Nithish Ravikkumar

UG (II Year II Semester)
B.Tech. (Engineering Physics)
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Indian Institute of Technology Roorkee

VERIFIED

Area of Interest

Computer Vision, Machine Learning, Deep Learning, Robotics

Education

Year	Degree/Examination	Institution/Board	CGPA/ Percentage
2024	B.Tech. 2nd Year	Indian Institute of Technology, Roorkee	6.732
2023	Intermediate (Class XII)	Vishwa Bharati Public School, Noida	95.00 %
2021	Matriculate (Class X)	Vishwa Bharati Public School, Noida	99.00 %

Internships

AI Developer Intern | Aviostack Pvt. Ltd. May 2025 - July 2025

- Prototyping and deploying a audio-modal AI agent as a Call Center assistant for micro-warehouse E-commerce Deliveries.
- Implemented pipeline with Speech-To-Text (STT), Text-To-Speech (TTS), dynamic conversational flow and real-time database querying.
- Optimized for cost-effective deployment using open-source tools and GPU-efficient Cloud deployment (GCP).

Projects

Optical-Flow Estimation and Collision Prevention on AMD Kria FPGA | IIT Roorkee May 2025 - July 2025

- Designed a collision prevention system for autonomous vehicles using PWC-Net-based dense optical flow and YOLOv9T-based obstacle detection.
- Developed a robust Time-To-Collision (TTC) estimator using divergence and flow magnitudebased heuristics, further enhanced with an Echo State Network (ESN) for temporal prediction.
- Applied quantization and pruning; compiled and optimized using Vitis AI for deployment on Kria DPU, to ensure low inference latency and real-time predictions.

Market Capitalization Forecasting with Deep Learning | IIT Roorkee April 2025

- Developed deep learning model pipeline to predict market capitalization growth rate of Indian companies using historical financial indicators.
- Benchmarked Decision Tree, ElasticNet, and LSTM models, with the LSTM variant achieving 96.4% accuracy on forward prediction and RMSE of 0.127 on validation.
- Provided investment risk profiling insights based on sectoral volatility and capital flow trends.

Control system for Mecanum Wheeled Robot | Team Robocon IITR February 2024 - May 2024

- Developed kinematics based control system for omnidirectional Mecanumwheel robots via Microcontroller (Arduino), supporting real-time motion commands like strafing, rotation, and sinusoidal trajectories via Bluetooth control.
- Implemented modular control architecture with independent scripts for IMU data collection and encoder-based feedback, enabling PID-controlled closed-loop motion.

Multi-Robot Path Planning and Coordination | IIT Roorkee March 2024 - May 2024

- Explored advanced strategies for efficient coordination and navigation of multiple robots in shared environments.
- Combined existing techniques (CBS, SLAM, CL-CBS) and a custom algorithm (Agglomerative hierarchial Clustering) for conflict prevention.

Text extraction, NLP and Image Processing for Warehouse Automation System | Team Robocon IITR August 2024 - October 2024

- Developed pipeline for automatic sortation of packages in a warehouse with NLP techniques and Image Segmentation models.
- Performed image preprocessing, and used OCR, entity recognision with fine-tuned Small Language Models (SLMs) - NuExtract, Gemma-2B for text extraction from printed receipts.

Optimisation of Terrain Mapping and Navigation Algorithms on Rough Terrain | Team Robocon IITR June 2024 - January 2025

- Enhanced an existing Informed RRT*-based path planning algorithm by introducing a custom terrain-aware cost function tailored for navigation over irregular surfaces.
- Tuned the cost function parameters using simulation feedback to penalize high-gradient zones, unstable slopes, and collision-prone paths, improving both safety and efficiency.

Integrated PCB for Multi-Functional Rover | Team Robocon IITR June 2024 - January 2025

- Designed and integrated custom PCBs for power management, chassis motor control, and robotic arm actuation to support a multi-functional autonomous rover system.
- Developed schematics and multilayer board layouts using Altium Designer, ensuring signal integrity, and expandability for subsystem interfacing.

Remote Communication System for Real time Video transmission | Team Robocon IITR December 2024 - January 2025

- Engineered a wireless video transmission pipeline between an autonomous rover and ground control station using a low-latency IP camera interface and socket-based communication.
- Implemented adaptive bitrate control, packet-loss recovery, and buffer optimization to ensure resilient video feed under fluctuating network conditions in outdoor test scenario.

Real-Time Object Detection Framework | Team Robocon IITR December 2024 - January 2025

- Developed a real-time object detection system for autonomous rover navigation by implementing arrow sign recognition to guide directional movement.
- Curated and annotated a custom hand-scanned dataset of directional markers and trained a lightweight CNN using transfer learning for deployment on resource-constrained hardware.
- Achieved high detection accuracy (>95%) with low inference latency, enabling robust arrow-following even under varying lighting and motion blur conditions.

Open Source RAG application | IIT Roorkee October 2024 - November 2024

- Developed a static RAG system for document ingestion and querying using Pathway for real-time dataflow processing and Gemini API for LLM-based responses.
- Built a Streamlit based frontend for uploading documents, generating embeddings, and responding to natural language queries with relevant excerpts.

Drone formation control using Pymavlink | ArIES IITR March 2024 - May 2024

- Demonstrated multi-agent formation control using the PyMAVLink library to interface with MAVLink-compatible drones (e.g., PX4, ArduPilot).
- Controlled a swarm of drones to achieve and maintain a desired geometric formation (e.g., line, V-shape, square) through coordinated flight commands, using low-level MAVLink messaging.

Line following Drone simulation using Simulink | ArIES IITR July 2024 - August 2024

- Design, simulation, and real-world deployment of a complete autonomous line-following system for the Parrot Mambo minidrone, as part of the MathWorks Minidrone Competition.
- Development of robust algorithms for color-based path tracking, trajectory planning, and feedback control, all implemented within the MATLAB/Simulink environment.

3D Chest Cavity Reconstruction from X-ray Scan for TB Diagnosis | Self Project March 2025 - June 2025

- Developed a deep learning pipeline to reconstruct 3D thoracic structures from 2D X-ray scans using LightTBNet and 3D Slicer for clinical visualization.
- Enhanced detection accuracy by 18% over baseline U-Net through multi-view depth estimation.
- Integrated model into an diagnostic platform for low-cost TB screening alternative to MRI.

Awards / Scholarships / Academic Achievements

- Secured **International Rank 10** in International Rover Challenge (**IRC**) 2025
- Secured **International Rank 5** in International Space Drone Challenge (**ISDC**) 2025
- **Runner-up** in Syntax Error X 2023, a **National level hackathon**
- Secured rank **AIR 3282** in JEE-Advanced and **AIR 1992** in JEE Mains 2023.
- Secured **AIR 178** in **KVPY** 2021 and **NTSE** Scholar
- Department Sports Meet (DSM) 2025 - **1st** Position in Powerlifting

Skills

Computer languages	Python, C++, SQL, R
Software Packages	PyTorch, Tensorflow, LangGraph, Torchvision, Sklearn, Keras, OpenCV

Positions of Responsibility & Extra Curriculars

Member - Electronics and Control | Team Robocon IITR April 2024 - March 2025

- Built and deployed DL models for **Real-time object detection** to enable autonomous navigation in robotic systems.
- Engineered **Communication protocols** and integrated control systems for Mars Rover, representing IITR at **IRC'2025.**
- Optimized terrain mapping and path planning using **ML-based altitude-aware cost function** in **ISDC'25** .
- Participated in **Flipkart GRID** Robotics Challenge, designing an end-to-end **Warehouse automation** pipeline involving vision-based package detection and intelligent routing.

Member - Robotics and Drone | ArIES IITR March 2024 - February 2025

- Designed, simulated and tested UAV prototypes with a focus on implementing and tuning **flight control algorithms.**
- Participated in and organized drone contests, such as **MathWorks Minidrone Challenge** hosted by **IISc** Bangalore.
- Collaborated with **80+** members across Electronics and ML verticals to build robotics solutions and foster innovation.

Volunteer, Editorial Cell | NSS IIT Roorkee October 2023 - April 2024

- Contributed to enhancing engagement and humanitarian outreach by curating impactful editorial content for awareness campaigns and social initiatives.
- Managed the NSS social media presence, increasing visibility through strategic content creation, design, and public relations efforts.

References

Dr. P. Arumugam
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