Vinayak Paroonon Kooloth

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Professional Summary

Innovative AI & Robotics master's student experienced in LLMs, agentic workflows, and explainable AI. Skilled in building production-grade MVPs using Python, RAG pipelines, SHAP, and vector databases. Passionate about autonomous systems and applied machine learning in real-world and research settings.

Education

- **Hof University of Applied Sciences** — Germany
  M.Sc. in Artificial Intelligence & Robotics — *Mar 2024 – Oct 2026 (Expected)*
- **CMS College of Engineering and Technology** — India
  B.Eng. in Computer Science and Engineering — *Aug 2019 – Jul 2023*

Experience

- **Fricke und Mallah Microwave Technology** — Peine, Germany
  Working Student – AI Agent Development — *Jun 2025 – Present*
  - **LLM-Based Agent Automation**: Designed and deployed AI agents using OpenAI GPT-4 and LangChain for automating multilingual content creation, lead generation, and marketing strategy planning. Integrated with company CRM tools and email pipelines.
  - **Vector Database Integration**: Implemented FAISS-based memory for context-aware email generation and follow-ups. Reduced manual email drafting by over 60%.
  - **Website NLP Optimization**: Analyzed and enhanced multilingual website content (microwaveheating.net, hhft.de) using NLP techniques for SEO and user personalization, increasing site traffic by 25%.
  - **Analytics Dashboarding**: Created performance dashboards using Power BI and Python scripts to monitor agent performance, email engagement, and lead conversion metrics.
- **Technische Universität Chemnitz** — Chemnitz, Germany
  Student Assistant – Surgical Lamp Simulation (autoPre) — *March 2025 – Present*
  - **ROS2-Based Simulation Development**: Built a robotic simulation environment using ROS2 and Gazebo for autonomous control of surgical lamp movement based on operator gestures and target zones.
  - **Human-Robot Interaction (HRI)**: Implemented motor actuation logic and behavior trees for simulating realistic lamp response in surgical settings. Focused on safety, precision, and latency.
  - **Collaborative Research**: Supported EU-funded autoPre project with Prof. Maik Berger, contributing to modular robotic assembly systems and HRI interface design.
  - **Testing & Documentation**: Developed test scripts and technical documentation for simulation modules, ensuring reproducibility and transferability to real-world robotic arms.
- **Hof University of Applied Sciences** — Germany
  Student Researcher – Applied Machine Learning — *Oct 2024 – Mar 2025*
  - **Phishing Email Classifier**: Trained a DistilBERT transformer model for email classification, achieving over 92% accuracy on custom English-language phishing datasets.
  - **Explainability via SHAP**: Integrated SHAP explainability into the model pipeline to visualize token-level phishing indicators. Deployed interpretability through FastAPI frontend.
  - **Experiment Tracking**: Utilized MLflow and Git versioning for reproducible experiments and tracked model performance across 15+ variations.
  - **Research Contribution**: Produced a technical report and visualization dashboard, contributing to the department's AI interpretability research initiative.

Projects

- **LLM-Powered Email Classification with Explainability**: **Focus**: Secure NLP pipeline for phishing detection | **Tech**: DistilBERT, SHAP, FastAPI, Docker | **Contributions**: Built end-to-end XAI pipeline with real-time inference; used SHAP for token-level interpretation | **Impact**: 92% F1 on in-house dataset
- **Generative QA with RAG and GPT-4**: **Goal**: Fact-grounded question answering using generative models | **Stack**: GPT-4, FAISS, LangChain, Python | **Design**: RAG with document retrievers and citation mechanism | **Outcome**: Deployed prototype used in compliance/legal AI demos
- **Autonomous Research Agent for Scientific Literature Discovery**: **Objective**: Automate academic research via generative agents | **Tech**: LangChain, GPT-4, Pinecone, Streamlit | **System**: Recursive search + summarization + citation validation | **Use Case**: Thesis literature automation
- **UWB-Based Localization Simulator for Robots**: **Use Case**: Indoor autonomous navigation | **Built With**: Python, simulated UWB RSSI model, heatmap visualization | **Results**: Achieved ¡1m positional accuracy in constrained environments | **Relevance**: Tied to robotics AI projects at TU Chemnitz
- **Multimodal Emotion Recognition for Human-Robot Interaction**: **Goal**: Real-time emotion detection for social robots | **Architecture**: CNN + wav2vec2 + BiLSTM | **Dataset**: RAVDESS, AffectNet | **Performance**: 87.2% F1-score | **AI Use**: Improved human-awareness in robotics simulations
- **ML Monitoring Dashboards with Auto-Retraining Trigger**: **Function**: Live tracking of ML KPIs and drift detection | **Tools**: Power BI, AWS Lambda, Scikit-learn | **Feature**: Custom triggers to retrain stale models based on performance decay

Technical Skills

- **Programming Languages**: Python, C++, SQL, Bash, Java (basic)
  Machine Learning & AI: Transformers (Hugging Face), SHAP, LangChain, OpenAI APIs, RAG Pipelines, Scikit-learn, CNNs, BiLSTM, wav2vec2
  Generative AI: GPT-4, LLaMA (prompt design), FAISS, Pinecone, LangChain, Retrieval-Augmented Generation (RAG)
  Software Development: FastAPI, Flask (basic), Docker, Git, REST APIs, Unit Testing, Clean Code Principles
  MLOps / DevOps: MLflow, GitHub Actions (basic), AWS Lambda, Power BI, Model Monitoring, CI/CD pipelines
  Robotics & Simulation: ROS2, SLAM (intro), UWB Localization, Gazebo (simulated), Behavior Trees (basic)
  Databases & Vectors: PostgreSQL, SQLite, FAISS, Pinecone
  Tools & IDEs: Jupyter, GitHub, LaTeX, Postman, VS Code, Streamlit

Languages

- **English**: C1 – Professional proficiency
- **German**: B1 – Conversational (improving)

Interests

- Tech Blogging, Reading Science Fiction, Hiking and Outdoor Adventures, Puzzles and Problem Solving