Christopher **Paine**

Senior Embedded Software Engineer

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Profile

Highly social engineer with a strong academic background, experience across several industries and demonstrable capability to work both independently and as part of a team. Looking for a role that pushes my technical boundaries, exposes me to new platforms and cross-functional work, and helps me grow into a more capable and versatile embedded systems engineer.

Programming `C, Python, make, github, docker, C++, Cmake, meson`

Key Skills Cortex-M, FreeRTOS, Board Bring Up, Low-Level Drivers, Signal Processing, Test Infrastructure/Automation

Experience

Pod Point

Senior Embedded Software Engineer — *Jan '23 - March '25*

Demonstrated extensive technical ability and excellent interpersonal skills in a highly-skilled team developing Smart EV-Chargers. Undertook several important roles as the team moved from maintaining maintaining legacy products into a full platform redesign and subsequent launch to market.

- Migrated Eclipse based project to command-line build system for enhanced automation.
- In close collaboration with hardware, developed a DC current detection algorithm with effective aliasing suppression for HF noise.
- Played an active and vocal role in the architecture of safety-critical MCU subsystem for the new platform. Leveraging and further developing my expertise in FreeRTOS.
- Implemented a modular signal processing pipeline for fault detection/monitoring alongside delivering many core components for the MCU subsystem.
- Built upon existing debug skills, expanding further into hardware issues and gaining experience debugging in an embedded linux context.
- Led the embedded systems contribution to product compliance. Undertook complicated cross-discipline investigations and subsequently implemented algorithms to exceed stringent regulations.
- Coordinated the design, implementation and deployment of automated system testing infrastructure:
  - Developed a pytest based test suite capable of executing the same tests in both a hardware and software context.
  - Integrated the tests into github workflows which included self-hosted runner deployments.
  - Facilitated the remote development of hardware tests, providing invaluable resource to a hybrid team.

Sportable

Senior Embedded Software Engineer — *Nov '19 - Oct '22*

Worked in a small team to develop a wireless 3D tracking technology for the realtime collection of sports data. Joined the company at an early stage of development, oversaw the succesful release of the product to market and acheived promotion to senior level.

- Worked with a complicated embedded stack that widened the scope of my coding ability. The stack our team maintained is comprised of 4 applications:
  - Server Side application to offload data from the network over USB and aggregate, process and publish data streams for cloud connections.
  - FreeRTOS application on the wireless device to manage the device state and collect sensor data.
  - Bare-metal application optimised to control the radio IC and manage connection to the TDMA network.
  - Python based integration, production and unit testing framework - which I took a lead role in design and implementation of.
- Gained experience in a fast-paced and dynamic start-up environment. Improving my ability to write flexible code to handle rapidly changing and evolving specifications.
- Trained and supervised the junior engineers, whilst also leading the development of coding practices that create a more approachable stack for new starters.
- Developed the skills necessary to work with wireless networks. Putting these into practice by designing and building tools that aided debugging of wireless devices.

Meridian Audio Limited

Embedded and DSP Engineer — *Aug '17 - Nov '19*

Starting at Meridian as a purely embedded firmware engineer then after about 6 months my role was expanded to include DSP software development.

- Developed, maintained and tested high quality code for both MCU and DSP architectures. Integrating new hardware, extending feature set for new products, tuning and developing DSP algorithms.
- The overarching project during my time at meridian was the design and implementation of a multi-product hardware and software development platform:
  - Worked with senior engineers to realise a forward compatible system design.
  - Researched and realised the toolchain and development environment to speed development and increase collaboration.
  - Established both MCU and DSP codebases for the project, transferring over existing functionality and re-implementing when necessary. Prioritising SOLID principles and acheiving a highly flexible structure to handle multiple platforms/products.
  - Specific projects included; asynchronous multirate input/output audio framework for SHARC, drivers for SPI and UART for MCU, Polyphase Filter module, Model-View-Controller implementation, Guaranteed delivery communication protocol.
  - Eventually took on a leading role, orchestrating the firmware aspects of the project between a small team of developers.
- Driving force in the release of a multi-award winning product, working across departments to ensure the outcome was both engineered to the highest standard but also realised the brief on a restricted timescale.
- Worked with a colleague to bring in a code review process using Gitea which was subsequently adopted across all new projects in the department.

Caldertech

Embedded Software Engineer — *June '17 - Aug '17*

Developed an SD Card driver library to integrate with an open source filesystem. Working on a platform in the very early stages of development and delivering a fully functioning library to the client with associated documentation and a handover session to compliment regular code reviews.

Education

University of Leeds

Integrated Master's Degree in Electronic Engineering — *2012-2016*

- Masters Level Embedded Systems Module covering implementation of embedded systems on an ARM A9 processor using Eclipse for DS5. Also developed a modular/portable graphical user interface library, exhibited through a multiplayer curve drawing game. Demonstrated high proficiency in C, in depth understanding of ARM Assembly/Toolchain, technical writing.
- Individual Project involved the parameterised simulation of Valve Amplifier in MATLAB for use as a creative audio effect. Demonstrated Non-linear and linear DSP, analogue circuit analysis, mathematical modelling, presentation and exhibition skills.
- Embedded Systems Project produced a prototype calculator capable of evaluating strings containing multiple embedded brackets and floating point values. Developed in the ARM Keil MDK for a Tiva C Microcontroller (ARM Cortex-M4).
- Communications and Network Security Module: OSI 7-Layer Model, TCP/IP structure, Error control methods, Flow control. Network security projects to trace and analyse a TLS handshake, then to model and hack a low order public key encryption algorithm.
- Digital Communications: Physical layer engineering principles, Digital Modulation schemes, Optical communications Receivers for binary communication systems, Lab project to examined receiver techniques and BER for BPSK, QPSK and QAM.
- Mobile Applications Project: (Objective C) Created a resistor combinations calculator for iOS using the first fit decreasing algorithm.

Additional Projects

`rayDance` — *Various*

Principal Engineer — *2016 - PRESENT*

Long running passion project developing an effective sound-to-light algorithm and platform based around an STM32F7.

- Developed a fully asynchronous DMX receiver to provide an interface capable of professional integration.
- Complex signal processing pipeline utilising DTFT, IIR/FIR implementations from the CMSIS-DSP library and some custom algorithms.
- Python simulation of the same pipeline to aid in debug and development of the algorithm.
- High-speed asynchronous LED driver suitable for scaling to variable LED arrays.
- Prototype hardware platform that was successfully demonstrated at Amsterdam Dance Event in 2023.

Groundforce Soundsystem — *Leeds*

Co-Owner — *2012 - 2018*

Designed and built a small (yet mighty!) sound system in Leeds to hire out for parties, and events.

- Researched and developed designs for loudspeaker enclosures, using programs like winISD to simulate designs.
- Practical end-user experience of Digital Signal Processing for Audio.
- Repaired broken equipment; amplifiers, mixers, turntables.
- Managed bookings, logistics and finances for the business.
- System is now set to be installed at a community centre in London, providing an asset to teach young people about live sound.