# Rakshith Ajetaravi

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## Education

**Indian Institute of Science (IISc)** — Bengaluru, India
*M.Tech in Robotics and Autonomous Systems (RBCCPS)* — *Present*

- **Current Performance:** 6.5 CGPA
- **Relevant Courses:** Applied Optimal Control and State Estimation (PG), Swarm Robotic System (PG), Generative and Agentic AI in Practice (PG), Reinforcement Learning (PG), Non-linear Systems and Control (PG), Sliding Mode Control and its Applications (PG), Motion Planning for Autonomous Systems (PG), Applied Linear and Non-Linear Control (PG), Machine Learning for Cyber-Physical Systems (PG), Foundations of Robotics (PG), Mathematical Techniques for Robotics Systems (PG), Design of Cyber-Physical Systems (PG).
- **Role: Teaching Assistant for "Dynamics of Linear System".**

**The National Institute of Engineering** — Mysuru, India
*Bachelor of Engineering in Mechanical Engineering* — *2022*

- **CGPA:** 8.75 / 10
- **Focus Areas:** Computational Fluid Dynamics, Robotics & Numerical Control, Control Engineering, Aircraft Propulsion.

**Gopalaswamy Shishuvihara PU College** — Mysuru, India
*Class 12 (PUC) - PCMB* — *Completed*

- **Percentage:** 81.67%

## Technical Skills

**Robotics & Simulation**: ROS2, Gazebo, RViz, NVIDIA ISAAC Sim, ArduPilot
**Programming**: Python, C++, C, MATLAB, Julia
**Data Science & ML**: PyTorch, TensorFlow, Keras, Gymnasium, Numpy, Pandas
**Engineering Design**: SolidWorks, Fusion 360, CATIA, Ansys, Qblade, Ultimaker Cura

## Academic & Personal Projects

**VidQuery: Agentic Multimodal Video RAG** | *LangGraph, Qdrant, Llama-3.2-Vision*

Developing an **agentic RAG system** for video lectures that synthesizes multimodal data (video frames, audio, slide text) using local open-source models like **Llama-3.2-Vision** and **Whisper**.

Engineered the **Vector Database pipeline** using **Qdrant** to store and index multimodal embeddings (**CLIP** for vision, Nomic for text), optimizing retrieval for **complex temporal queries** (e.g., "what was said after this diagram?").

Implemented precise synchronization between visual embeddings and audio transcripts to enable **high-accuracy semantic search** across lecture content.

**Machine Learning Research Applications** | *Python, Scikit-Learn*

Utilized **Supervised Learning** techniques to classify earthquake-prone buildings based on structural data. Conducted hypothesis-driven research and exploratory data analysis of Australian suburbs using **Unsupervised Learning** methods.

**Innovative Bi-Copter Drone Design & Control**

Designed an innovative **bi-copter drone**, addressing mechanical complexities unique to dual-rotor aerial systems. Implemented a **custom control strategy** to ensure **optimal flight stability** and precise rotor synchronization.

**Decentralized leader-follower formation control using RL**

Implemented a decentralized leader-follower formation control using Reinforcement Learning, specifically utilizing two Double Deep Q-Network (DDQN) algorithms: one for reaching the formation and the other for maintaining it.

**Vision-Based UAV Perception**

Engineered a **vision-based pipeline** for autonomous UAVs to **estimate velocity** and detect obstacles in real-time. Integrated perception modules with **flight control loops** to enable autonomous navigation in dynamic environments.

**Fixed Wing VTOL Development**

Currently developing a **Fixed-Wing Vertical Take-Off and Landing (VTOL)** aircraft, advancing the prototype to **Technology Readiness Level (TRL) 2**.

**4-DOF Manipulator (BE Project)** | *SolidWorks, Embedded C*

Designed and fabricated a **4 Degrees of Freedom (DOF)** robotic manipulator, handling the **mechanical design** and actuation system.

## Professional Experience & Leadership

**Paraha Ventures** — Mysuru, India
*Co-Founder* — *2022 – 2023*

Co-founded and actively operated a **freelance digital marketing startup** for 1.5 years following graduation.

Delivered **end-to-end digital solutions** for local businesses, managing projects across Website Development, **SEO**, and Social Media Marketing.

Gained hands-on **entrepreneurial experience** in client relations, project management, and technical implementation before transitioning to higher studies.

**Agnie Racing (Student Motorsport Club)**
*Captain* — *2020 – 2021*

Led the team in two national-level events: **Go-kart Design Challenge 2020** and **Formula Green Concept Challenge 2021**.

Oversaw the **design and fabrication** of electric karts, managing team logistics and engineering timelines.

**Make A Difference (MAD)**
*Transition Readiness Tutor* — *2 Years*

Served as a tutor focusing on **transition readiness**, providing mentorship and educational support to youth.

## Hobbies & Interests

**Sports**: Basketball, Cricket, Chess, Frisbee
**Creative**: Filmmaking, Writing Stories
**Reading**: Fiction, Non-Fiction, History