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Relevant experience

Embedded C/C++, motor drive software and GUI development. 30 years' experience as a consultant software engineer, hardware design background. 12 years' experience designing different families of complete control systems for a client's semiconductor fabrication tools including motor drives and animated GUI. Medical device experience (IEC 62304 class C). Designed coding standards and configured PC-Lint and MISRA for projects. Experience developing modelling and test software for projects. Sole developer on many large projects from conception to commissioning. Experience on commercial, industrial and research projects.

Languages	Embedded C and C++, C#, Swift, Java, linker scripts, some Python, … Designed a complete embedded language and several scripting languages
Processors / SOCs	ARM Cortex STM(32F4xx, F2xx, F1xx, M7xx), NXP2119, Nordic NRf, Atmel Atmega, Texas MSP430, Fujitsu MB91F465P, 8051, 80C186, ...
Embedded IDEs	Eclipse, Atollic Studio, Keil, IAR workbench, Atmel Studio, …
Other IDEs	VS, XCode, some Android Studio
OS	Bare-metal, RTOS, iOS, MacOs / OSX, Windows 3-10
Hardware design	Analog and digital electronic design
Application areas	Medical, wearable, multi-media, industrial control systems, telecoms
Quality	SDLC, IEC 62304 - Medical device (class C), MISRA, Git, SVN, TFS, PC-Lint
Comms	BLE, USB, CAN, RS485, Modbus, UDP, I2C, SPI, PCM, RS232, VHF, UHF, ISDN
Database	Mysql, Sqlite, Access Excel and C# for configuration and auto code generation
Education	Certificate in Machine Learning BSc Maths with Physics
Interests	Walking, drumming, cooking, African food and music, perception and psychology.

Some software experience

Eaton 2018-2019 Consultant software engineer

RS485 Ring Network for Fire Alarm Panels

Designed and developed the architecture, protocols and firmware including device drivers for a robust 3-layer RS485 network stack, to link local CAN networks of up to 250 fire panels. Emulated the firmware network and protocols in a C# app to prototype the design, then ported the emulated firmware to embedded C. Wrote a C# test app which ran scripts to exercise up to 250 Network Cards (without their Fire Panels). Debugged and proposed changes to several hardware design issues.

bare-metal embedded C, ARM 32F1xx, ARM 32F2xx, C#, PC, CAN, RS485

Cloudtag 2016-2017 Technical lead and senior software engineer

Embedded wearable device with server and mobile App:

Led and recruited a team of 5 engineers working on algorithms, wireless comms, iOS and Android apps. Took over development of embedded wearable device re-developed basic prototype to produce complete robust production code.

Conceived of, designed, developed an E2E secure Over-The-Air firmware updater system. Embedded Bootloader/Mobile App/Server. The system could target specific updates for individual or groups of devices which was very useful for testing. Designed a post build app to analyse the map file and create linker scripts to restructure the firmware into 4 independent patches bootloader, application, algorithms and library in a way that minimised the differences between versions. The OTA updater was very reliable and never corrupted a target system

embedded C (wearable) ARM 32F429, swift/Java (mobile apps), C# (server), C# (PC)

Led rapid development of a demo iOS app to use a third-party wearable device, wrote the Model and View Model part of the app

swift, iOS

Blackwood Embedded Solutions 2013-2016 Consultant software engineer – 3 projects

Insulin pump and controller:

Had sole responsibility for designing and implementing a complete Bluetooth Low Energy (BLE) stack for the pair of medical devices using a Nordic ARM SOC. The project was under IEC 62304 SDLC class C (risk of serious injury) with no 3rd-party libraries allowed. Implemented it as a multi-layer architecture, which

comprised 8 protocols and a frequency hopping low level radio controller. Extracted over 5000 BLE requirements from the Bluetooth spec. Developed the BLE security package with AES-CCM encryption, HMAC, SHA256, OOB pairing, encryption establishment procedures and key exchange. Configured and managed the static code analysis for the project *C, ARM - Nordic Nrf51822 SoC, PC-Lint, MISRA 2012*

Another project challenge was converting the software in a slow, low reliability, incoming data only, telemetry system into a fast, high reliability, bi directional, control system where the client hadn't realised the extent of the paradigm shift. System used VHF and UHF transceivers and UDP hub *embedded C, Atmega, MSP430*

Oxford Instruments Plasma Technology Consultant software engineer – many projects

Designed and developed all PC, PLC and embedded software for very large, complex HPVE reactor for growing GaN for high brightness LEDs. Designed GUI, smart data logger, PLC control system, embedded device interfaces, motor drive software. Commissioned system.

C++, F#, C#, WPF, PLC code, SQLite, UDP, CAN, MCode, RS232 embedded C ARM 7, RTX, MISRA 2004

Range of semiconductor fabrication tools with PC front ends, PLCs, embedded devices controlling robot arms, motor drives, process chambers, vacuum pumping, hazardous gases, heaters and high-power RF: Proposed, designed and developed 3 generations of process control software with animated GUIs for systems sold around the world. Focused the GUI design on intuitive animation which reduced the need for text and internationalisation. Designed a scripting language to configure the complex bespoke systems and their GUIs to minimise software changes. In 2nd generation added a WYSIWYG editor for configuration *C++, PLC code, embedded C, MCode, UDP, CAN, MODBUS, RS232, ARM 7, RTX, MISRA 2004*

Peter Gabriel's Real World Multimedia Consultant software engineer - 3 projects

Designed several complex animated graphics effects (as plug-ins for authoring tools), as well as an animation and audio sequencer. Developed on Mac and ported to PC and optimised the matrix convolutions for speed in assembly separately for the vector processors on Pentium and Power PC *C++, Pentium and Power PC assembly, Java, OpenGL*

Dowty Systems Integration/Vivista Consultant software engineer – several projects

Police emergency systems:

Designed demo touch screen emergency operator console with PCM switch to combine radio / telephone comms which won client the first major UK contract against BT, Plessey and others *C++, embedded C*

BP Fortes oil field:

Designed, developed and commissioned s/w for radio network routing (tropospheric scatter and line of site) and distributed alarm data system for onshore and offshore sites *embedded C*

BBC TV centre:

Designed, developed and commissioned s/w, to route and conference speech between studios and outside broadcasts with network of 7 operator control panels *embedded C*

Some hardware experience

Environmental Research Technology: Product development

Complete electronic, software and mechanical design of two types of system for measuring particulate monitoring in gas flows. Control panels, remote sensors, data logging. Also manufactured low volume initial production runs *embedded C++*

Admiralty Materials Laboratory, MIT, NOAA, CSIRO Australia, Rutgers University and others

Designed and developed and built many types of bespoke gas chromatograph and other instruments for environmental field research. Also automated field monitoring equipment for the admiralty. Analogue sensor circuitry, 4-20mA, rs485, rs232, IEE488, pulse generators, V/F, A/D, D/A, ultra-low power, switch mode PSUs, embedded processors, flash memory, firmware, micro printers, led/lcd displays. PCB design, assembly, test

Some recognition

Futurelab
Received a grant for a science education project called Size Matters about the effects of scale in science and engineering

NESTA
Received a collaboration grant to develop an exhibit of Size Matters with Science Projects Ltd

University of Oldenburg
Invited to the Geo-microbiology dept to pursue my own ideas. Designed and developed a very low power micro-chromatograph as a laptop peripheral. The University of Boston invited me to bring it on a field trip to Baja California

Some personal projects

Worked on a lightweight 3D astrophysics model ultimately for a science education app on the effects of scale *Swift, SceneKit, OSX, iOS*

Investigated viability of machine learning techniques for emotion tracking, by adapting algorithms from papers on fast facial tracking techniques *C++, OpenGL, OpenCV, OSX*