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Specialized areas of experience:

Digital Signal Processing. Audio and image processing, including FFT, time-domain filtering, filter design, etc. Floating and fixed point DSP systems design (both hardware/software) using both TI and Analog Devices DSPs (e.g. Blackfin). C, C++, and assembly languages. Optimized Intel SSE programming. Linux/OpenSource: OpenEmbedded, Eclipse, gdb, gstreamer, OpenMAX, pulseaudio, alsa, gquilt, etc. POSIX threads, Win32 programming. Visual C/C++/DevStudio, Matlab, VisualDSP, CodeComposer, Xcode. STL, Boost, Objective C. I2C, RS-232, DirectSound, OpenGL, and Direct3D, MIDI and audio technologies. Intel x86, Arm Cortex. Subversion, CVS, Perforce, SourceSafe. Logic Analyzers, scopes, etc. Hardware design: PLD/FPGA programming, JTAG debugging, state machines, memory controllers, advanced frame buffer controllers, display controllers, board design and schematic capture, including mixed-signal / analog components.

Education:

BS in Electrical Engineering, Massachusetts Institute of Technology, 1982. GPA 3.0.

MS in Electrical Engineering, University of California, Berkeley, December, 1993. GPA 3.5.

Work Experience:

3/09-Present

Designed and implemented a large-scale audio mixing engine, using the SMP characteristics of Intel's i7 ("Nehalem") processor. Initial phase involved extensive investigation and prototyping to establish the technical viability of replacing a large array of Sharc floating point DSP chips with a single modern CPU. Implemented using a variant of the Win32 API, it exploits a 3rd-party real-time deterministic scheduler, that is implemented as an extension to the Windows HAL. We are ahead of schedule, and the technical feasibility has been well established, given the channel counts we are seeing. Involved writing some hand-coded SIMD instructions for the more critical portions of the engine.

Architecture supports dynamic channel and bus creation and destruction, and a flexible audio plug-in framework that allows customizing each audio channel to call a unique sequence of DSP operations on the audio entering that channel. Audio engine is a server process that uses shared memory to interface with the client, running in the same machine under vanilla MS-Windows. Oversee 2 other technical staff members. Maintain project schedule and track bugs, generate technical specs, brief management on progress.

4/07-11/08

Designed and implemented the Media Server, a key piece of middleware for media playback and capture, for new embedded-linux based mobile communications product. Defined the API's, documented, coded, tested and debugged. Design docs were done using an internal wiki. Implemented in C under glib, using a dbus-based IPC mechanism. Added async notifications/callback interfaces to other components (power management, audio policy, DSP image loader). Added profiling functionality and documented performance of various commands. Worked closely with apps-team customers to assure it met their functional requirements, quickly making periodic modifications as requested (the entire system was undergoing iterative re-design). Debugging involved using both Eclipse (for desktop build) and gdb and printf-based debug (device builds). Modified and debugged other parts of the system that I did not author, including making patches to GStreamer audio/video codec and sink elements, pulse audio, alsalib, etc. Delivered an EXIF image metadata parser and a proprietary (to my consulting company) audio Sample Rate Converter. Early on, I did research on programming the DSP core (using Code Composer) of the dual-core (TI OMAP) chip that drives the product so that the client would not be dependent on the vendor for codec

deliverables. With little external support I got up to speed by digesting out-dated, inconsistent documentation. Ported an open-source libjpg JPEG decoder to the DSP and documented my results.

11/05-9/06

Provided engineering leadership to a startup company, Vidiva, Inc. Vidiva created the firmware, UI design, and host application software for a new iPod peripheral, the iSee360 from ATO (a Vidiva strategic partner). This product won Best of Show at MacWorld in Jan '06, among other awards. My responsibilities at Vidiva included managing the firmware development for two products, including the iSee360 and another Portable Media Player. This included, among other things, writing functional specifications, revision control, load balancing of engineering resources, project management, managing software build and release process, and coordinating development efforts between three companies (add Zoran, the underlying hardware vendor). Oversaw Vidiva's debug efforts, host application development, IP roadmap (filed one patent), licensing terms, external technology licensing. Hired new firmware resources (contract and permanent), researched data encryption, improved software release process.

3/05-10/05

Implemented a functional model in C++ of the video display controller portion of a complex video processing chip. Worked closely with two other engineers to finish the implementation, which required extensive modifications of previous codebase as well as implementation of many new features unique to the current chip. Interacted closely with design validation and chip design groups to flesh out bugs in the RTL implementation of the chip. Wrote image conversion utilities, etc. Daily activities included responding to bug reports, fixing them, regressing the fix against a large set of test cases (thousands), then checking in the fix. Used Developer Studio, Linux, DesignSync, VCS, ddd, HSD (bug tracker), etc. Project went to zero bugs and lead to a timely tape-out of the chip.

5/04-8/04

Managed a team working on a SH3-processor-based product for delivery to Philips Medical Systems. I came in to replace the project leader, who was overwhelmed delivering other projects. Responsibilities included coaching the team to be more effective in delivering to milestones and taking a more systematic approach to debugging. Prior to my arrival, they were "thrashing", due to the high-stress nature of this product (the schedule had already slipped 6 months when I arrived). We delivered our final prototypes on or around Aug 3rd, two days late. Extensive documentation (scheduling, BOM, etc), coordination with customer, release coordination, project management, and debugging.

1/04-4/04

Short-term contract for Innov-X Systems a privately held X-ray instrumentation company. Designed compact hybrid board (Blackfin processor) for use in a hand held X-ray instrument to acquire signals from an X-ray detector and process them. Coded the non-linear pulse processing, digital filtering, and histogram (multi-channel analyzer) computation. Also programmed the I2C interface state machine. Debugged, tested, documented.

10/03-12/03

Short-term contract for TKO Software, a privately held game company. Wrote a proprietary exporter to export geometry data from the Maya modeling environment to a format readable by their in-house design tool. Ported some nVidia register combiner code to ATI's fragment shader model (all in OpenGL).

9/03 – 10/03

Implemented a musical drum machine in Max/MSP that uses nonlinear signal processing technology that I hold two patents on to realize novel control over percussive sounds.

7/01 – 8/02

Manager, Strategic Applications group. Managed a number of enhanced music playback projects, including various smart playlist prototypes using both audio derived and tag-based metadata. Defined (with marketing) an mp3 enhanced-playback product using these features. Product was ready to ship.

6/99 – 6/01

LAVA R&D Manager. Responsible for growing our US-based development team from two engineers to a total of 7, including VP of Engineering. Coordinated the development of the core technology components, authored and maintained specifications, prepared and filed 5 patent applications (2 granted, 3 pending), led conference calls with engineering and test organizations in multiple locations in California, Oklahoma, and Singapore. Conceived (along with engineers and marketing) a steady progression of new features and drafted and maintained many technical specifications. Roles included project management, product map definition, development tool chain maintenance, hiring, budgets, team management, mentoring, decision making.

8/98 - 5/99

Co-inventor (with another engineer) of a new technology combining 3D graphics and audio signal processing called LAVA (for Live! Audio Visual Animations). Wrote a real time visual synthesis module, conceived of the file format, authored, maintained, and distributed specifications for all components. Gathered support throughout the corporation. This project grew to become a major software product, bundled with millions of Creative products (SoundBlaster Live!, WebCam, GraphicsBlaster, etc). It has been featured on CNN, ZDNet, NY Times, and at various venues, including Woodstock '99.

3/94 – 8/98

Staff engineer, E-mu/Creative. Worked on advanced music synthesis projects. Development a real-time DSP accelerator card based on a TI floating point chip. The product added state-of-the-art DSP time scaling and pitch shifting to E-mu's Darwin hard disk recorder. Architected, implemented, debugged, and tested the hardware system. Also wrote some of the embedded support software.

Wrote a filter design tool in Matlab that allowed sound designers to directly manipulate pole-zero filter representations (ARMA models) of arbitrary soundfiles and export them to a proprietary filtering chip via MIDI. Trained sound designers in using the tool, which was used successfully in sound design for E-mu's Audity 2000 product.

Wrote a number of utilities for working with audio on the SGI platform: fixed- and floating-pt simulations of the filtering chip, MIDI controlled real-time software synthesizer, etc. Conceived of a novel real-time frequency domain signal processing technique, and interfaced it with Matlab, which provided a GUI front end for creating tables and editing parameters. Patent granted for this algorithm.

Wrote an additional patent application (granted) on a portable musical composition device.

9/91 - 12/93

Completed an MS program at UC Berkeley in the Electrical Engineering department. Thesis: "*A Real Time 3D Signal Analysis/Synthesis Tool Based on the Short Time Fourier Transform*". Courses in Advanced

DSP, stochastic processing, modern filters, time-frequency distributions, computer graphics, computer music, FFT applications for audio DSP (at Stanford).

8/90-8/91

Advisory engineer, IBM T.J. Watson Research Center. Designed frame-buffer and workstation interface components of an ultra-high-performance scientific visualization system product.

1/87-7/90

Staff Engineer, IBM Research. Developed IBM's M-Motion Video Playback Adaptor/A for IBM PCs. Initial research carried out by myself and my manager. Product places motion video in a window on a VGA screen. Many other companies cloned the idea after the product's release.

Earlier Work

Worked at IBM in the UK to design the first graphics controller chip to render bitmaps in virtual memory.

Developed proprietary waveshaping technology for audio signal processing. Implemented technology demos in hardware, DSP code, and C. Technology has been licensed non-exclusively to a major Japanese synthesizer manufacturer.

Publications

Presented MS Thesis work at AES '94 (MS Thesis).

MS Thesis can be viewed on-line at <http://cnmat.cnmat.berkeley.edu/~alan/>

Presented at International Computer Music Conference in 1989 (Moog Touch-sensitive piano keyboard).

"Real-time Simulation Environment for Audio Signal Processing", Proceedings of the 1992 International Workshop on Models and Representations of Musical Signals, Capri, September 1992.

Eighteen granted patents (see this [link](#) to see them on the USPTO website).

Blackfin system design featured in "Innov-X Systems's Portable X-Ray System Aids Scientific, Forensic Research with Blackfin", published by Analog Devices.

- 7,038,683 Audio driven self-generating objects
- 6,856,329 Automated acquisition of video textures acquired from a video camera for mapping to audio-driven deformable objects
- 6,448,971 Audio driven texture and color deformations of computer generated graphics
- 6,369,822 Audio-driven visual representations
- 6,182,042 Sound modification employing spectral warping techniques
- 6,088,045 High definition multimedia display
- 5,986,199 Device for acoustic entry of musical data
- 4,949,169 Audio-video data interface for a high speed communication link in a video-graphics display window environment
- 5,420,608 Frame buffer organization and control for real-time image decompression
- 5,351,067 Multi-source image real time mixing and anti-aliasing
- 5,319,395 Pixel depth converter for a computer video display
- 5,296,936 Communication apparatus and method for transferring image data from a source to one or more receivers
- 5,283,561 Color television window for a video display unit

- 5,220,312 Pixel protection mechanism for mixed graphics/video display adaptors
- 5,196,924 Look-up table based gamma and inverse gamma correction for high-resolution frame buffers
- 5,119,082 Color television window expansion and overscan correction for high-resolution raster graphics displays
- 5,113,180 Virtual display adapter
- 4,994,912 Audio video interactive display

Presentations

DSPx Panel on using DSP vs general-purpose CPUs for signal processing applications.

Honors

IBM Resident Study Fellowship.

IBM Outstanding Innovation Award.

Multiple IBM Outstanding Technical Achievement Awards.

Numerous IBM and Creative patent awards.