Ram Harikrishnan

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Summary

Systems-focused Software Engineer with 4+ years of experience in embedded systems, C/C++ programming, and hardware-software integration. Currently pursuing Masters in Computer Engineering at Arizona State University with expertise in Linux/Unix development, microcontroller programming, and PC/CPU architecture. Proven track record in debugging complex systems, building low-level firmware for ARM-based platforms, and developing scalable applications across embedded and cloud environments.

Education

Arizona State University Tempe, AZ
Master of Science in Computer Engineering (Computer Systems) *Expected: December 2025*

- GPA: 3.3/4.0
- Relevant Coursework: Operating Systems, Computer Architecture, Distributed Systems, Data Processing at Scale, Statistical Machine Learning

PRIST University Thanjavur, India
Bachelor of Technology in Electronics & Communication Engineering *March 2020*

- CGPA: 7.2/10

Technical Skills

Systems & Embedded: C/C++, PC/CPU architecture, embedded systems, ARM Cortex-M microcontrollers, RTOS concepts, hardware-software integration, firmware development, interrupt-driven programming
Operating Systems: Linux/Unix (Ubuntu, CentOS), macOS, Windows, shell scripting (Bash, PowerShell)
Languages: Python, Java, JavaScript, TypeScript, SQL, Perl, Dart
Software Engineering: Object-oriented design, debugging, defect tracking, root cause analysis, testing, version control (Git, GitHub, Perforce)
Databases: PostgreSQL, MySQL, MongoDB, Oracle, MS SQL, Firebase, Redis
Cloud & DevOps: AWS (EC2, S3), Azure, Docker, Kubernetes, Jenkins, GitHub Actions, CI/CD pipelines, Terraform
Frameworks & Tools: FastAPI, Django, Spring Boot, Node.js, React, Vue, Angular, Electron.js
Security: OAuth2, JWT, SSL/TLS, WebSockets, MQTT
Testing & Debugging: Root cause analysis, performance profiling, defect tracking, JTAG debuggers, Cypress, Jest, Mocha, logging frameworks
Markup & Documentation: HTML, XML, XSL, UML, technical documentation, functional specifications

Experience

Full Stack Developer — Arizona Water Project May 2024 – Present
Arizona State University *Tempe, AZ*

- Developed and deployed statewide FastAPI/React system on AWS (EC2, S3) with 50,000+ user interactions
- Built Arizona WaterBot, a multilingual RAG chatbot using LangChain, OpenAI, and Neo4j with auto-content ingestion
- Performed extensive debugging and root cause analysis using structured methodologies to improve system reliability
- Conducted defect tracking and resolution using systematic debugging methodologies and logging frameworks
- Created Python and Bash automation scripts to streamline data processing, deployment workflows, and API validation
- Optimized PostgreSQL queries and backend logic to reduce latency and stabilize performance under peak load
- Implemented CI/CD pipelines using GitHub Actions, improving release quality and deployment consistency
- Authored technical documentation including functional specifications, API documentation, and UML diagrams

Full Stack Developer May 2022 – October 2023
PIT Solutions Pvt. Ltd. *Trivandrum, India*

- Engineered Python (Django) microservices for large-scale AI and data processing workflows
- Led migration from legacy .NET monolith to microservices architecture using React and Spring Boot
- Built automation scripts (Python, Bash, PowerShell) to streamline deployment and improve development velocity
- Performed CPU/memory profiling and structured debugging to identify bottlenecks and resolve performance issues
- Designed secure REST APIs with OAuth2.0/JWT authentication connecting Oracle and MS SQL databases
- Automated CI/CD pipelines using Jenkins for legacy and modern systems; developed test suites using Cypress and Jest
- Maintained defect tracking systems and performed systematic debugging using structured methodologies
- Created functional and technical documentation including UML diagrams and system architecture specifications

Software Engineer & Co-founder December 2020 – April 2022
MakerLabs Edutech Pvt. Ltd. *Kochi, India*

- Co-founded and architected IoT-enabled STEM learning platform with C/C++ firmware and Python backend infrastructure
- Designed and developed ARM Cortex-M based smart educational toys integrating sensors, actuators, and wireless communication modules
- Implemented hardware-software integration layer for ARM-based systems, bridging low-level firmware with high-level application logic
- Developed embedded firmware for Arduino and ESP32 microcontrollers using C/C++, implementing interrupt-driven programming and peripheral drivers (UART, SPI, I2C)
- Built real-time communication protocols (MQTT/WebSockets) enabling seamless embedded device-to-cloud connectivity
- Designed PC-to-microcontroller communication interfaces via serial protocols for hardware debugging and control
- Created automated testing framework and debugging tools for embedded firmware validation using JTAG and serial monitors

Projects

Graph Processing at Scale using Neo4j, Kubernetes, and Kafka

- Built large-scale graph data processing pipeline using Neo4j, Terraform, AWS, Docker, Kubernetes, and Kafka
- Processed NYC Yellow Cab Trip dataset, transforming raw records into structured graph nodes and relationships
- Implemented PageRank and BFS algorithms using Neo4j Graph Data Science to analyze node importance and connectivity
- Deployed distributed pipeline using Kubernetes (Minikube, Helm) to improve scalability and fault tolerance
- Integrated Kafka with Neo4j via Kafka Connect for real-time streaming and data ingestion
- Optimized performance through query tuning, memory configuration, and indexing strategies
- Applied debugging methodologies and performance profiling to identify and resolve bottlenecks

Embedded Systems Programming & IoT Device Integration

- Developed C/C++ firmware for ARM Cortex-M and AVR microcontrollers for IoT sensor networks and robotics applications
- Implemented interrupt-driven programming and low-level peripheral drivers (UART, SPI, I2C) for sensor integration
- Applied systematic debugging methodologies using JTAG debuggers and serial monitors for root cause analysis
- Optimized firmware for memory-constrained environments using profiling and code size reduction techniques
- Created technical specifications and UML sequence diagrams documenting firmware architecture and communication protocols
- Integrated defect tracking workflows using Git and issue management systems for embedded software development
- Designed PC/CPU-to-microcontroller communication interfaces enabling real-time data exchange and control

AI-Generated Image Classification Using CNNs

- Developed deep learning model to classify AI-generated and real images using ResNet50v2 and EfficientNetV2, leveraging advanced convolutional neural networks (CNNs) for robust classification
- Preprocessed datasets (CFAKE & ArtiFact) by resizing, normalizing, and applying data augmentation techniques such as rotation, scaling, and flipping to improve generalization and mitigate data imbalance
- Performed hyperparameter tuning, optimizing learning rate, batch size, dropout rate, and weight decay to enhance model accuracy and prevent overfitting
- Evaluated model performance using key metrics including AUC, accuracy, precision, recall, and F1-score, selecting the best-performing model for deployment
- Implemented transfer learning on the ArtiFact dataset, fine-tuning the pre-trained model to assess generalization capabilities in real-world applications

Achievements

1st Place — Meta AI / AMD / PyTorch Synthetic Data Hackathon 2025

- Built novel multi-stage synthetic data pipeline for complex relational reasoning tasks using Python and PyTorch
- Implemented Guided Reinforcement Policy Optimization (GRPO) with custom JSON rewards for logical accuracy
- Fine-tuned Llama 3, Qwen 3, and Phi-4 models using LoRA, creating separate Q/A model pairs
- Identified and mitigated major LLM reasoning flaw (alphabetical sorting bias), improving logical consistency

Open Source Contributions — Meta PyTorch OpenEnv 2025

- Developed wildfire simulation environment enabling reinforcement learning research and agent training
- Collaborated with Meta/PyTorch teams to enhance simulation capabilities and documentation
- Wrote comprehensive technical documentation and unit tests, improving adoption and development workflows

Additional Information

Work Authorization: Eligible for CPT/OPT (F-1 visa status)
Availability: Available for Spring/Summer 2026 or Summer/Fall 2026 co-op terms
Location Preference: Open to Austin, TX; Boxborough, MA; Fort Collins, CO; Longmont, CO; Fishkill, NY; Rochester, NY