

# 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 Artificial Intelligence, Computer Vision, 3D Vision, Planning & Decision Making for Autonomous Robots, Robot Dynamics, Dynamic Programming & Optimal Control
- **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 Intern

FPrime AI

Zürich

Apr 2025 – Present

- Fine-tuned diffusion models using **Low Rank Adaptation (LoRA)** for product photography
- Trained a retention-focused **RAG (Retrieval-Augmented Generation)** WhatsApp Chatbot that answers order related queries, suggests complementary items and triggers post-purchase customer 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 custom **PPO JAX implementation** to train the policies for the Flightmare Simulator
- Achieved SOTA performance – **8–10% faster lap times** and **50% faster inference times** in comparison to existing drone racing policies on the Flightmare Simulator by utilizing the hidden temporal context

### 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](#) ↗]
- Proposed the first **multi-event** learning based optical flow framework for **Event-based (Neuromorphic) vision**
- Achieved **SOTA performance (6% reduction in EPE)** on event-based datasets such as DSEC-Flow and MVSEC

### Research Assistant

*Heriot-Watt University*

Dubai

Sep 2021 – Aug 2022

- Curated bearing-vibration datasets with multiple fault sizes and RPM ranges
- Ran ablations on spectrogram CNNs for fault classification, tuned hyper-parameters; documented experiments and results
- Tutored **120** undergraduate students in CoppeliaSim and OnShape; delivered 6 labs and 4 demos

## Publications

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

<b>Spaceship Obstacle Avoidance and Trajectory Planning</b> <i>Planning and Decision Making for Autonomous Robots Project</i>	<i>Nov 2024 – Dec 2024</i> [GitHub  ]
<b>Robust Soccer Ball Detection and Tracking (FIFA)</b> <i>3D Vision Project</i>	<i>Mar 2023 – Jun 2023</i> [GitHub  ]

- Implemented a **SCvx (Successive Convexification)** planning and control algorithm for a 2-D spaceship to effectively avoid static obstacles (planets) & dynamic obstacles (satellites) and to dock with the docking station

<b>Fault Diagnosis of Rolling Element Bearings using Artificial Neural Networks</b> <i>Bachelor Thesis</i>	<i>Sep 2020 – Apr 2021</i>
<ul style="list-style-type: none"><li>◦ Developed a novel approach to diagnose and classify different faults in Rolling Element Bearings (REBs)</li><li>◦ Utilized a benchmarked vibration dataset to train a Discrete Wavelet Transform based Artificial Neural Network on MATLAB</li><li>◦ Optimized the neural network architecture to achieve a <b>classification accuracy of 100%</b> and an <b>accuracy of 99.64% in estimating the magnitude of faults</b> induced in the REBs</li></ul>	

<b>ATLAS-D: Industrial Autonomous Robot Vacuum</b> <i>Industrial Project</i>	<i>Sep 2020 – Mar 2021</i>
<ul style="list-style-type: none"><li>◦ Collaborated with EGA (Emirates Global Aluminum) to design a functional CAD Design for an industrial autonomous robot vacuum to clean substations</li><li>◦ Developed a CAD Design of the robot vacuum and implemented an algorithm assisted by LiDAR Sensors and IR sensors on ROS, Gazebo, and RViz for the robot to map an arbitrary environment and for navigation purposes</li><li>◦ Designed a 4-Stage Dust Separation System consisting of a multi-cyclone separator coupled with HEPA-grade washable filters and a custom 3D-printed impeller operated by a BLDC motor to maximize the cleaning efficiency</li></ul>	

## Honors and Awards

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