Akhila Pingali

+91-8008986698 | akhiping2@gmail.com | www.linkedin.com/in/akhila-pingali-93aa08206 | https://github.com/akhiping

EDUCATION

Vellore Institute of Technology, Vellore- B.Tech *2021 - 2025*

Major: Electronics and Communications Engineering *CGPA:8.46*

WORK EXPERIENCE

Intern at Machani Robotics *January 2025 - July2025*

- Designed and implemented the **Proactive Interaction Pipeline** for RIA, a humanoid robot, including flowcharts, modular ROS 2 codebase, and system-level documentation.
- Engineered multi-modal **real-time perception** by integrating facial recognition (InsightFace), emotion detection (FER), and voice DOA (ReSpeaker) into ROS 2 nodes. Utilized ROS4HRI package for seamless integration.
- Built and containerized a **multi-service architecture** using Docker, orchestrating vision, speech, TTS, and servo control for intelligent humanoid behavior.
- Developed and validated advanced **human-robot engagement logic**, including gaze detection, emotion-aware responses, and proactive greeting strategies.

Intern at Infinos Tech-IIIT-Hyd *August 2023 – September 2023*

IoT Smart Environment

- **Developed** a device to **maintain contrasting temperature environments** using NodeMCU and ESP32, enhancing IoT applications for diverse climate control.
- **Spearheaded product enhancements** by designing and optimizing circuits, leading to a 20% decrease in system errors and **better user interaction**.

PROJECT EXPERIENCE

Research Paper- MEMS capacitive pressure sensor (published on Research Gate) -
https://www.researchgate.net/publication/385362217_MEMS_capacitive_pressure_sensor_analysis_theoretical_modeling_simulation_and_performance_comparison_of_the_effect_of_a_conical_notch

Review Paper- Enhancing Antenna Performance

- A Comprehensive Review of Metamaterial Utilization

Proactive Humanoid Development

- **Designed** and **implemented** the workflow and base logic for **enabling proactive features** in a humanoid robot. Worked on local Ollama model(Mistral) for security and reduced latency.

- Integrated **advanced decision-making algorithms** to enhance adaptability and responsiveness in **real-world scenarios**. Converted a modular Bazel-based AI animation and TTS pipeline (Puppeteer) into a ROS 2-compliant package using native pub-sub architecture for real-time humanoid interaction.

Integrated Face and Voice DOA Servo Control System

- Developed a **real-time servo control system** integrating computer vision and audio processing. Utilized **MediaPipe** and Intel RealSense for **face tracking** and **servo alignment**, with ReSpeaker mic array for Voice Activity Detection (VAD) and Direction of Arrival (DOA) tracking. Implemented seamless **fallback mechanisms** for switching between face and voice tracking.

Entropy – AI-Powered Conversational Framework

- Developed a modular AI system leveraging **vector databases (Pinecone), RAG**, and **reranking** to enhance LLM **response relevance** and **context handling**.
- Designed an extensible **plug-and-play architecture** for dynamic user interactions and model flexibility.
- Implemented client-side **embedding generation** and scalable **retrieval pipelines** with performance-focused design.
- Focused on **applied agentic AI principles** to explore intelligent, **non-linear knowledge workflows**.

SKILLS

- **Systems & Platform Experience systems** - Linux Ubuntu, Windows
- **Frameworks:** ROS, ROS2, Docker, TF2, ROS1-ROS2 bridge, rqt_graph, gRPC API
- **Programming Languages:** Python, C++
- **Computer Vision** - Face detection and tracking, coordinate mapping, bounding box optimization and Image Processing (Realsense d435i depth camera, See3_cam_24cug, Respeaker mic array v2.0), Gaze Estimation, Depth Mapping
- **AI/ML** - Data-driven video analysis, Emotion Recognition, Zero-shot Image Classification, Feature Extraction, TTS/STT (Whisper, DIA), RAG, rerankers, embedding pipelines
- **Version control** - Git, GitHub
- **Audio Processing** - Speech-to-Text (WhisperX, faster-whisper), TTS (Cereproc, Coqui, DIA), Direction of Arrival, Voice Activity Detection
- **Hardware & sensors** - (ESP, Arduino), SEE3 cam, Arducam Thermal Camera, Inte Realsense d435i, Respeaker Mic Array v2.0, STS3032 Feetech servo, Nvidia GPU's
- **Package & Environment Management** - pip, conda, virtual environments
- **Libraries/Frameworks** - OpenCV, Mediapipe, PyEVM, SciPy, NumPy, Scikit-learn, Pytorch, Tensorflow, Matplotlib, Sounddevice
- **Agentic AI & LLMs** – OpenAI GPT, Ollama, ChatGPT API, Context-aware response generation, Modular AI Pipeline Integration
- **Vector Databases & LLM Integration** – Pinecone, LangChain, FAISS, Client-side Embedding Generation, Context-aware Retrieval

CERTIFICATIONS and OTHER INTERESTS

- Google Data Analytics
- Design Thinking - For Innovators (Coursera)
- Skill badges in AI/ML on Google Cloud
- IBM Web Development
- Western Violin Trinity Certified (Grade 2), College Volleyball team player
- Delft University of Technology:Introduction to Aerospace Structures and Materials
- Educational Leadership-NPTEL
- Active member of The Planetary Society