Adrian Cull

Basingstoke, Hampshire.

Key Skills

- 22 years of C and assembler real-time embedded software/firmware design and development.
- 3G, GSM and TETRA DSP/layer 1.
- Telecommunications fixed and floating-point DSP software experience. Digital signal processing theory.
- Software for Analog Devices ADSP-21xx, Blackfin, SHARC, ARM, CEVA Teak, IMG Meta core, TI C55x and 8051.
- Windows programming using the Windows APIs.
- Telecommunications hardware design and development (both analogue and digital).
- Use of spectrum analysers, oscilloscopes, logic analysers, emulators and software simulators for testing and debugging.
- Good analytical, problem solving and mathematical abilities.

Professional Experience

Toumaz Microsystems/Sensium Healthcare Ltd, Abingdon, Oxfordshire. **February 2012 – February 2014**
Senior Embedded Software Engineer

BodySense IC: Software implementation in C of IEEE 802.15.6 medical wireless body area network functionality using Imagination Technologies Meta core processor and Eclipse IDE. Integration and testing of MindTree Bluetooth Low Energy (BLE) software ported from ARM to Meta core. Use of SVN configuration management software.

Software implementation of GPIO, I2C master/slave, SPI master/slave, Timers, UARTs and other peripherals. Generation of cryptographic private, public and shared keys. Eeprom/Flash SPI bootloader software. Low level MAC and RF radio hardware abstraction layer software APIs. Software to test various hardware features and parameters, including over the air testing of two-way RF transmit, receive and ACK turnarounds.

Investigation of hardware issues using logic analyser and Xilinx Chipscope for the development FPGA platform to support the hardware team.

16F886 PIC software in C and hardware interfacing for automated testing. Python test scripts for testing of RAM and ROM.

Generation of ROM image containing the bootloader and RTOS for chip tape-out. Chip bring-up and testing. Successful chip use for a demonstrator project (transmitting live heart rate, respiration rate and body temperature via IEEE 802.15.6 to a PC).

While seeking employment in the Thames Valley. **March 2011 – February 2012**

Windows programming of an application in C/C++. Addition of over 24,000 lines of working code. Includes use of menus, toolbars, common controls (with custom icons and run-time changeable 24-bit colour), sub-classed edit controls, combo boxes and buttons. Used for data input, settings windows, control and implementation of various automatically scaled and labelled graph displays, and other functionality. Use of the system registry, COM, timers, mouse and keyboard input.

CSR plc, Cambridge, Cambridgeshire. **November 2010 – March 2011**
Senior Engineer (Contract)

Development of a test framework and test scripts in Python. Use of Perforce configuration management software.

Aeroflex Ltd, Stevenage, Hertfordshire. **October 2009 – October 2010**
Senior Engineer (Contract)

Recommended for the position by previous managers I used to work for at Marconi Instruments Ltd who work at Aeroflex. (Marconi Instruments eventually became part of Aeroflex.)

LTE TM500 Test Mobile: Addition of new features for the user interface, test entity, logging agent and result formatting C software for measurements and statistics. Support of UE handover to multiple radio contexts. Use of ClearCase configuration management software.

Profiling and optimisation of code speed and memory use for a new capacity test variant to increase the number of supported UEs from 32 to 420. Improvement of the existing code structure. Support of architectural differences in a multitasking VxWorks RTOS environment. Design documentation.

Sepura plc, Reading, Berkshire. **February 2008 – May 2009**
Senior Engineer

Recommended for the position by previous managers I used to work for at Marconi Instruments who now work at Sepura.

Demonstrator Project: Use of Analog Devices Blackfin development board functionality and VDK kernel/RTOS.

New TETRA Mobile Phone Platform: Ported ADSP-218x physical/lower MAC layer and audio DSP assembler to bit-exact C code. Investigated use of ARM processor and programmable hardware to run parts of ported code instead of a DSP. Evaluated CEVA, Tensilica and VeriSilicon DSPs for audio use, including compiler efficiency. Optimised the entire ETSI ACELP vocoder C reference code for a CEVA Teak DSP. Produced test harness and test vectors for ported and optimised C functions.

Anite Telecoms Ltd, Fleet, Hampshire. **March 2004 – November 2007**
Senior Engineer
Development of the UTRAN Programmer's Toolset (PT) C software for 3G wireless communication test solutions. PT provides protocol primitives, event management, logging, system functions, error handling and diagnostics.

SAT(A): Addition of new features to PT to support the Anite 3G baseband processor system.

SAT(S): Investigation and resolution of UbiNetics/Spirent CS100 3G layer 1 cell simulator firmware issues, for internal and external customers. Analysis of reported problems, reproduce and confirm issues, determine if due to CS100 or Anite PT, Conformance Toolset (CT) test cases, or SAS network simulator applications. Use of UE debug capability.

Management of external CS100 firmware support supplier for fixes and new features. Define issues and priority for 3G DSP/layer 1 team (initially USA then India based) to work on per release. Technical leadership of team, management of corrective action and progress. Ensure firmware fixes and new feature implementation will be suitable. Modify PT applications for use during investigations. Integrate CS100 firmware releases and interface changes into PT. Verify fixes. Regression testing.

Addition of new features to PT. Support CT and SAS use of PT. Provide technical information and solutions to customer support for external customers.

Ericsson Mobile Communications (UK) Ltd, Basingstoke, Hampshire. **March 2000 – January 2004**
Consultant (i.e. Principal) **Engineer (DSP)**
Cobalt Compact Mobile Phone Platform: Definition work for a lower cost GSM mobile phone platform using less DSP RAM and MIPS from conception to completion. Extensive restructuring and rewriting of the code base at the time added to the complexity, including stability issues. Software changes made due to new hardware and architectural differences, including inter-processor communication. DSP power saving functionality. Patch functionality added to allow future code changes to occur if necessary without the need for a new ROM version. Successful implementation of a ROM release version of this system-on-chip design. Use of ClearCase configuration management software and Enea OSEck RTOS.

Enhanced Observed Time Difference (E-OTD) Functionality: Porting of TI C54x assembler to C55x DSP, including change of memory model size and interfacing of assembler code with C code, as part of the positioning functionality used to locate the geographical location of a mobile phone. Optimisation of assembler code execution speed using the new features of the C55x. Conversion of the discrete correlator to use optimised C code. Designed test program functionality running on the ARM host processor to apply test vectors and analyse the results.

Asia Cellular Satellite (ACeS) System Mobile Phone: Acquired layer 1 knowledge of a combined ACeS GSM based satellite/GSM mobile phone. Software debugging of phone, integration with GSM and satellite network. Successful live field trialling in Indonesia.

Motorola Ltd, Swindon, Wiltshire. **July 1999 – March 2000**
Definition work for a wideband digital modem payload card for a 3G base station.

Marconi Instruments Ltd / IFR Ltd, Stevenage, Hertfordshire. (Marconi until 1998.) **March 1991 – July 1999**
Principal Design Engineer
2310 RF Signal Analyser: C and assembler software for Analog Devices ADSP-21062 SHARC (floating-point) DSP as part of a team for various TETRA measurements including non-active slot power, adjacent channel power due to switching transients, linearization burst adjacent channel power tests, frequency pre-scan facility, and Cartesian displays.

2968 TETRA Test Set: The industry standard test set. ADSP-2115 (16 bit fixed-point) DSP assembler for TETRA measurements of mobiles and base stations. Formatting of display trace data. $\pi/4$ DQPSK modulation and demodulation of data, and AGC of the IF signal level.

The demodulation software involved mixing down the IF frequency, low-pass filtering and sample decimation, (square) root raised cosine filtering, symbol timing recovery, arctan demodulation and detection of different training sequences for both

continuous demodulation (every symbol in every slot), or burst type signals. Written for maximum speed of execution. The modulation software also controls the burst power profile.

Measurement of burst time alignment. Parametric measurements, involved frequency error calculation and removal, timing and frequency iteration, linear and cubic spline interpolation, power calculation, burst power profiles, residual carrier power calculation and removal, measurement of RMS and peak modulation vector error.

2965 Radio Communications Test Set: C software as part of a team for measurement control of a multi-68000 based platform. Assembler applications for formatting of display trace data, and an FFT (the existing FFT software was rewritten to improve calculation resolution and to reduce spurious false frequency component results).

2966 GSM Test Set: Real-time embedded GSM layer 1 DL implementation for a base station. Converts layer 2 messages into GSM burst formats suitable for differential encoding and GMSK modulation. Simultaneously generates control and traffic channels. Parity generation (e.g. FIRE code), convolution encoding, bit reordering, interleaving and burst mapping. Generates frame counts and DL physical channel structure. Inter-DSP and 68000 communications. Implemented in ADSP-2115 assembler.

Produced an ideal GMSK modulated burst at the IF frequency at the A/D sampling rate to verify measurement software.

2957D DAMPS Test Set: Real-time DL and UL channel coding using assembler written to use minimal code space, and C for an 8051. Various measurements, including bit error rate using pseudorandom data. Supervisory responsibility of a team member.

Telspec Ltd, Rochester, Kent. **November 1986 – February 1991**
Senior Engineer
Hardware and 8051 software design of analogue transmission audio conferencing telecommunication systems. Adaptive shallow voice switching and AGC compensation of line loss used, achieved by software control using A/D and D/A converters to measure signal levels and control variable gain amplifiers. Direct customer liaison, equipment approval and management of the project and personnel assigned to it.

Autophon (UK) Ltd, Cardiff, South Glamorgan. **July 1985 – November 1986**
Hardware design and development of a range of modern domestic and PABX telephones.

Notable Courses Attended
Digital Signal Processing: University of Hertfordshire, University of Strathclyde, University of Surrey.
Project Management for Software Development: Learning Tree International.

Qualifications
University degree: BSc (Honours) Electronics 2(ii). UWIST, Cardiff (1985). Now Cardiff University, a Russell Group member.
S level: Mathematics (Distinction). A level: Mathematics (A), Physics (B), Geography (E). A/S level: (A). 8 O levels.

Personal Information
Year of Birth: 1964 Nationality: British Driving Licence: Clean UK licence
Swim regularly to keep fit. Interested in Windows programming. Learnt C++ and object orientated programming.