Sona Rosa Babloo

Trivandrum, Kerala, India
Email: sonarosababloo@gmail.com
Phone: +91 9895588391
LinkedIn: linkedin.com/in/sona-rosa-babloo-725453227
GitHub: github.com/sonarosa
Website: portfolio-sonarosa.vercel.app

Profile Summary

Machine Learning Engineer and enthusiast with strong research and engineering experience in computer vision, object detection, and AI-driven automation systems. Experienced in designing custom loss functions for small object detection, building robust detection pipelines under adverse conditions, and developing LLM-based RAG systems for real-world financial workflows. Skilled in end-to-end ML workflows including experimentation, evaluation, and deployment.

Technical Skills

Programming: Python, Java, C++, C, R, MATLAB, Rust
ML Frameworks: PyTorch, TensorFlow, Keras, Scikit-Learn
Deep Learning: CNNs, YOLO (v3–v8), BERT, Transformers
LLMs & Agentic AI: GPT-based Models, LLaMA, LangChain, RAG Pipelines, Vector Databases (FAISS, Chroma)
Model Engineering: Loss Function Design, Scale & Class Imbalance Handling, Ablation Studies
MLOps & Tools: Git, IBM Cloud, Azure, GStreamer, NNStreamer
Deployment: Embedded AI, Edge Deployment, Real-time Inference
Web/Software: Node.js, React.js, HTML, CSS, Flask, FastAPI, Streamlit

Experience

Project Engineer Jun 2025 – Present
IIT Tirupati

- Designed scale- and class-aware loss functions for UAV-based small object detection.
- Conducted extensive ablation studies comparing custom losses with existing methods.
- Investigating cross-domain generalization of loss-function design.

ML Intern Nov 2024 – Apr 2025
Geojit Financial Services Ltd.

- Built a RAG-based annual report summarisation and recommendation system using fine-tuned financial-domain LLMs.
- Worked on document processing automation using OCR (Azure Document Intelligence) and NLP; deployed via Azure App Services.

Research Intern Jun 2023 – Aug 2023
IIT Tirupati

- Researched YOLO-based small object detection pipelines.
- Studied detection robustness under adverse weather conditions.

Intern Jun 2023 – Jul 2023
KPIT Technologies Ltd., Kochi

- Developed embedded driver-monitoring systems using TensorFlow models.
- Built edge AI pipelines using GStreamer and NNStreamer for low-latency inference.

Achievements

- **First Prize – Hackify'24:** YOLOv7-based automated medical assistant (Mar Athanasius College of Engineering).

- **Road Safety Track Winner – HackAthena'24:** Real-time driving learner assistance system (Jyothi Engineering College, Cheruthuruthy).
- **FIN-A-THON Finalist:** Top 15 teams out of 600 at IIT Delhi (South Indian Bank).
- **Mentor – Tink-Her-Hack 3:** Mentored 10 teams at TinkerSpace Kochi.
- **Top-16 Finish – 4th Anti-UAV Challenge (CVPR 2025)**: Secured **16th position out of 156 global teams** in a competitive CVPR 2025 workshop challenge on multi-UAV detection and tracking from thermal infrared videos; addressed dense multi-target tracking (up to 30 UAVs), background clutter, occlusions, and complex motion patterns.
- **10th International Conference on Computer Vision & Image Processing :**Attended and presented as co-author for paper **"Multi-UAV Tracking through Complementary Trackers Fusion in IR Videos"** CVIP 2025 Conference at IIT Ropar.

Projects

- **Scale-Aware UAV Small Object Detection**
  Designed custom loss functions to address scale and class imbalance in UAV imagery.
  Skills: YOLO (v5–v8), Loss Design, UAV Vision, PyTorch
- **Small Object Detection in Adverse Weather**
  Developed YOLOv8-based detection pipelines for fog, rain, and low-light conditions.
  Skills: Model Training, CV Pipelines, Synthetic Data
- **RAG-Based Financial Workflow Automation**
  Built RAG pipelines integrating vector databases and LLMs.
  Skills: RAG, LangChain, Financial NLP
- **Document Processing Automation**
  Automated structured data extraction from physical forms using OCR and NLP; deployed on Azure App Services.
  Skills: OCR, Azure AI, NLP, Cloud Deployment
- **Medical Named Entity Recognition and Relation Extraction**
  Academic Project (6th Semester)
  Fine-tuned BERT models to extract biomedical entities and relations.
  Skills: Transformers, NLP, Fine-Tuning

Publications

Multi-UAV Tracking through Complementary Trackers Fusion in IR Videos.
Accepted at CVIP 2025, IIT Ropar.

Education

Cochin University of Science and Technology (CUSAT), Kochi 2021 – Present
M.Sc. (5-Year Integrated) in Computer Science – AI & Data Science
CGPA: 9.03 / 10

Saraswathi Vidyalaya 2018 – 2020
Higher Secondary (Class XII)
Score: 92.2%

References

Dr. Madhu S. Nair — Professor & Head, CUSAT — msn@cusat.ac.in
Mr. Jithin K. S — Senior Technical Lead, KPIT — jithins2@kpit.com
Dr. Rama Krishna Sai Gorthi — Professor & Dean of Academic Affairs, IIT Tirupati — rkg@iittp.ac.in