

Aaron David Levine
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36+ Years of Professional Programming, Software Engineering, and R&D Experience:

2012–2017: Systems Software Engineering — Incredible Technologies, Inc.

Employed full-time as the Senior Systems Software Engineer for the Platform Development group in the Casino Gaming division. Primary responsibilities included advancement and optimization of the operating system kernel ecosystem, including FOSS and proprietary native libraries, module, and driver functionality. Initially hired to research, design, and implement a novel internal DVR system for IT video slot machines to establish international and domestic jurisdictional regulatory compliance. Worked extensively with GNU Linux at system and application levels using C, c++, Java, OpenGL, Javascript, NetBeans, Perforce, Node, VirtualBox, and VMWare, developing video, graphics, timing, diagnostic, and performance optimization technologies. Worked repeatedly with Cypress PSoC hardware designing and programming embedded USB peripheral devices for realtime LED lightshow synthesis, coin-op platform security, and other firmware functionality. R&D efforts included realtime robust multiscreen video capture/encode/record/decode/playback, with both open-source GLX/mesa/xf86-video-intel/drm ffmpeg hwaccel and commercial nVidia drivers, kernel module micro-timing platform resynchronization, generalized compositing lightshow engine, Java/JNI/OpenGL animation platform architectural extensions, refinement and optimization, scripting server implementations, DSP-based data encoding, realtime remote-play video streaming server and clients, multi-screen GPU load balancing, hardware-accelerated movie transcoding with alpha channel playback, and adoption of advances in video graphics technology.

2012: Private Consulting — VST Plugin for Digital Audio Workstations

In a service mentorship role with a programmer/music-theorist client, translated their implementation of an original algorithm for realtime context-dependent adjustment of musical intonation from Java into portable c++ and produced a framework for further development under testbed conditions and for commercial deployment as a DAW VST Plugin.

2012: iOS App Published — Flowfazer—Music for the Eye

Rebuilt for the iOS platform the classic title originally created by myself and partner producer musician Todd Rundgren in 1990. Staying true to the original form I recreated the complex full screen 60 frame per second animation with simultaneous background image rendering by utilizing highly optimized GPU shader programming under OpenGL ES 2.0 and Objective C, producing a highest-rated universal App for the iPad, iPhone, and iPod Touch platforms.

2011: Private Consulting — iOS App Realtime Physics 3D Game / Augmented Reality Engine

Designed and implemented sophisticated geometry synthesis, graphics rendering, inertial motion-tracking with realtime video image synchronization, and high-precision physics simulation code for an iOS game-designer client.

2011: Private Consulting — Server-based Video Conferencing Audio and Video Processing

Designed and implemented a realtime JNI-bound C library for a Java-based video conferencing server leveraging open-source ffmpeg libraries on a GNU Linux platform for a client.

2010: Relocation from SF Bay Area to New Buffalo, Michigan

Designed and supervised construction of home office and studio facility for continued private consulting work from new family home.

2009: Musical Performance Technology — Muzemazer

Invented and developed into a product, Chromavoder™ — a digitally modeled analog polyphonic chromatic harmonizing instrument transposer. Currently engaging in the launch of an internet-based Custom Programming Service targeting a commercial DSP platform, for distribution of Chromavoder™ into the musical performance effects and music education markets.

2008: GNU Linux Systems Programming — Schooner Information Technology, Inc.

Contracted full-time on-site to assist systems engineering team with proprietary scalable high-performance software development.

2008: GNU Linux Video Creation Systems Programming — Fliptrack, Inc.

Contracted full-time to engineer Fliptrack's Moblyng Slideshow-to-Video conversion tool for commercial deployment in the compute-cloud context. Converted client's large proprietary pc-dependent Delphi application to portable c++, and wrote a high-performance graphics engine and general multi-process multi-threaded framework to support high-quality synthesis and rendering of an XML-scripted, audio track event-synchronized movie specification, with rendered data-piping to and control of the video and audio encoding process for streaming delivery. Implemented open-source library-facilitated text, graphics, audio, and video asset acquisition, import, decoding, export, and encoding. Wrote advanced technology software renderer for still graphics and video processing and synthesis, incorporating state-of-the-art generalized multi-layer antialiased and transparent image compositing. Engineered XML reading, audio and video decoding, font rendering, image transformation mathematics, realtime video monitoring, robust garbage-collecting memory management and cache file control, multi-thread and multi-subprocess management. Delivered a complete GNU Linux command line utility for scalable fulfillment service, providing a remotely-deployable customized media product creation engine for a Web 2.0 service-oriented venture.

2004–2006: Principal Engineer — InfoSpace Mobile, North American Games Studio

Employed full-time as the Principal Engineer of a major global label mobile games studio. Did R&D for production, architecting and co-leading sophisticated game development from concept to deployment, designing and implementing mobile client code in BREW and J2ME. Specifically responsible for pushing the envelope on mobile phones in the areas of 2D and 3D rendering, animation, and realtime physical simulation. Designed and wrote engines and libraries. Taught and mentored the junior and senior engineering staff, bringing techniques and science from a long and well-versed career in realtime entertainment code writing to the nascent cellphone games field. Produced from end to end: Skee-Ball for Prizes, a breakthrough mobile title employing a pre-rendered 3D graphics model seamlessly combined with realtime scaling 2D animation and robust, precise, realtime physics simulation, comprising the company's "Virtual 3D Simulator", extending the 3D experience to the wider market of 2D-capable phones. Wrote tool sets for implementing such simulations including ray-tracing renderer scripts to generate 2D assets while exporting geometry for interpretation by a realtime physics engine and animation framework. Wrote full scalar, vector, matrix, trig and inverse trig fixed-point high-precision math libraries for both BREW and J2ME, complete with a compiler-preprocessor vector math accelerator for J2ME, and optimization for ARM C/c++ compilers. Conceived, specified the design, and supervised the implementation of a threaded-interpreted language for platform-independent dynamic downloadable game logic scripting. Implemented client-side advanced realtime image compositing and transformation libraries for BREW and J2ME, including unprecedented image synthesis techniques for MIDP1 as well as MIDP2, and realtime filtered 3D image perspective transformation for pseudo-3D gameplay from normal 2D animation in BREW. Built both server-side and client-side image processing functionality. Designed and implemented client-side realtime raycasting environment renderer. Generally solved hard problems providing advanced capabilities for the engineering staff.

2004: Mobile Phone Game Engineering — Atlas Mobile

Contracted by Atlas Mobile to optimize J2ME conversion of production BREW title for mobile phone game deployment. Performed code design pattern analysis and effected significant size reduction, refactoring utilizing data-driven architecture. Also wrote BREW Demo (2003) for production game now deployed demonstrating advanced game logic and refined 2D graphic animation and rendering techniques. Technology utilized includes: Java, J2ME, MIDP, C/c++, BREW.

2004: Physics Engineering — Electronic Arts

Contracted on-site by EA Headquarters Central Technology Group to assist in the adoption and integration of middleware physics technology into their authoring toolchain and multi-platform runtime engines. Specific focus on vehicle simulation subsystem, collision system, rendering geometry/physics geometry consolidation, paradigm shifting to incorporate physics into the game environment as a fundamental architecture, and facilitating land vehicle, water vehicle, and water object dynamics formulation and authoring. Technology utilized includes: C/c++, VS.NET, Perforce, Maya, RenderWare core system, game engine, and framework, Havok physics and collision systems.

2002–2003: High Performance Software Engineering — Kinetic Books

Contracted by Kinetic Books to architect and engineer a Java-based physics simulation engine. Transformed client code from a rough port of a scripted multimedia-authoring-tool-based prototype, into a proprietary, commercially-viable, high-performance, platform-and-version-independent Java applet, complete with a platform-independent native C/c++ code library containing optimized implementations of critical-performance code and interfaces to native library-based multimedia resources. Custom architectural and algorithmic developments include: high-speed affine transformed static and animated image compositing with full antialiasing and alpha-transparency independent of Java imaging, optimized realtime 2D animation system utilizing native platform functionality, pseudo-3D framework for CAD-style interactive environments, vector/matrix math library, and unique mathematical numerical solutions to specific problems in: N-body mechanics, refractive optics, graphical realtime wave mechanics, implicit 3D surface and volume rendering. Technology utilized includes: Java, C/c++, QuickTime, Flash, JNI, JDirect.

2000–2001: Demo Development — Gracenote

Designed and implemented VAAR, the prototype for Gracenote's next-generation online interface. Technology utilized includes: OpenGL, Java, Java3D, JPEG2000, XMLRPC.

1999–2000: Research & Development — dIMV Music Visualization Engine and SDK

Designed, implemented, and documented for Gracenote a platform-independent music-oriented signal processing and analysis/specialized 2D graphics engine, for installation in the QCD Player. Music processing features include: physically-modeled programmable resonator banks for musically relevant spectral analysis, physically-modeled ANSI-standard VU meters for perceptually significant volume analysis, and edge-triggered sampling for visually coherent waveform images. Graphic engine features include: compositing blitter with 32-bit alpha-transparency, supersampling antialiasing, parametric resolution, scaling, shearing, rotation, and clipping; and a Volve Map Generator and Image Volver that implement 'rotozoom', 'decay', 'blur', and generalized arbitrarily complex image evolution effects.

1998–1999: Research & Development — dl Physics Realtime Physics Engine

Wrote physics code as an independent consultant for Trilobyte's Baja 1000 Racing, an ambitious extreme offroad racing simulation. Although the project was canceled when the publisher was acquired in a predatory game-industry takeover, and Trilobyte has since dissolved, I continued self-funded development of my proprietary techniques. I can now write precise, robust, simulation code for general multi-rigid-body systems, with unique features including: closed kinematic loops, static and dynamic holonomic and nonholonomic constraints, multiple rigid and deformable slip-stick frictional contacts, and collision impulse processing. The dl Physics engine employs full six-dimensional tensor-based inertial eccentricity modeling, quaternion-based spatial representation, complex multi-DOF linkages, arbitrarily complex and dynamically-changing models, and fully vectorized C code. It can accurately compute kinematics and dynamics for realworld vehicles with complex multilink suspensions, deformable tires, and fully expressed drivetrains, and for robots, or any other articulated mechanisms in realtime on common high performance CPUs.

1993–1997: Programming — Interactive Music CD-ROMs:

Todd Rundgren: No World Order

The world's first true Interactive Music CD. Based on unique AI code to re-compose and re-mix CD-quality music in realtime, I engineered and programmed the product for Philips CD-I, Macintosh, and Windows. Areas of breakthrough engineering included the AI, which was built on a slick mathematical invention we call Slack that computes natural-feeling probabilities for events, realtime compressed audio decoding, playback, and synchronization, my own multitasking kernel, interactive animation, a context-sensitive audio help system, and user-interface styling.

Todd Rundgren: The Individualist Enhanced-CD

A team effort with Ion Music, based on technology I developed called daVR (digital anamorphic Video Renderer) which cohesively combines the functionality of Quicktime VR, rendering full-screen panoramic images in realtime, and a 3D environment 'Doom'-like engine, with high-resolution fully scaled and rendered walls, floor, ceiling, and 2.5D sprites, multiple camera contexts, automated camera moves, and real physical boundaries for wall, sprite, and camera collisions. The emphasis was on fast realtime performance, scriptability, flexibility, reusability, and video special-effects. The daVR engine was written for both Macintosh and Windows.

Primus: Tales From The Punchbowl Enhanced-CD

Produced by Ion Music, used daVR to drive its animated navigation environment.

1996: Programming — Canter Technology

Marc Canter, the founder of Macromedia, Inc., licensed daVR, which I converted to a Director XTRA, for use as a multi-player realtime 3D game engine in the futuristic MediaBar environment.

1989–Present: Partner — Utopia Grokware, Inc.

Utopia Grokware is a Computer Art / Software / Media Synthesis company founded with musician / programmer Todd Rundgren in 1989. Our first title was Flowfazer—Music for The Eye, for the Macintosh, based on unique realtime abstract video synthesis algorithms I developed. Since publishing Flowfazer we have produced GrokGazer—Your Visual Concert Hall (a video tape / laserdisc product) and several image-licensed products, including calendars from Cedco publishing, extremely successful posters from Western Graphics, and a book Music for The Eye: Digital Apparitions from TenSpeed Press. Flowfazer now lives as an iOS app, detailed above.

1991–1994: Programming — NewTek, Inc.

NewTek produced the Video Toaster, for which I developed ToasterLink, a SCSI-based remote control / imaging application that allowed the Toaster to be used as a peripheral for the Macintosh. Hardcore technology included: SCSI driver engineering, image transformation mathematics and processing, and a veritable mountain of user-interface management code.

1991: Programming — Silicon Graphics, Inc.

Ported a demo version of Flowfazer to SGI.

1991: Image Synthesis — Triad, Inc.

Developed my own image rendering tools and produced cover artwork for a British Telecom internationally-published technology brochure.

1989–1990: Programming — Animatrix

Developed dlfX, a realtime image-transition engine for Animatrix's animation authoring tool. Breakthrough engineering included a pipelined modular architecture, recursive enhancement of all transition effects, and a realtime recursive-dithered dissolve, for computer output and NTSC video. Later incorporated into GrokGazer, this effects package allowed the nonstop no-edit realtime recording of a commercially-successful video tape product from a Macintosh II computer.

1987–1988: Design — Macromedia, Inc.

Did preliminary design and specification for a precursor to the Lingo scripting language.

1982–1987: Design and Programming — Lucasfilm, Ltd.

Joined Lucasfilm in the fall of 1982, as a founding member of the Lucasfilm Games Division, now known as LucasArts. There I developed the videogame Ballblazer for the Atari 800 home computer. Now considered a Classic, Ballblazer represented breakthrough engineering in many areas. On a 2MHz 8-bit 6502, with some hardware assistance, written in a Lisp-based Macro Assembler, Ballblazer synthesized 20 frame per second 3D POV video views for two players simultaneously, of a 24-bit precision mathematically modeled realtime physical environment, updated 60 times per second. All imagery was algorithmically synthesized and rendered. User interaction was rich and fluid, with deep physics and rock-solid rendering precision yielding an ultimately intuitive interface. My partner in Ballblazer was the head of the Games Division, Peter Langston, a notable scientist and innovator in the pioneering days of multiplayer Unix networked computer games. As a member of the Lucasfilm Computer Division, I had the privilege of learning computer graphics and signal processing from the leading scientists and creators of those fields: Loren Carpenter, Alvy Ray Smith, Ed Catmull, Tom Duff, Rob Cook, and Andy Moorer.

1980–1982: Systems Programming — Mark Williams Co.

Mark Williams Co. was one of the first software development entities to clone the Unix operating system, which was not publicly available at the time. Their OS was called Coherent, built from the ground-up to be code-compatible with Unix V7. I learned C, systems-level programming, and compiler design, and wrote clones of the sophisticated Unix tools lex and m4, adding my own enhancements, as well as writing a networked multiplayer realtime Spacewar game utilizing a loadable kernel level driver, and a popular clone of PacMan (photographed with former President Ronald Reagan on his tour of a Digital Equipment Corporation plant.)

1978–1980: Hardware Design and Engineering — GIMIX, Inc.

Digital Designer. Created videographic display, videotext display, and remote control devices for GIMIX, Inc., a manufacturer of industrial 6800-based computer systems. Notable was the design and engineering of a programmable-character-set video card for the European market.

Electronic Visualization / Industrial Design Student — UICC

Under the tutelage of pioneers Dan Sandin and Tom Defanti, studied Video Synthesis and Computer Graphics as an Art Student at the University of Illinois, Chicago Campus. Had some of my work displayed at a group show in Paris, France.

Kinetic Art Student — School of the Art Institute of Chicago

Studied the aesthetics of Light, Sound, Fluids, and Mechanisms.

Computer Engineering Student — University of Illinois

At U of I Urbana campus I learned the PLATO computer system, one of the earliest very large multi-user realtime interactive systems with a graphical user interface. Wrote a definitive multiplane animation demo that was used for years afterward as an educational resource. Also wrote a display driver and programming language for the Levine Device, mentioned below, which I used to discover The Weaver, a fascinating animation, with extraordinary complexity and topology, based on a simple repetitive algorithm.

1975–1977: Video Hardware Designer — The Itty Bitty Machine Co, Inc.

The first computer store in the midwestern US, figureheaded by the legendary Ted Nelson (the inventor of HyperText) funded my development of the first hi-res Videographic Display Generator for home computers, dubbed the Levine Device by Ted in his book The Home Computer Revolution. This card was rendered obsolete two years later when Motorola, Inc. announced the first integrated graphics controller-on-a-chip, which coincidentally replicated my design, timing, and specifications almost exactly. Ted made further mention of me, as the author of Ballblazer and as one of the Designers to Watch in the second edition of his Classic book Computer Lib / Dream Machines.

Miscellaneous:

Commercial / Instrument Pilot, former Certified Flight Instructor

Received Private License in 1978, Instrument Rating / Commercial License in 1987, worked for two years as a CFI out of Marin County, California. Gained knowledge and insight into kinesthetics and the art of teaching visual / auditory / reactive skill development.

Musician / Instrumentalist

Specialist in Acoustic & Electric Flute, and African Mbira, near 40 years experience.

Trained Neon Sculpture Artisan

Apprenticed at a Neon shop, learned the art and craft of disciplined perseverance through daily being cut and burned to produce working sculpture made of brilliant tubes of light.

End of Resume: Dave Levine