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Profile

A VOIP / Embedded Software Developer with 20+ years experience of working as a member of a multi-disciplined team, identifying software requirements, designing real-time, multi-processor, event-driven systems and implementing software solutions. Has worked on projects from conception through to final product. A self-motivated individual who can work independently, or as part of a software team.

- VOIP Development: Developed Signalling / Media servers, Gateway (Asterisk), and mobile client (iPhone) software for a secure mobile VOIP network using smartphones and office desk phones.
- Embedded Development: Led a team of Embedded Software Engineers in the analysis, design, implementation and test of the software used to control the FujiFilm Luxel F9000 – a multi-beam expose engine. The FujiFilm Luxel F9000 won a Queen's Award for Innovation in 2002.

Software:

- Designed and coded CAPS approved encrypted VOIP application software.
- Worked on both VOIP client and server software (iPhone/iOS and Centos/Redhat).
- Experience of developing cryptographic software to a UK Gov. CESG IL3 / Restricted level (http://www.cellcrypt.com/news-events/pr/cellcrypt-gateway-baseline-receives-cesg-approval).
- Currently hold UK Security Clearance.
- Involved in all aspects of analysis, design, coding, and testing of multi-processor real-time, event-driven systems.
- Responsibilities have ranged from coding of low level drivers to complete software design control of multi-processor, real-time systems.
- Experience of various target systems, including Linux, iOS, ECOS, VRTX.
- Developed Board Support Packages (BSPs) for various real-time operating systems.
- Coding predominantly in C and C++, together with Objective-C, bash and perl scripting.
- Experienced in the GNU toolset, both on a host machine and for cross-compilation (PowerPC, M68k, etc). Tools include: GCC/G++, GDB, Binutils, Automake, Autoconf, etc.
- Experience of automated testing tools (CPPUnit, DejaGnu, Check).
- Configured and maintained various in-house development servers and integrated them in to a company infrastructure (e.g. Samba, NFS, Apache, Mysql, Subversion, Foswiki, Request Tracker).
- Provider of software solutions within an R & D environment, evaluating and championing their use.

Project management:

- Experience of taking a technical lead in teams of 2-14 Software Engineers on projects lasting 3 months to 3 years.
- Responsible for identifying work packages, prioritising them, allocated them within the embedded software group.
- Responsible for estimating project time scales and reporting on progress to management.
- Responsible for interviewing and selecting embedded software engineers.
- Evaluated, introduced and supported various open source enterprise collaboration tools to aid project development and bug tracking in an R&D environment. (Foswiki Request Tracker, etc.).

Position: **Senior Software Engineer** (Aug. 09 - Present)

Company: **Armour Communications Ltd**
***(was Cellcrypt Ltd - management buyout, Jan 2015)*,**
Millbank Tower, 30 Millbank, London. SW1P 4QP

Aug. 09 – Present:

Armour Communications Ltd (http://www.armourcomms.com) is a leading provider of technology for a secure mobile VOIP network using smartphones (encryption certified to FIPS 140-2 standard). Armour Communications' encrypted voice solution has received CAPS approval for use in UK Government departments.

Products include secure Signalling and Media servers, client applications for iPhone, Android, Blackberry, and Nokia smartphones, and a Gateway server which integrates standard office desk phones with a secure Armour Communications network. The Gateway server uses Asterisk (Open Source PBX), with an Armour Communications channel driver.

Responsibilities included:

- ***Asterisk Mikey-Sakke SIP Gateway:*** Allowed secure encrypted SIP audio/video calls between Android mobiles and PBX/desk phones using Mikey-Sakke key exchange. The Gateway included secure video/audio conferencing call capability. The Gateway was compatible with CESG's Secure Chorus Specification.
- ***Baseline Gateway:*** Developed CESG CAPS-approved variant of the Armour Communications Gateway product, with modified encryption to meet CESG requirements. (http://www.cesg.gov.uk/finda/Pages/CAPSProduct.aspx?PID=186)
- ***Signalling Server:*** Enhanced epoll-based SSL/TLS Signalling Server. Added Apple Push notification support; Added SSL cipher list control; Added e164 support; Developed intelligent Media server allocation based on caller/callee location; Extended media protocol to allow DTMF (RFC2833) and text messaging to be supported. Additional bug fixes as necessary.
- ***Gateway:*** developed Asterisk-based Gateway product; developed Asterisk channel driver capable of supporting multiple simultaneous secure calls between a PBX and the Armour Communications secure network.
- ***iPhone Client App:*** developed Armour Communications iOS application capable of secure voice and messaging; added Apple push notification support (PushKit); resolved issues with maintaining connection whilst app was backgrounded; implemented low-level protocol stack; added UI messaging capability. (https://itunes.apple.com/app/armourcc/id973912292?mt=8)
- ***Protocol Diagnostics:*** developed and maintained a Wireshark dissector for the Armour Communications signalling protocol.

All Server/Gateway software was developed for CentOS/Redhat, using C/C++ and released in RPM format. C/C++ and Objective-C were used on iPhone development. Software tools used include Virtualbox, OpenSSL, Maxmind GeoIP, Log4c, Asterisk, SIPp, Xcode, Wireshark, Valgrind, Subversion and Check/CPPunit for unit testing. Audio data used the AMR codec (Opencore AMR & 3GPP).

Position: **Contract Software Engineer** (Mar. 07 – Aug. 09)

Company: **Imagination Technologies Ltd.**
Home Park Estate, Kings Langley, Herts. WD4 8LZ

PURE Digital division (Mar. 09 – Aug. 09):

Ported Gstreamer (http://gstreamer.freedesktop.org/) to the iPhone iOS. Developed a Gstreamer iphone sink plugin and an iPhone/Gstreamer application capable of communicating with PURE's internet radio portal (http://www.thelounge.com) and used Gstreamer to decode the audio data stream directly, or pass it straight through to the iPhone iOS for hardware decode.

PowerVR division (Oct. 08 – Jan. 09):

Porting of software to control video encoding hardware (H.264, MPEG4, MPEG2, JPEG, etc.) to Linux. Work involved repartitioning the original code into driver and application layers, adding interrupt support to the driver and modifying the existing build system. Testing carried out on a Linux 2.6 kernel PC, with PCI-based FPGA development board.

PURE Digital division (Mar. 07 – Sept. 08):

Provided sole software support during hardware bring-up of a new in-car product that combined a DAB radio with an FM transmitter (PURE Highway) [Frontier Silicon Chorus2 + MeOS]. Liaised closely with RF engineer. Developed DAB/FM Receiver and FM transmitter device drivers, together with a bit-bashed I2C device driver, and interrupt driven shaft encoder driver. Developed algorithm to identify free FM frequencies. System designed and implemented using UML hierarchical statecharts. Added DAB+ capability to this system. Also added FM capability to existing PURE Oasis DAB radio [Frontier Silicon Venice 4.2 + MeOS]. Coding predominantly done in C, using a Linux development environment.

[see: **http://tuxian.co.uk/images/tuxian/brochures/pure_highway.pdf**]

Position: **Embedded Software Technical Team Leader** (Oct. 81 - Feb. 07)
Company: **FFEI Ltd., Hemel Hempstead, Herts. HP2 7DR**
(formerly *FujiFilm Electronic Imaging Ltd. & Crosfield Electronics Ltd.*)

Feb 2006 – Feb 2007:

Development of a print engine, capable of outputting images to multiple Xaar 1001 inkjet printheads. The architecture uses a custom built PC, running Linux (2.6 kernel), with an in-house designed PCI card capable of driving 12 printheads (12,000 pixels) simultaneously. Software written included a Linux PCI device driver and a Reorder Server. The Reorder Server buffers and reorders image data for the required system configuration. It supports real-time image overlaying, and seamless image-to-image output. The architecture allows for multiple print engines to be supported in various configurations, with image output synchronised between them.

Responsible for the software on the Linux PC. Designed and implemented the Reorder Server. Successfully proved the system capable of processing data at the required rate (72MPixels/sec). The system uses CORBA (OmniOrb), POSIX threads, Log4cpp, CPPUnit, a Linux PCI driver, Gigabit ethernet, and Samba.

Additionally completed a part-time contract at FFEI Ltd. (Jul. 07 - May 08) to further enhance this system. Added the capability to support on-the-fly image repositioning, both along and across the web, synchronised to a print mark on the media. Shifts in image output are synchronised across multiple print engines as necessary. The system was successfully demonstrated at LabelExpo 2007 and Drupa 2008, and is now marketed as Nilpeters Caslon Inkjet System.

[see: **http://tuxian.co.uk/images/tuxian/brochures/nilpeter_caslon.pdf**]

Oct 2004 – Feb 2006:

Investigation into the hardware/software architecture needed to support a family of CCD-based digital microscopes. All models were designed to be capable of digitising slides at resolutions up to 4,000 pixels/mm (at 24-bits per pixels).

The architecture consisted of 2 PCs, each running Linux (2.6 kernel). One PC used an in-house designed PCI card to interface to a CCD headboard and performed real-time image processing before transferring image data to the second PC, which carried out on-the-fly image compression prior to writing the data to a RAID array.

Responsible for the software on the 2 Linux PCs and successfully showed them to be capable of processing data at the required rate (60MBytes/sec). Technologies investigated included RTAI (real-time extensions to Linux kernel). The final architecture used CORBA (OmniOrb), POSIX threads, Log4cpp, CPPUnit, a Linux PCI driver, NFS, Samba, Gigabit ethernet and a RAID array.

Jan 1998 – Oct 2004:

Development of 2 large format expose engines. A FujiFilm Luxel P9600 CTP system, capable of

exposing on photographic plates up to 1160x960mm, and a FujiFilm Luxel F9000 capable of exposing on photographic film up to 1130x910mm. Both used a laser system capable of exposing multiple beams simultaneously, at resolutions up to 144 pixels/mm. Each system consisted of multiple boards (up to 7), each with a M68376 CPU running VRTX. Boards communicated on a peer-to-peer network via CAN-bus.

The FujiFilm Luxel F9000 won a Queen's Award for Innovation in 2002.

Responsible for the embedded software on the project, and led the Embedded Software Team (8-14 Software Engineers) in the analysis, design, coding and testing of it, taking an active role in all aspects. Developed the main carriage servo motor software, ensuring image data path, carriage and internal spinner (30000 rpm) were correctly synchronised.

A number of variants were derived from these initial systems. Changes include replacing the external SCSI interface with Firewire, replacing internal SCSI disks with a RAM buffer, and replacing the M68376 on the main system board with a PowerPC (MPC561) CPU.

Responsible for selecting and porting ECOS (an open source real-time executive) to the new system board, developing a VRTX simulation layer to reduce system changes, building a PowerPC cross-compiler toolset (GNU powerpc-eabi), and taking a technical lead in defining and implementing the necessary embedded software systems.

[see: **http://tuxian.co.uk/images/tuxian/brochures/uk_f6000_9000.pdf**]

May 1995 – Jan 1998:

Development of a A3 format desktop CCD (Charge Couple Device) scanner - the FujiFilm C550 Lanovia. The system board controlled a 3-colour CCD, with on-the-fly image processing performed by a DSP56k.

Responsible for defining the embedded software requirements, and leading a team (4 Software Engineers) in its design and implementation.

[see: **http://tuxian.co.uk/images/tuxian/brochures/ffei_lanovia.pdf**]

1991 – May 1995:

Development of a small format (6"x6") CCD scanner - the FujiFilm C360. Used a CASE tool (Cadre Teamwork) to define the architecture. Developed a tool which generated C-code templates from Teamwork STDs (State Transition Diagrams). The tool has been used on the majority of embedded projects developed within FFEI over the past 15 years.

Responsible for the embedded software on the project, and led a team of 5 Software Engineers.

1981 – 1991:

Worked on a number of embedded software projects within FFEI/Crosfield, predominantly coded in C and using M68k based CPU's.

Software

Host systems:	Linux, OS-X, Windows-7/XP/NT/98, Cygwin, OS-9.
Target systems:	Linux, iOS, ECOS, VRTX, OS-9.
System-on-chip:	Frontier Silicon – Chorus 2 & Venice 4.2.
Analysis and design:	UML, OOA/OOD, RTSASD (Real-Time System Analysis and System Design) (Yourdon, Ward/ Mellor).
Languages/ Libraries:	C, C++, Objective-C, STL (STLport), OpenSSL, Log4cpp, Log4c, Maxmind GeoIP, Newlib.
Assemblers:	PowerPC, M68k, M6809, DSP56k.
Development tools:	(GNU) make, automake, autoconf, rpmbuild, bash, perl, Xcode, emacs, gdb, ddd, valgrind, check, cppunit, dejaGnu.
Version control:	subversion, mercurial, cvs, rcs.
Static analysis:	Lint (Flexelint).
Protocols/ Interfaces:	Ethernet (TCP/UDP), Firewire, SCSI, CAN (CAN-bus), I2C.
Middleware:	CORBA (OmniORB), POSIX threads.
Linux variants:	Centos/Redhat(5/6), Ubuntu.
Server tools:	Request Tracker, Mantis, Subversion, Foswiki/Twiki/MediaWiki, Apache, Samba, NFS, Mysql.
Office tools:	Microsoft Outlook, Word, Excel, PowerPoint, Visio, Project, LibreOffice.
Additional experience:	Virtualbox, Vmware, Doxygen, ImageMagick, Gimp, Inkscape, and live linux CD customisation.

Education

University of Bath Claverton Down, Bath. BA2 7AY	B.Sc.(Hons.) Mathematics and Computing.	1978-1981
Bishop Vesey's Grammar School, Sutton Coldfield, West Midlands.	3 A-levels (Mathematics, Further Mathematics, Physics), 9 O-levels (incl. Maths and English).	1971-1977