior Perception Engineer — Autonomy & ADAS* Aug 2022 – Present

- Architected **falconeye**: production **C++ multi-object tracking & sensor fusion** stack — two-stage pipeline: **GNN non-Hungarian many-to-one** (LiDAR/radar/stereo) + **Hungarian** (camera) → **GNN cross-modal track fusion** in machine/equirectangular/LLA frames; reduced **false-positive** safety stops from **~20 to <1 per acre**.
- Built **GPU-accelerated 3D SurroundView** (bowl mesh: flat+torus+cylinder) with **multi-camera extrinsics calibration** (overlapping-board); POC in 2 weeks → production at **60 Hz GPU / 20 Hz CPU** with odometry-based articulation.
- Prototyped **BEVFormer perception backbone** as falconeye upgrade — unified **multi-camera + LiDAR BEV representation**; benchmarked on **nuScenes 3D detection** vs. late-fusion baselines;
- Deployed **TensorRT optimization pipeline** (FP16/INT8 quantization, layer fusion) on **NVIDIA Orin**; achieved **2–3× inference latency reduction** within operational accuracy thresholds.
- Researching **DrivingGaussian neural scene reconstruction** to replace bowl projection with **scene-adaptive 3D Gaussian splatting** from calibrated 8-camera rig; enables **novel view synthesis** and simulation data generation from field logs.
- Evaluated **3D/4D radar** across 6 vendors (Bosch, Arbe, Zendar, Lunewave); built **Safety Test Bench** for automated **closed-loop KPI evaluation** (200+ field scenarios, nightly regression) and LUMOS visualization tools for field triage.

Arizona State University, Tempe AZ — *Research Assistant* Dec 2021 – Aug 2022

- Thesis:** Multi-Robot Coordination in Unstructured Environments — designed and implemented full UGV-UAV coordination system for search and rescue; UGV handles **SLAM/navigation/detection**, UAV dispatched autonomously when UGV path is blocked; decentralized state-machine handoff across 6 mission states.
- Built **AERO** autonomous robot: **object detection + multi-object tracking** + U-Net segmentation (75% AP / 90% tracking / 92% seg.); **multi-sensor fusion** (LiDAR + ultrasonic + cameras); **Hybrid A* planner** (–25% compute).
- Engineered autonomous drone: **YOLO** object detection, **optical flow** + color tracking, MediaPipe face/pose/hand recognition, KNN gesture classifiers, PID stabilization, swarm trajectory planning UI with **3D A*** path validation.

ZentronLabs, Bangalore India — *Computer Vision Engineer* Jul 2019 – Jul 2021

- Invented **patent-filed lossless spherical-to-image projection** method for precise fruit color categorization and designed a **one-dimensional polynomial-regression** color model for simple classification tasks.
- Re-engineered **YOLOv4** for edge deployment, achieving approximately **40% mAP** at **100 FPS** on standard hardware.
- Built **multivariable-regression anomaly detector** for load cells with MSE 0.0241 and proposed **TELEA/Navier-Stokes** inpainting workflows for fruit specular-reflection removal.
- Created AutoML image-classification stack that reduced model fine-tuning time by 7x and built environment-agnostic automated test infrastructure for machine workflows and post-deployment certification.

OTHER PROJECTS

ResearchSquid - Agentic AI Research System (Open-source side project)

May 2026 - Present

- Built open-source closed-loop multi-agent research platform with FastAPI, LangGraph, Neo4j, PostgreSQL/pgvector, Docker sandboxes, Hindsight memory, and OpenAI-compatible LLMs.
- System decomposes research questions into subproblems, dispatches parallel Squid agents, uses graph-based RAG, executes sandboxed experiments, converts outputs into evidence-backed Findings, and updates hypothesis confidence through a closed-loop evidence pipeline.
- Designed production-style architecture with Director, Squids, Debate, Controller, convergence detection, per-agent/shared memory, server-sent events, sandbox authority, and cost/budget tracking.

Cursor Control Using Brain Waves Independent neural-interface demo

April 2022 - April 2022

- Built low-cost BCI prototype using NeuroSky MindWave Mobile 1 headset to decode attention, meditation, and eye-blink signals and map them into cursor actions.
- Demoed in a neural assistive interfaces presentation; presenting organization offered full PhD funding to continue neural-interface research.

Crowd-Aware Robot Navigation

January 2022 - May 2022

- Studied attention-based deep reinforcement learning for socially compliant navigation in dense crowds, including SARL/LM-SARL, human-human and human-robot interaction modeling, and self-attention pooling for future-relevant humans.

Local Path Planning for Self-Driving Cars

January 2022 - May 2022

- Studied real-time local path modification using cubic polynomial path representation, Voronoi-cell-based obstacle avoidance, continuous collision checking, and VFH fallback for complex self-driving environments.

Deep Playground Open-source side project

May 2021 - August 2021

- Designed graphical interface concept for building deep learning models with drag-and-drop layers, custom layers, graph-based dynamic path building, TensorFlow backend, one-click compilation, generated Python scripts, save/resume workflows, cloud export, and live training visualization.

Generative Adversarial Imitation Learning for Autonomous Driving

August 2021 - December 2021

- Implemented GAIL on OpenAI Gym CarRacing using DQN/PPO expert trajectories and discriminator-derived rewards to learn driving behavior without hand-crafted reward engineering.
- DQN expert reached maximum reward 800; PPO expert averaged 786 across 10 test races with maximum 909; GAIL agent averaged 616 with maximum 795.

EDUCATION

M.S. Robotics and Autonomous Systems — Arizona State University, Tempe AZ

GPA 4.0/4.0 · Defended thesis formally with 4/4 score; First to complete MS with thesis in 11 months · declined a fully funded PhD.

Thesis: Multi-Robot Coordination in Unstructured Environments

B.Tech Electronics and Communication Engineering — NIT Nagpur, India

Thesis: GANs for Semi-Supervised Image Classification (F1: 0.95)