Aaron Clarke

EMBEDDED SYSTEMS & EDGE AI ENGINEER | INDEPENDENT CONSULTANT

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PROFESSIONAL PROFILE

Embedded systems engineer and independent consultant with 30+ years of experience in C/C++, embedded Linux, firmware, DSP, hardware/software integration and systems validation. Recent work focuses on on-device AI, CPU/GPU/NPU inference, model conversion and quantization, and integrated speech and language services on resource-constrained ARM platforms. Combines low-level debugging, performance measurement and software integration with clear technical documentation. Experience spans aerospace avionics, industrial systems, consumer products and emerging AI hardware.

CORE TECHNICAL CAPABILITIES

Embedded AI: MediaTek Genio; Neuron NPU; ONNX Runtime; TensorFlow Lite / LiteRT; CPU/GPU/NPU inference; post-training quantization; model compilation and operator adaptation; latency/accuracy benchmarking; on-device language models; speech-to-text and text-to-speech.

Embedded software: C, C++, Python, Go, assembly, shell; Embedded Linux; Yocto/OpenEmbedded, BitBake, PetaLinux; Linux drivers, U-Boot and board bring-up; FreeRTOS and VxWorks; Docker; ALSA and PipeWire.

Systems & engineering: ARM SoCs, DSP/fixed-point arithmetic, numerical algorithms, USB/HID, Ethernet/TCP/IP, device-driver debugging, power management, hardware diagnostics, test automation, validation and design reviews.

PROFESSIONAL EXPERIENCE

Aaron Clarke Consulting — Independent Embedded Systems Consultant | July 2007 – Present

Provide embedded software, firmware, Linux platform and systems integration services to engineering clients across multiple industries. Selected engagements and capabilities:

Embedded Linux & Edge AI Engineering — Confidential Client | 2025–Present

- Developed and evaluated AI workloads on MediaTek Genio 520 SoCs across CPU, GPU and Neuron NPU, including model conversion, quantization, compilation, operator compatibility and output validation.
- Adapted unsupported computer-vision operators for NPU execution; benchmarked matched inputs to compare model outputs, inference latency and energy consumption across execution back ends.
- Built repeatable workflows to quantize and compile small language models for embedded accelerators; developed a containerized, on-device language-model service with streaming and API-compatible interfaces.
- Evaluated speech-recognition accuracy using word-error-rate (WER) tooling and microphone-matched test sets; integrated speech recognition and streaming TTS with heterogeneous CPU/NPU execution.
- Created Yocto/OpenEmbedded recipes and BitBake layers for GUI and speech components; supported BSP migration, reproducible builds and integration of containerized services.
- Debugged board-level power management, charging and battery behavior, along with camera/video and audio failures, using source-level analysis, diagnostic instrumentation and controlled tests.
- Documented reproducible verification procedures, benchmark methods and open-source software/model license considerations for engineering and field-test teams.

Embedded IoT & Firmware Engineering — Confidential Client | 2026–Present

- Developed embedded C firmware for STM32WLE5-based, battery-powered IoT devices, using shared application code across multiple PCB revisions and hardware configurations.
- Developed and reviewed LoRaWAN communications, including OTAA, Class B/C modes, event acknowledgments and retry/queue behavior; used ChirpStack for firmware integration testing.
- Integrated NAU7802 load-cell acquisition with TAL220 sensors; developed tare, threshold-event and flash-persistence functions, plus RTC/GPIO wake and low-power operating logic.
- Developed and debugged Pervasive Displays e-paper interfaces, image transfer and repair, CRC/RLE processing, and board-level diagnostics; maintained reproducible builds and test documentation.

Avionics Firmware Engineering — Confidential Aerospace Client | July 2020 – December 2025

- Developed firmware to acquire and transmit flight-computer telemetry, including pressure sensors, temperature measurements and flight-termination interfaces.
- Developed Python-based data-acquisition and test software to verify flight-computer sensor interfaces and support formal hardware qualification for spaceflight.
- Supported flight-computer development from prototypes through hardware qualification and integration.

Other Consulting Projects — Selected Work | 2007–Present

- Ported U-Boot to multiple ARM embedded Linux platforms and optimized system boot time.
- Diagnosed Ethernet PHY, kernel-driver, and board bring-up issues.
- Developed embedded Linux build systems and device drivers.
- Implemented and debugged USB host/device stacks, HID firmware, Bluetooth and other wireless interfaces, embedded networking, and microcontroller code for commercial products and prototypes.

Fisher-Price, Inc. — Project Engineer | November 2004 – July 2007

- Led ARM7 firmware integration for a consumer product combining video, audio, Flash content and a multithreaded RTOS; resolved cross-component issues before production.
- Developed USB HID firmware and diagnostic test tools for resource-constrained microcontrollers; optimized interrupt latency, code size and analog-input processing.

ATTO Technology — Systems Engineer | August 2002 – November 2004

- Implemented an iSCSI target in C, ported it to a multithreaded embedded processor and developed independent protocol and interoperability test utilities.
- Performed code and design reviews, interoperability testing, and Ethernet diagnostics.
- Resolved storage-network protocol and performance issues.

Sierra Research — Engineer | June 2001 – August 2002

- Developed C/C++ networking software and VxWorks device drivers for embedded PowerPC systems.
- Tested real-time timing and serial/Ethernet communications.

Amherst Systems — Engineer | December 1997 – January 1999; summer 1999

- Developed StrongARM interface firmware, flash-programming utilities, UNIX UDP multicast software and embedded hardware diagnostics.

VoCAL Technologies — DSP Engineer / Team Lead | February 1996 – June 1997

- Designed Toshiba fixed-point VLIW DSP instruction-set extensions for real-time echo cancellation and Viterbi decoding; built a C simulator to design and verify the extensions before hardware. Used in commercial 33.6 kbps fax machines.

Dynamics Research Corp. — Programmer | 1994–1996

- Developed real-time data-acquisition and FFT-based vibration-analysis software.
- Co-inventor of U.S. Patent 5,805,464 covering computerized balancing technology.

EDUCATION

B.S., Electrical Engineering — University at Buffalo, 2000

B.S., Mathematics (Applied Mathematics) — University at Buffalo, 1995

A.S., Engineering Science — Erie Community College, 1990