Harsha Vardhan Rapeti

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Technical Skills

Languages C++, Python, Rust, Bash, TypeScript, MySQL, Ruby, Faust
Frameworks FastAPI, Ruby on Rails, JUCE, LangChain, React, TensorFlow
Developer Tools Git, CMake, Make, Visual Studio, GDB, Docker, Valgrind, Perf, Postman

Professional Experience

Junior C++ Developer   **Aug 2024 – May 2025**
Pitch Innovations

- Developed **VST and standalone audio plugins** for Windows and macOS using **C++ and JUCE framework**, deployed to **1,000+ active users**.
- Architected **cross-platform build systems** using CMake, reducing **compilation time by 40%** and enabling concurrent Windows/Mac/Linux builds.
- Integrated **Faust DSP language** into build pipeline, accelerating audio effect **development cycle by 60%** through automated code generation.
- Implemented **8+ professional-grade audio effects** including delays, compressors, distortions, Schroeder reverb, granular synthesis, and convolution reverb with **optimized real-time performance**.

Projects

Warmer - Node-Based Audio Synthesizer repo   **Feb 2024 – Jun 2024**
Open-source audio synthesis platform with 25+ unique nodes and real-time graph processing

- Engineered **lock-free multi-threaded audio processing engine** using topological sorting algorithms, supporting **graphs with 50+ nodes at 48kHz sample rate**
- Implemented **15+ DSP algorithms** including FFT-based spectral processing, IIR/FIR digital filters, and non-linear waveshapers.
- Designed efficient **XML-based serialization system** for graph state persistence.
- Technologies: C++17, CMake, Make, Mingw-w64, JUCE, GDB, Valgrind, Git

tusk.ai - Intelligent Web Page Data Extraction repo   **Aug 2025**
Browser extension leveraging RAG pipeline for context-aware web scraping

- Built **agentic RAG pipeline** with context-aware query processing
- Integrated **local Ollama LLM support**, enabling offline operation and **reducing API costs by 100%** for privacy-conscious users
- Developed responsive **React/TypeScript UI** with Vite build system, achieving **sub-200ms interaction latency**
- Technologies: TypeScript, React, Vite, LangChain, Ollama, Firefox Extension API

SynthBite16 - 16-bit Computer Architecture repo   **Nov 2023 – Jan 2024**
Fully functional 16-bit computer design with custom instruction set architecture

- Designed **complete 16-bit computer architecture** with 38 instructions, 2 addressing modes, and hardware register stack in Logisim
- Optimized instruction format using 4-nibble encoding scheme, achieving **95% opcode utilization efficiency**
- Implemented **Harvard architecture** with separate 8KB instruction and data memory spaces
- Created **custom assembly language and assembler in C++**, supporting symbolic addressing
- Technologies: Logisim, C++, Assembly Language Design, Computer Architecture

Education

BIT Mesra (Birla Institute of Technology)   **Oct 2022 – Present**
Bachelor of Technology in Artificial Intelligence and Machine Learning
CGPA: 7.58/10.0

Presentations and Talks

ADC India 2025: Spatial Audio Localization Techniques   **Conference Presentation**
Presented at Audio Developer Conference (ADCx) India Watch

- Presented to audience of **100+ audio developers, engineers, and industry professionals**