

KartEEK Gandiboyina

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Summary

Robotics & Computer Vision Engineer with 4+ years of industry experience building production-grade perception, SLAM, and manipulation systems. Deep expertise in 3D Gaussian Splatting, 6-DoF pose estimation, real-time object detection, and ROS-based autonomy stacks. Proven track record: 1st place in the ENACT Challenge (CVPR 2026), 2 patents filed (USPTO & JPO), IROS 2026 publication, and industry collaborations with JAXA and Georgia Tech. MS in Autonomy & Robotics (GPA 3.89), UIUC.

Skills

Computer Vision & Perception: 3D Gaussian Splatting (3DGS), NeRF, SLAM, 6-DoF Pose Estimation, Object Detection (Detectron2, YOLOv7/v8), Point Cloud Processing, Optical Flow, Structure-from-Motion, SAM/SAM2, Visual Odometry
Robotics & Autonomy: ROS/ROS2, MPC, PID, Min-Snap Trajectory Planning, VIO (Basalt), Quadrotor Control, Robotic Manipulation, Bin Picking, AirSim, MuJoCo, MetaWorld, Gym AI
Machine Learning: PyTorch, JAX, CNNs, Transformers, VAEs, Diffusion Models, GNNs, World Models (DreamerV3), Actor-Critic RL, SAC, Imitation Learning (Dagger), LLMs, VLMs, VLAs, Foundational Models
Languages & Tools: Python, C++, Docker, Linux, Git, VOXL 2

Experience

Robotics Engineer | Rational CyPhy Inc Feb 2026 – Present

- Developing a UAV autonomy stack on VOXL 2 + Pixhawk for wildfire-suppression BVLOS operations, integrating PX4 flight control with onboard perception for reliable flight in GPS-denied, high-interference environments.
- Fused GPS, IMU, and Basalt VIO into PX4 EKF2 for robust state estimation; tuned failover logic to maintain continuous EKF operation under GPS dropout, ensuring stable flight in degraded conditions.
- Developing a synchronized aerial data collection pipeline on VOXL 2 + Pixhawk, capturing time-aligned camera and IMU streams for offline 3DGS reconstruction targeting high-fidelity scene mapping for wildfire-suppression mission planning.

Graduate Research Assistant | Prof. Sayan Mitra | Coordinated Science Laboratory at UIUC Sept 2025 – Jan 2026

- Trained a DreamerV3 World Model on Crazyflie FPV data to learn a compact latent space where, given the current frame and action, the model predicts the next latent state and future observations; used the learned world model for imagination-based policy training without direct environment interaction.
- Built a 6-DoF pose estimation pipeline using 3DGS-generated synthetic FPV datasets (10k frames) and a fine-tuned U-Net, achieving sub-centimeter positional accuracy in sim-to-real transfer.
- Developed an actor-critic policy (using PPO) within the latent world model for vision-based autonomous navigation, increasing successful waypoint completion from 70 % to 95 % in simulation trials
- Designed min-snap trajectory planners with velocity and acceleration limits using differential flatness, reducing planning time by 30 % and enabling agile quadrotor maneuvers in cluttered environments

R&D Robotics Engineer | Konica Minolta – Tokyo, Japan July 2021 – Aug 2024

- Engineered a structured-light point cloud sensing device achieving **0.99 IoU** on 1 cm² items at 0.05 m range under <10 Lux enabling bin picking of highly reflective industrial components.
- Built an auto-annotation pipeline (SAM, Detectron2, YOLOv7) that reduced manual labeling time by >80%, accelerating object detection model training cycles across multiple product lines.
- Developed a language-conditioned multi-task RL framework (SAC + Dagger) with Georgia Tech; improved zero-shot task success rates by **200%** and enabled rapid skill transfer via natural language goal specification.
- Collaborated with JAXA to design a vision-based 6-DoF grasping system for multi-limbed robots aboard the International Space Station, optimized for microgravity manipulation.
- Filed **2 patents** in computer vision and robotic grasping (USPTO & JPO).

Machine Learning Intern | Philips Innovation Campus – Bangalore, India April 2020 – July 2020

- Developed a 3D residual U-Net region-proposal network for pulmonary nodule detection on 888 CT scans (LUNA16); achieved a **FROC score of 0.914**, surpassing the baseline by 8%.

Projects

Autonomous Drone Racing | UIUC DroneRacer-MPC-Vision.git

- Implemented MPC & PID spline tracker for autonomous gate navigation; achieved a Tier-1 race record of **50.13 seconds**.
- Deployed NanoSAM with a keypoint detector for misaligned gate correction, reaching a positional prediction error of **0.05 m**.

Stack: Python, NeRF, AirSim, MPC, PID, Trajectory Planning, State-Space Estimation.

- VLM4Autonomy | UIUCVLM4Autonomy-.git
- Fused SAM2, optical flow, and VLMs for real-time object tracking and ego-vehicle motion estimation; integrated YOLOv8 and Structure-from-Motion for spatial grounding. Stack: Python, VLM, SAM2, YOLOv8, Visual Odometry, SpatialBot.
- Volatility-Aware Stock Prediction via Transformer-VAE-Flow | UIUCVAE-Stock-Predictor.git
- Built a Transformer-VAE with RealNVP normalizing flows conditioned on VIX for synthetic financial time-series generation; achieved **Wasserstein Distance of 0.0629**. Stack: PyTorch, VAE, RealNVP, Transformers.

Awards & Honors

- 1st Place, ENACT Embodied Cognition Challenge | CVPR 2026 FMEA WorkshopMay 2026
- Fine-tuned Qwen2.5-VL-7B with LoRA SFT on 7,672 samples; achieved **94.6% Task Accuracy** and **98.4% Pairwise Accuracy**, outperforming GPT-5 and Gemini 2.5 Pro zero-shot on the hidden test set. [GitHub]
 - Invited to give a **5-minute Contributed Talk** at the CVPR 2026 FMEA Workshop (June 2026).

Patents & Publications

- FalconTrack: Photorealistic Auto-Labeled Perception and Physics-Aware Vision-Based Aerial TrackingIROS 2026
- Developed a unified 3DGS-based simulator that automates 6-DoF pose and mask labeling (10k images in <20 min), enabling zero-shot sim-to-real aerial tracking with **100% success** on high-speed trajectories.
- Learning Data Generation Support Device, Movement Controller, and Article Acquisition SystemUS: 20250336175
- Co-invented an automated data generation framework to eliminate manual labeling bottlenecks for complex 3D pick-and-place robotics in bulk manufacturing.
- Component Posture Information Acquiring Device and Posture Determination MethodJPO: 2023-060687
- Invented a vision-based sensing system using ROI determination and feature extraction for accurate component posture estimation during robotic pick-and-place.

Education

- University of Illinois Urbana-Champaign | MS in Autonomy & Robotics | GPA: 3.89/4.0Aug 2024 – Dec 2025
- **Coursework:** Deep Learning for Graphs, Computer Vision, Safe Autonomy, Deep Generative Models
- Indian Institute of Technology Kharagpur | B.Tech in Electrical Engineering | GPA: 3.48/4.0Aug 2017 – May 2021
- **Coursework:** Deep Learning, Machine Learning, Embedded Systems, Control Systems