

Gokul Raju Govinda Raju

Machine Learning / Computer Vision Engineer
Robotics, Systems and Control MSc at ETH Zürich

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➡️ Residence Permit B (Switzerland) [Job Seeker Permit]

Education

ETH Zürich

MSc in Robotics, Systems and Control

Sep 2022 – Aug 2025

- **Coursework:** Machine Learning, Probabilistic AI, Computer Vision, 3D Vision, Planning & Decision Making for Autonomous Robots, Robot Dynamics, Dynamic Programming & Optimal Control, Algorithms & Fairness
- **Master Thesis:** State-Space Models for Efficient Reinforcement Learning in Quadrotors
- **Semester Thesis:** Pushing the Limits of Optical Flow Estimation for Event Cameras

Heriot-Watt University, Dubai

BEng in Mechanical Engineering (Hons.)

Sep 2018 – Aug 2021

- **Bachelor Thesis:** Fault Diagnosis of Rolling Element Bearings using Artificial Neural Networks
- **Watt Club Medal (2021):** Awarded to the student and achieving (**University Rank: 1/254**) in the Mechanical Engineering batch across all campuses

Skills

Programming: Python, C++, MATLAB

Frameworks & Tools: PyTorch, JAX, TensorFlow, Keras, NumPy, SciPy, scikit-learn, Matplotlib, Pandas, OpenCV, Git, SQL, Weights & Biases (Wandb), Docker, Kubernetes, Hugging Face, AWS, FastAPI, Flask

Domains: Computer Vision, Machine Learning, Reinforcement Learning, Sequence Modeling, Neuromorphic Vision, Diffusion Models, Natural Language Processing, Large Language Models

Languages: English (C2), Tamil (C2), Hindi (C1)

Experience

Machine Learning Engineer (Intern)

FPrime AI

Zürich

Apr 2025 – Present

- Fine-tuned diffusion models using **Low Rank Adaptation (LoRA)** for product photography
- Increased customer retention by **40%** by training a **RAG (Retrieval-Augmented Generation)** WhatsApp Chatbot to answer order queries, suggest complementary items, and trigger post-purchase engagements

Graduate Researcher

Robotics and Perception Group, University of Zürich

Zürich

Apr 2024 – Oct 2024

- **Master Thesis:** State-Space Models for Efficient Reinforcement Learning in Quadrotors [[GitHub](#) ↗]
- Proposed the first **SSM-based RL** framework for Autonomous Drone Racing for both state and vision based domains
- Developed a novel **PPO JAX RL framework** for Flightmare Simulator, resulting in SOTA performance - **10% faster lap times** and **50% faster inference times** compared to existing policies

Graduate Researcher

Robotics and Perception Group, University of Zürich

Zürich

Aug 2023 – Dec 2023

- **Semester Thesis:** Pushing the Limits of Optical Flow Estimation for Event Cameras [[GitHub](#) ↗]
- Pioneered the first **multi-event** optical flow framework for event-based vision, achieving a **8% reduction in EPE**
- **Accelerated inference times by 30%** when compared to existing baselines on DSEC and MVSEC benchmarks by optimizing the model architecture with a SSM-based encoder

Research Assistant

Heriot-Watt University

Dubai

Sep 2021 – Aug 2022

- Curated bearing-vibration datasets with over **1000 samples**, featuring varied fault sizes and RPM ranges
- Conducted ablations on spectrogram CNNs and achieved **97% classification accuracy** through hyper-parameter tuning
- Tutored **120** undergraduate students in CoppeliaSim and OnShape; delivered **6 labs** and **4 demos**

Publications

Perturbed State Space Feature Encoders for Optical Flow with Event Cameras <i>Gokul Raju Govinda Raju, Nikola Zubić, Marco Cannici, Davide Scaramuzza</i> IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW), Nashville, 2025	Jun 2025 [arXiv ]
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Projects

Spaceship Obstacle Avoidance and Trajectory Planning <i>Planning and Decision Making for Autonomous Robots Project</i>	Nov 2024 – Dec 2024 [GitHub ]
◦ Implemented a SCvx (Successive Convexification) planning and control algorithm for a 2-D spaceship to avoid static obstacles (planets) & dynamic obstacles (satellites) and to dock with the docking station	
Robust Soccer Ball Detection and Tracking (FIFA) <i>3D Vision Project</i>	Mar 2023 – Jun 2023 [GitHub ]
◦ Created an end-to-end pipeline to detect & track soccer balls in both sharp and blurred broadcast frames	
◦ Engineered a synthetic dataset with Google Research Football Simulator to enhance YOLOv8n object detection through transfer learning and improved recall by 717% and precision by 216%	
◦ Integrated the fine-tuned detection model with a state-of-the-art approach, Motion-from-Blur (MfB) to handle high-speed blurry motion, resulting in a 8% improvement in soccer ball detections	
◦ Combined multi-view detections with camera pose information to triangulate the position of the soccer ball (95.78% tracking accuracy at 0.75 IoU) and visualized the tracking results by generating 3D trajectories for coaching analytics	
Fault Diagnosis of Rolling Element Bearings using Artificial Neural Networks <i>Bachelor Thesis</i>	Sep 2020 – Apr 2021
◦ Engineered an ANN-based fault diagnosis system using MATLAB's Wavelet and Neural Network Toolboxes, achieving 100% fault classification accuracy in bearings	
◦ Evaluated the system's performance on unseen data, achieving 99.64% accuracy in fault magnitude estimation	
◦ Implemented a data augmentation strategy to address class imbalance, leading to a 20% improvement in minority class classification and enhanced model robustness	
ATLAS-D: Industrial Autonomous Robot Vacuum <i>Industrial Project</i>	Sep 2020 – Mar 2021
◦ Collaborated with EGA (Emirates Global Aluminum) to design a functional CAD Design for an industrial autonomous robot vacuum to clean substations	
◦ Designed a CAD model of the robot vacuum and an algorithm assisted by LiDAR Sensors and IR sensors on ROS, Gazebo, and RViz for mapping and navigation	
◦ Designed a 4-stage dust separation system (multi-cyclone, HEPA-grade washable filters, BLDC-driven impeller) targeting a >99% capture efficiency for fine dust particles	

Honors and Awards

UAE Golden Visa for Academic Excellence (2022-2032): Received the prestigious UAE Golden Visa for academic excellence
James Anderson Memorial Prize (2021): £5000 Monetary Prize awarded for exceptional Merit and Distinction in the Mechanical Engineering batch
Eric Gibb Prize (2020): Certificate and £100 Monetary Prize awarded to the student securing the highest total marks in the Mechanical Engineering batch
Deputy Principal's Award (2021, 2019): Awarded for securing straight A's in all modules in the year
Heriot-Watt Merit Scholarship (2018): AED 30,000 Scholarship and direct Year-2 undergraduate entry for exceptional high school results