

Rathna Sabhapaty Badha

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SSH Portfolio: `ssh ssh.badha.is-a.dev -p 2222`

Research Profile

Computational researcher specializing in reproducible AI, programmatic LLM evaluation, and benchmark integrity. Experienced in auditing benchmark integrity, investigating dataset contamination, and developing open-science research tools. Passionate about trustworthiness in empirical research and engineering transparent, reproducible analysis pipelines that bridge the gap between machine learning and verifiable scientific validation.

Education

Integrated Bachelor & Master of Technology in Software Engineering

Sep 2020 – Jun 2025

Vellore Institute of Technology, India

GPA: 9.06/10

- **Master's Thesis Focus:** Executed a two-phase research thesis spanning LLM evaluation and practical engineering: developed automated program repair pipelines evaluated on the SWE-bench Lite dataset, and architected multilingual geospatial LLM routing systems.

Research Experience

Research Contributor, OpenVideoWM

Jul 2026 – Present

Cohere Labs Open Science Research Group

- Collaborating within a core four-member research group to design the architecture and curate datasets for a truly open video world model, establishing transparent open-science methodologies from day one.
- Co-engineering reproducible experimentation and analysis pipelines to ensure rigorous, verifiable model evaluation across diverse video datasets.
- Contributing to a global open-research ecosystem to build scalable, publicly accessible AI and open-source codebases.

Research Intern (MITACS Sponsored)

Jun 2024 – Aug 2024

York University, Toronto, Canada

- Architected an LLM-driven automated program repair pipeline, rigorously evaluating model performance via API against established software engineering benchmarks.
- Investigated benchmark contamination and data leakage in LLM training corpora, directly addressing trustworthiness and evaluation reliability in AI research.
- Expanded the Defects database, curating high-quality, reproducible evaluation datasets for empirical software engineering studies.

Professional Experience

AI Research Consultant

Sep 2025 – Present

Sky Serve Pvt. Ltd., Bangalore, India

- Engineered computer vision pipelines for remote sensing, developing high-precision convoy and ship detection models that secured a Top-3 national finish at the AIGC India Finals.
- Developed a novel Shape-Aware OBB to HBB conversion algorithm for satellite ship localization (resulting in a published preprint), improving mean IoU from 0.4929 to 0.5609 on the ShipRSImageNet benchmark.
- Architecting an automated road health assessment algorithm, optimizing intensive geospatial vectorization workflows (GeoPandas) on high-performance clusters to ensure scalable data processing.

Research and Development Project Intern

Nov 2024 – May 2025

National Remote Sensing Center (ISRO), Hyderabad, India

- Engineered a public-facing multilingual geospatial chatbot, integrating programmatic LLM APIs to democratize access to complex data for non-technical users.
- Designed an LLM router for querying disparate geospatial data sources, ensuring transparent and verifiable data retrieval metrics.
- Developed empirical systems for road identification and solar-energy analysis, establishing baseline accuracy thresholds for public-sector deployment.

- Developed and empirically evaluated GPT-powered documentation QA systems, focusing on mitigating model hallucinations and quantifying response accuracy.
- Built software-specification query tools utilizing open-source LLMs, establishing baseline metrics for automated reasoning and logic tasks.
- Implemented rigorous automation and testing for real-time request-response workflows.

Head of Software

Sep 2020 – Dec 2023

Students for the Exploration and Development of Space (SEDS), VIT Chapter

- Developed evaluation frameworks for autonomous drone navigation, conducting rigorous empirical testing on aerial object-detection algorithms over multiple kilometer-scale test flights.
- Engineered path-planning and obstacle-avoidance algorithms, establishing baseline reliability metrics across simulated test workflows for AUVSI SUAS competitions.
- Spearheaded hardware-software integration, emphasizing fail-safe mechanisms and transparent logging.

Selected Publications & Preprints

- **Shape-Aware Oriented Bounding Box (OBB) to Horizontal Bounding Box (HBB) Conversion** (*Under Review*). Superellipse-based localization method with public code and reproducible data. Benchmarked on ShipRSImageNet (**10,043** samples). Mean IoU: **0.5609** vs **0.4929** for OuterHBB.
- **Deep Learning Approach Towards Green IIOT**. In *Smart Computing Techniques in Industrial IoT*, Studies in Computational Intelligence, vol. 1172, Springer, 2025.
- **Drones, the Technology Involved, and Their Widespread Use**. *International Journal of Research in Humanities, Arts and Science*, 2021.

Academic Service & Mentorship

- **Student Co-Supervisor, ISRO (2024–2025)**: Directed and mentored undergraduate contributors across multiple geospatial engineering tasks, overseeing codebase integrity, open documentation practices, and code-review cycles.
- **Technical Lead & Mentor, SEDS VIT (2020–2023)**: Onboarded and trained junior developers in computer vision pipelines and path-planning algorithms, fostering a culture of rigorous testing and peer review.

Open-Source & Research Projects

- **LLM-Driven Automated Program Repair** – Formulated transformer-based workflows executing multi-round LLM interactions via API to generate and statistically validate code patches on SWE-bench Lite.
- **LLaMA Fine-tuning & Bias Evaluation** – Fine-tuned LLaMA models on culturally diverse corpora, employing statistical analysis to quantify cross-lingual performance disparities and benchmark reliability.
- **Homelab Infrastructure Automation** – Engineered a reproducible, containerized research environment utilizing Proxmox LXC, Docker Compose, Portainer, and Tailscale for isolated, interference-free model testing.
- **Open-Source Intelligence Framework** – Built a scalable scraping and analysis pipeline for malicious content detection, focusing on automated data sanitization and building verifiable datasets.

Technical Skills

Programming & Data: Python (GeoPandas, Data Management), Java, Rust

AI/ML & Meta-Science: API-based LLM Evaluation, Benchmark Integrity, Reproducible Pipelines, Data Curation

Frameworks/Libraries: PyTorch, TensorFlow, HuggingFace Transformers, LangChain

Infrastructure/Tools: Git, Docker Compose, Proxmox, Portainer, High-Performance Compute Environments

Awards

- **MITACS Globalink Research Internship, Summer 2024** – Fully funded 12-week AI/ML research internship.
- **Second Place, Bengaluru Hackathon** – Developed a custom, cost-effective storage infrastructure solution.
- **Second Place, Vinhack VIT Hackathon** – Engineered a blockchain-based carbon emission monitoring framework.