

Curriculum Vitae

Dr. Gareth Loy, DMA
Stanford, 1980

President, Gareth Loy Consulting
274 Sausalito St., Corte Madera, CA 94925-1641
(415) 927.2916, (415) 847.9663 (cell)
dgl@GarethLoy.com
<http://www.GarethLoy.com>

Synopsis

Litigation Support

- 25 years of experience as a Testifying Expert
- Testified before the ITC
- Testified before a jury in Federal Court
- Expert of record for > 10 IPRs
- 2 Markman claim construction hearings
- 1 Markman tutorial
- Deposed 13 times
- > 30 cases, 25 as Expert of Record
- > 55 reports and declarations
- Subjects: patent, copyright, trademark infringement, inequitable conduct, trade secrets
- Software/source code discovery (UNIX, LINUX, Microsoft, C/C++, Java, ObjectiveC, Lisp, yacc, lex, etc.)

Primary Technologies

- > 43 years industry/academic experience
- **Generalist:** computer science/ senior software engineer/software architect
- **Specialist:** digital signal processing (DSP) digital media, networked media systems for music and audio, digital media streaming

Published Author and Lecturer

- *Musimathics*, two-volume reference on digital audio signal processing and music published by MIT Press
- > 41 peer-reviewed publications in major journals, internationally
- Keynote speaker at MCM2015, London

Academic / Degrees

- Doctorate (DMA) from Stanford (1980)
- Stanford Artificial Intelligence Laboratory (SAIL), 1975–1980
- Stanford Center for Computer Research in Music and Acoustics (CCRMA)
- Lecturer/Researcher UCSD (taught graduate courses in computer science and Digital Signal Processing (DSP) at UCSD, 1980–1990)

Employment

- Apple Computer (1979), reported directly to Jef Raskin
- Frox, Inc.
- Sonic Solutions/Rovi
- Chromatic Research/ATI
- Sony Corporation of America

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Consulting Clients

Buchla Assoc., Philips Semiconductor, Equator Technologies, Raza Microelectronics, Pixim, Inc., Cradle Technologies, Siemens Microsystems, Infineon Technologies, Zoran Corp., Dolby Laboratories, Malleable Technologies, C-Cube Microsystems, TriMedia Technologies, BOPS, Inc., SeaSound LLP, Palm, Inc.

Source Code Discovery

- E-Watch v. Apple — digital watch functions
- Black Hills Media v. Samsung — networked mobile media players
- MobileMedia Ideas v. Apple — media codec, music recording, playlist, image compression and resolution conversion, GPS automobile navigation
- RMail v. Amazon — email authentication and dispatch
- Mirror Worlds v. Apple — OSX system, Spotlight, CoverFlow, Finder, and Time Machine, IOS system, iPod, iPhone, Apple TV, and xServe system and applications
- ValueClick v. Tacoda — behavioral profiling for advertising
- 1st Technology v. Tiltware — black-box forensic analysis of Internet gambling application
- Visto v. Good — file synchronization across server, desktop, cellular network, and mobile handheld devices
- Visto v. RIM — file synchronization across server, desktop, cellular network, and mobile handheld devices
- Premiere International v. Apple — iTunes, iTunes Music Store (ITMS), stem to stern source code analysis
- Digeo v. Audible — audio content, encryption, audio downloading from the Internet, and device integration for handheld players
- Information Technology Innovation v. Motorola — Fortran 77 software program dating from 1986 for factory automation
- Audio MPEG v. Creative Labs — reviewed CL's MPEG decoder source code for noninfringement

Expertise

- Digital Signal Processing (DSP), audio codecs, music technology, acoustics, digital recorders
- Home entertainment systems, set-top boxes
- Large Scale Software Architecture/Analysis in C, C++, Objective-C, Java, Swift, etc.
- Networked digital media, streaming digital media, digital radio
- Mobile apps, cellular networks, iOS iPhone apps, iPad apps, Android apps, PDAs, data synchronization
- Enterprise email apps, Enterprise networked systems
- Factory automation software
- Networked file systems, file backup/restore and archiving
- Media databases, iTunes Music Store
- MPEG, MP3 and MPEG Standards
- On-line gaming
- Internet commerce systems
- Networked digital cameras, CCDs, digital video, DVDs, video codecs
- GPS navigation systems
- Music Technology
- Operating systems
- User interfaces
- Compilers/assemblers
- Real-time computing, parallel processing systems
- Digital watch systems

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Professional Summary

Dr. Loy has over 43 years of academic and engineering experience and 27 year of experience as an expert witness in computer science, software development, network streaming media, embedded systems, enterprise software systems, and digital signal processing for audio and music technology.

He has sustained a long and successful career at the cutting edge of software development and system design using multiprocessor/multi-core architectures for signal processing and control. He has been a Software Architect for multiple projects at various companies and has consulted for a long list of technology companies. Through Gareth, Inc., Dr. Loy provides computer technology consulting, software engineering, and litigation support to high-technology companies, internationally.

Dr. Loy has testified before the International Trade Commission, and before a jury in Federal Court, has testified at Markman claim construction hearings and Markman tutorials in Federal Court, has been deposed over 10 times, and has authored more than 50 reports and declarations. Case types include patent, trademark infringement, copyright, trade secret misappropriation, and inequitable conduct. He has worked on complex international patent cases and has provided expertise in such diverse areas as streaming media systems, handheld networked Personal Information Management (PIM) devices, enterprise email systems, software for factory automation, interactive databases, enterprise software for management of media libraries, MPEG audio compression, on-line gaming, composition systems, digital camera hardware and software, digital audio hardware and software technologies, compilers, file systems, operating systems, and more. (See the Summary of Testifying Experience below.)

Dr. Loy's doctorate is from Stanford, 1980, where he studied under Dr. John Chowning at the Stanford Artificial Intelligence Laboratory and the Center for Computer Research in Music and Acoustics.

He has published widely in various juried journals and has authored three books with the MIT Press, including *Musimathcs*, a two-volume text on the mathematics of music, and *Music and Connectionism*, a collection of articles on artificial neural networks and music research.

He taught graduate and undergraduate courses in computer science and digital audio at UCSD for a decade, cofounded the Computer Audio Research Laboratory there, conducted computer systems research for digital audio, and designed and built several networked digital media computer laboratories.

Education

<u>Year</u>	<u>College or University</u>	<u>Degree</u>
1980	Stanford University	DMA digital signal processing (DSP), computer science (CS), computer systems for audio, real-time computing, and compiler technology. Thesis research: <ul style="list-style-type: none">• Stanford Artificial Intelligence Laboratory (SAIL)• Center for Computer Research in Music and Acoustics (CCRMA) I wrote the compiler for the Systems Concepts Digital Synthesizer, and conducted foundational research in digital audio that led to hardware and software systems to compute digital audio in real time.
1975	San Francisco State University	B.A. Music — music technology, computer science, composition, and classical guitar

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About my Graduate Education

I was teaching analog electronic music at SFSU in 1974 when I became aware of a new program in digital audio signal processing offered at Stanford under the auspices of the Music Department in conjunction with the Stanford Artificial Intelligence Laboratory (directed by Dr. John McCarthy). Dr. John Chowning and Dr. Andy Moorer directed the program, titled Center for Computer Research in Music and Acoustics (CCRMA). This was a critical juncture in digital music technology: CCRMA was the vanguard, leading the transition from analog to digital audio processing technologies that would ultimately remake the fields of music and audio. I helped construct the first (1975) all-digital recording studio there. My graduate research was to build the compiler for the Systems Concepts Digital Synthesizer that CCRMA commissioned from Pete Samson of Systems Concepts. My thesis was a musical composition, "Nekyia" composed for and executed by the Digital Synthesizer. The piece won a Bourges Prize and a National Endowment for the Arts grant.

While I was studying there, the patents that John Chowning developed at CCRMA for audio-band frequency modulation synthesis were licensed to Yamaha Corporation which built the first commercial all-digital music synthesizer, the DX7. The device was so popular that Stanford Licensing received more revenue from Chowning's patents than any other patent-based source at the time. As a consequence, CCRMA is now a department at Stanford with headquarters in the Knoll Building on the Stanford Campus, and it enjoys solid support from the University.

Projects and Skills

- > 43 years experience as a C/C++/ObjectiveC/Java software engineer, software systems architect
- Early Apple employee (1979), worked for Jef Raskin, who reported directly to Steve Jobs
- Lecturer and researcher in computer science, and digital signal processing for a decade at UCSD
- Architected numerous large-scale enterprise software and hardware systems
- Developed and debugged prototype multiprocessor systems, real-time systems, embedded systems, file systems
- Wrote assemblers, compilers, linkers/loaders
- Created hundreds of user-level applications on numerous platforms
- Built home entertainment systems, professional audio recording systems
- Designed, developed and implemented embedded systems for handheld applications
- Direction and management of research and software development projects
- Digital audio signal processing, systems software for custom computing platforms
- Parallel-processing systems software
- Operating systems: PC, UNIX, OSX Mac, iOS iPhone, Windows Developer Studio, LINUX, VxWorks, and WindRiver
- Computer programming language development with yacc and lex
- Real-time programming with VxWorks
- Systems programming, device drivers, file systems, systems administration
- Multiprocessor systems programming
- Multimedia computing
- Designed, debugged, and documented microprocessor Instruction Set Architecture for Philips
- Built automatic document generation systems that created finished documents directly from the commented code source
- Designed software, hardware, and VLSI architectures

Professional Experience

From: 2019
To: Present
Organization: Gareth Loy Consulting, Corte Madera (Marin County), CA.
Title: President
Summary: Provide software and hardware engineering, and litigation support to high-technology companies, internationally.

From: 1998
To: 2019
Organization: Gareth, Inc., Corte Madera (Marin County), CA.
Title: President
Summary: Provide software and hardware engineering, and litigation support to high-technology companies, internationally.

From: 2003
To: 2004
Organization: Sony Corporation of America
Title: Software Architect, Super Audio CD Project
Summary:

- Developed 48-track pro-audio recording system for authoring next-generation audio media, including SACD/DSD audio discs, DVD, and Blu-Ray discs.
- System included synchronous Internet transmission of digital audio, custom hardware interfacing, complex user interface design, real-time operating systems (VxWorks), code development in C++, interfacing to traditional recording devices.
- Improved system design to meet project goals
- Met aggressive project deadlines.
- Specified wireless remote control for managing audio recording and distribution.
- Manager: Ethan Grossman

From: 1994
To: 1998
Organization: Chromatic Research, Inc.
Summary: Senior Information Engineer
1997-1998:

- Wrote hardware architecture documentation for next-generation multi-media processor
- Wrote software API reference documentation for multi-media processor

1994-1997: Senior Digital Audio Engineer

- Reverse-engineered popular FM synthesis chip, and reduced it to software simulation running on Mpact processor.
- Reviewed extensive music synthesis patent law, advised on patent protection strategies and work-arounds to patented signal-processing technologies.
- Led wave-table synthesis project, hired & managed voicers, licensed sound libraries, specified the synthesis architecture, interfaced between marketing, engineering and instrument voicers.
- Developed window-driven interfaces and applications to control Chromatic hardware.

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- Represented Chromatic at the MIDI Manufacturing Association (MMA) Special Interest Group (IASIG) regarding 3D Audio (3DWG — 3D audio industry group of the MIDI Manufacturer’s Association).
- Spearheaded the successful effort to open Microsoft’s 3D audio API to hardware acceleration.
- Consulted on 3D audio subsystem design.

From: 1994
To: 1994
Organization: Sonic Solutions; Novato, CA
Title: Senior Digital Audio Engineer
Summary: Specified, architected, and implemented multitrack-based recording system for automatic dialog replacement (ADR) and Foley, involving user interface design, new core functionality for rapidly capturing and easily comparing multiple session takes.

From: 1988
To: 1993
Organization: Frox, Inc., Milpitas, CA
Title: Digital Audio Systems Architect and Project Lead
Summary: Frox, Inc. manufactured the world’s first all-digital home entertainment system. Based on SUN Microsystems SPARC chip set, 11 custom ASICs, and custom software, the Frox system provided complete digital home theater video and audio via a graphical user interface (GUI) controlled by an infrared (IR) wand-type remote control. I was a project lead for the digital audio subsystem, responsible for controlling external digital storage devices, receiving streams of digital audio, synchronizing them, processing them using a nest of Phillips 68000 DSP engines, and controlling an audio distribution and transmission subsystem to direct audio to digital loudspeakers and recorders. Audio processing included Lucasfilm THX and Dolby ProLogic surround sound. Other audio features included remote digital loudspeakers, concert hall reverberation, digital filtering, and other forms of audio processing.

Details:

- Digital Audio Signal Processing (DSP) architect and lead.
- Member of VLSI design team that developed a custom stream-oriented move engine that linked an array of up to 16 Motorola 56000’s, operating synchronously at the instruction and sample level. Features included subsampling, 24x24 AES-EBU serial link I/O, and both asynchronous parameter update and synchronous data movement to/from a host computer.
- Debugged brass-board and ASIC implementation of move-engine with architects.
- Designed and implemented the user interface, system model, and control system for a parallel-processing multiple-DSP audio subsystem.
- Developed user interface for audio system based on proprietary Frox “wand” remote controller.
- Implemented Lucasfilm THX processing, Dolby ProLogic, concert hall simulation and other forms of audio processing.
- Team lead for Frox digital loudspeaker with digital fiber-optic link to home theater from remote speakers. Design used multiplying DACs to scale audio amplitude in the loudspeaker for high-quality reproduction at all volume levels. Distribution and control was controlled by Frox graphical user interface.
- Wrote marketing documentation, white papers, delivered papers at conferences (AES and ICMA), and wrote support documentation.
- The FroxSystem received the Industrial Design Excellence Award (IDEA) Bronze Award for excellence in User Interface Design; Popular Science

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Magazine's Best of What's New Award for Audio and Video Products,
AudioVideo Magazine's Grand Prix Award, CES/EIA Innovations '93 Award.

From: 1980
To: 1989
Organization: University of California, San Diego, CA
Concurrent appointments: Computer Audio Research Laboratory, Center for Music Experiment, UCSD Music Department
Title: Researcher, Lecturer, Administrator, with concurrent appointment as Director of Research at the Computer Audio Research Laboratory (CARL), part of the Center for Music Experiment (CME), an Organized Research Unit (ORU) of the University of California, San Diego (UCSD)
Summary:

- Lecturer, 3-quarter graduate sequence in computer science, digital audio and computer music.
- Lecturer, undergraduate computer science, digital media, electronic music and computer aided music composition.
- Conducted original research in computer architectures and software for digital signal processing of music and musical performance
- Wrote numerous scholarly articles for various publications on original research topics
- Responsible for development and distribution of the CARL Software Distribution, a collection of research software developed at CARL for use at collaborating sites
- Supervised staff and research assistants, directed projects in digital interfaces for music instrument gesture capture, digital audio, signal processing
- Designed, specified, and installed computing laboratories and instructional facilities

From: 1979
To: 1980
Organization: Apple Computer, Inc., Cupertino, CA
Title: Technical writer
Summary:

- Wrote user manuals for the original Apple II: Fortran, Basic, text editing
- Developed Apple's first self-documenting text editing paradigm
- Worked with Jef Raskin (my boss) on the very earliest research platforms that would eventually become the Macintosh computer. Raskin worked directly for Steve Jobs.

From: 1974
To: 1975
Organization: San Francisco State University
Title: Lecturer
Summary:

- While still a graduate student, I was appointed to be a Lecturer by the Music Department to replace faculty on sabbatical.
- I taught electronic music theory and practice.

Summary of Testifying Experience

- **39 engagements as Expert**
 - 33 as **Testifying Expert** or Expert of Record
 - 6 as **Consulting Expert**
- **Trial testimony**
 - 2014: ITC: Black Hills Media LLC v. Samsung, et al.
 - Two days under oath before the International Trade Commission
 - Deposed 4.5 consecutive days (and lived to tell the tale)
 - 1995: Industrial Indemnity v. Apple Computer
 - Three days jury testimony in Federal Court
- **Markman Claim Construction hearings**
 - 2011: Gibson v. 745 LLC
 - 2011: MONKEYmedia Inc. v. Apple
 - 2011: MONKEYmedia Inc. v. Disney et al.
- **Markman tutorials**
 - 2004: Seer Systems v. Beatnick & Microsoft
- **Depositions**
 - 2018 ClearOne v. Sure (IPR)
 - 2018 ClearOne v. Shure, Biamp Systems, and QSC
 - 2017 Alliance of Artists and Recording Companies (AARC) v. General Motors et al.
 - 2016 Mobile Media Ideas v. Apple (re. design-arounds)
 - 2016 MasterObjects v. Google
 - 2014 IPR: Yamaha v. Black Hills Media
 - 2014 IPR: Yamaha v. Black Hills Media
 - 2013 ITC: Black Hills Media v. Samsung et al.
 - 2012: MobileMedia Ideas v. Apple (re. infringement/validity)
 - 2011: Gibson Guitar v. 745 LLC
 - 2011: MONKEYmedia v. Apple
 - 2011: MONKEYmedia v. Disney
 - 2009: 1st Media. v. Electronic Arts, inequitable conduct
 - 2004: Seer Systems v. Beatnick & Microsoft
 - 1995: Industrial Indemnity v. Apple
- **Case Profile:**
 - IPRs: 11
 - Patent litigation: 39
 - Inequitable conduct: 1
 - Copyright: 2
 - Trade secret misappropriation: 1
 - Trademark infringement: 1

Expert Engagements

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Laurence & Phillips IP Law
Case Name: Shure Inc. v. ClearOne Inc.
Services: **Consulting expert** for invalidity regarding Shumard et al. US Patent Application 16/576549, Adjustable Lobe Shape for Array Microphones. Pub. No.: US 2020/0100025 A1. Pub. Date: Mar. 26, 2020.
Disposition: Settled.
Date: 2022
Contact: mphillips@lpiplaw.com

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Alston & Bird, LLC
Case Name: ITC Section 337 Investigation Of Certain Electronic Devices, Including Streaming Players, Televisions, Set Top Boxes, Remote Controllers, And Components Thereof.
Services: **Testifying expert** for UEI regarding Patents US7589642 and US9911325; drafted expert report; deposed, trial testimony.
Disposition: Won infringement on summary determination (rare).
Date: 2021
Contact: ryan.koppelman@alston.com, Tom.Davison@alston.com, Nick.Tsui@alston.com

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Alston & Bird, LLC
Case Name: Universal Electronics, Inc. (UEI) v. Roku, Inc.
Services: **Testifying expert** for UEI regarding Patents US7589642, US8004389, US9911325 and US9716853.
Disposition: District court case suspended pending concurrent IPRs.
Date: 2019
Contact: ryan.koppelman@alston.com

Expert Engagement:

Type of Matter: IPR
Law Firm: Laurence & Phillips IP Law
Case Name: Shure Inc. v. ClearOne Inc., IPR2017-01785
Services: **Testifying expert** for ClearOne regarding Patent 9,264,553, Methods And Apparatuses For Echo Cancellation With Beamforming Microphone Arrays. Declaration, deposition.
Disposition: IPR **DENIED** by PTO Board; the PTO denial was **AFFIRMED** by Court of Appeals for the Federal Circuit (Case: 19-1755, Filed: 03/06/2020).
Date: 2018 — 2020
Contact: mphillips@lpiplaw.com

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Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Hueston Hennigan
Case Name: ClearOne v. Shure, Biamp Systems, and QSC, United States District Court For The Northern District Of Illinois Eastern Division Mar 16, 2018
Services: **Testifying expert** for plaintiff regarding Patent 9,635,186, Conferencing Apparatus That Combines A Beamforming Microphone Array With An Acoustic Echo Canceller.
Report, declaration, deposition.
Disposition: Ongoing
Date: 2017
Contact: Sourabh Mishra smishra@hueston.com
Alexander Giza, now a judge, was the lead attorney for ClearOne.

Expert Engagement:

Type of Matter: Copyright
Law Firm: Axinn, Veltrop & Harkrider
Case Name: Alliance of Artists and Recording Companies (AARC) v General Motors et al. 1:2014cv01271, United States District Court for the District of Columbia.
Services: **Testifying expert** for plaintiff regarding the Audio Home Recording Act (AHRA) of 1992.
Report, declaration, deposition.
Disposition: On appeal
Date: 2014-2017
Contact: Richard B. Dagen, AXINN, 202.721.5418

Expert Engagement:

Type of Matter: IPR United States Patent Office, *Inter Partes* Review
Law Firm: Kelley Drye & Warren
Case Name: I.M.L. SLU and CoolVision Petitioner v. WAG Acquisition, LLC Patent Owner
Patent owner: WAG Acquisition
Patents: 8,364,839 – IPR2016-01658
8,327,011 – IPR2016-01655
8,122,141 – IPR2016-01656
8,185,611 – IPR2016-01657
Petitioner(s): I.M.L. SLU and CoolVision
Services: **Testifying expert** for invalidity, for **petitioner** I.M.L. SLU and CoolVision
Expert declarations.
Disposition: Submitted to the PTO 8/23/2015.
Date: 2016
Contact: David Yohannan, Beth Jacob, (212) 808-7800

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Heim, Payne & Chorush
Case Name: MasterObjects, Inc., Plaintiff, v. Google, Inc., Defendant. Case No. 15-cv-1775-PJH, United States District Court, N.D. California. May 6, 2015.
Patents at issue: U.S. 8,539,024 — “System and Method for Asynchronous Client Server Session Communication”
Services: **Testifying expert** for **plaintiff** regarding dispositive issues in claim

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Disposition: construction. Declaration. Deposition.
Settled.
Date: 2015–2016

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: DiNovo Price
Case Name: E-Watch, Inc. et al. v. Apple, Inc. et al. 2:13-cv-1061, United States District Court For The Eastern District Of Texas Marshall Division, Mar 25, 2015

Patents at issue: 7,365,871, 7,643,168 — “Apparatus for capturing, converting and transmitting a visual image signal via a digital transmission system”
Services: **Testifying expert** for infringement, **source code discovery** for **plaintiff**.
Disposition: All work for client in this matter has been completed.
Date: 2015

Expert Engagement:

Type of Matter: IPR United States Patent Office, *inter partes* review
Law Firm: Pepper Hamilton
Case Name: Samsung v. Black Hills Media, LLC IPR2014-00709 Patent 8,028,323
Samsung v. Black Hills Media, LLC IPR2014-00711 Patent 8,230,099
Samsung v. Black Hills Media, LLC IPR2014-00723 Patent 8,214,873
Patent owner: Black Hills Media, LLC
Petitioner(s): Samsung Electronics Company, Ltd.
Services: **Testifying expert** for validity, for **patent owner** Black Hills.
Expert reports, deposition.
Disposition: All work for client has been completed.
Date: 2014 – 2015
Contact: Lana Gladstein, Reza Mollaaghababa, Thomas Engellenner, 617-204-5168.

Expert Engagement:

Type of Matter: IPR United States Patent Office, *inter partes* review
Law Firm: Pepper Hamilton
Case Name: Yamaha v. Black Hills Media, LLC IPR2013-00598 Patent 8,214,873 B2
Yamaha v. Black Hills Media, LLC IPR2013-00597 Patent 8,230,099 B2
Yamaha v. Black Hills Media, LLC IPR2014-00733 Patent 8,458,356 B2
Yamaha v. Black Hills Media, LLC IPR2014-00766 Patent 8,214,873 B2
Patent owner: Black Hills Media, LLC
Petitioner(s): Yamaha Corporation of America
Services: **Testifying expert** for validity, for **patent owner**, Black Hills.
Expert reports on validity, deposition.
Disposition: All work for client has been completed.
Date: 2014 – 2015
Contact: Lana Gladstein, Reza Mollaaghababa, Thomas Engellenner, 617-204-5168.

Expert Engagement:

Type of Matter: ITC Patent litigation before International Trade Commission
Law Firm: Mintz Levin
Case Name: Complainant Black Hills Media, LLC v. Samsung, et al. “In the Matter of certain digital media devices, including televisions, Blu-Ray disc players, home theater systems, tablets and mobile phones, components thereof and associated

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software.” Investigation No. 337-TA-882.
Complainant: Black Hills Media, LLC
Respondents: Samsung, LG, Panasonic, Toshiba, Sharp
Patents at issue:

- 8,214,873 — Method, system, and computer-readable medium for employing a first device to direct a networked audio device to render a playlist
- 8,028,323 — Method and system for employing a first device to direct a networked audio device to obtain a media item
- 8,230,099 — System and method for sharing playlists

Services: **Testifying expert** for infringement and validity, source code discovery, for **complainant**.
Two days testimony at ITC hearing in February 2014; 4.5 days of deposition; expert reports on infringement and validity; witness statements on infringement and validity, product testing, Wireshark internet packet analysis; source code analysis.
Disposition: All work for client has been completed.
Date: 2013 – 2014
Contact: James Conley (858) 314-1500, Howard Wisnia (858) 314-1500, Joe Hameline (617) 348-1651.

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Desmarais LLP
Case Name: MobileMedia Ideas LLC v. HTC Corp. and HTC America, Inc., Case 2:10-cv-00112-DF (2:2010cv00112), Eastern District of Texas. Judge Folsom.
Services: **Testifying expert** for **plaintiff** for infringement and validity.
Patents at issue:

- 5,490,170 — Coding apparatus for digital signal

Disposition: Settled
Date: 2011 – 2013
Contact: Jonas McDavit, Desmerais LLP 212-351-3425; Laurie Stempler, Desmerais LLP, 212-351-3423

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Proskauer Rose
Case Name: MobileMedia Ideas LLC v. Apple Inc., Case 1:10-cv-00258-SLR-MPT (1:2010cv00258), Wilmington Delaware, Judge Robinson.
Patents at issue:

- 5,490,170 — Coding apparatus for digital signal
- 6,393,430 — Method and system for automatically recording music data files by using the hard drive of a personal computer as an intermediate storage medium
- 6,446,080 — Method for creating, modifying, and playing a custom playlist, saved as a virtual CD, to be played by a digital audio/visual actuator device
- 7,349,012 — Imaging apparatus with higher and lower resolution converters and a compression unit to compress decreased resolution image data
- 6,725,155 — Method and apparatus for information processing, and medium for information processing
 - GPS routing and navigation systems

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Services: **Testifying expert** for infringement, validity, design-arounds, source code discovery, for **plaintiff**. Source code review, reports on infringement and validity (1/13/2012), depositions on infringement and validity (4/13/2012). Report on design-arounds and deposition on design-arounds (4/14/16) re. the '155 patent.

Disposition: Continuing.

Date: 2011 – 2012

Contact: Current contacts: Safraz Ishmael, 617.526.9712. For work performed in 2012: Alan Federbush, 212.969.3211, John Stellabotte, 212.969.3413

Expert Engagement:

Type of Matter: Patent litigation

Law Firm: Proskauer Rose

Case Name: MobileMedia Ideas LLC v. Research In Motion Limited and Research In Motion Corporation, No. 3:11-cv-02353-N (3:2011cv02353), Northern District of Texas, Judge Godbey.

Patents at issue:

- 6,446,080 — Method for creating, modifying, and playing a custom playlist, saved as a virtual CD, to be played by a digital audio/visual actuator device
- 7,349,012 — Imaging apparatus with higher and lower resolution converters and a compression unit to compress decreased resolution image data
- Digital camera resolution conversion and compression system

Services: **Testifying expert** for **plaintiff** for infringement and validity, source code discovery.

Disposition: Concluded

Date: 2011 – 2013

Contact: Alan Federbush, 212.969.3211, John Kitchura, (617) 526-9676

Expert Engagement:

Type of Matter: Patent litigation

Law Firm: Harness & Dickey

Case Name: Gibson Guitar Corp. v. 745 LLC; Case No. 3:11-cv-00058, before Hon. Sharp, Magistrate Judge Brown, Middle District of Tennessee, Nashville

Patent at issue:

- 5,990,405 — System and method for generating and controlling a simulated musical concert experience

Services: **Testifying expert** for **defendant**, for infringement and validity. Reports, declarations, deposition, Markman claim construction hearing.

Disposition: Settled on terms favorable to my client

Date: 2011 – 2012

Contact: Kara Fussner, Rudolph Telsher, Harness & Dickey: (314) 446-7664

Expert Engagement:

Type of Matter: ITC Patent litigation

Law Firm: Jones Day

Case Name: International Trade Commission (ITC) Ogma v. Activision et al. “On certain motion-sensitive sound effects devices and image display devices and components and products containing same”, Investigation No. 337-TA-773; ALJ Gildea;

Patent at issue:

- 6,150,947 — Programmable motion-sensitive sound effects device

Services: **Testifying expert**: non-infringement/invalidity for **respondent Kyocera**. Prior art research.

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Disposition: Settled.
Date: 2011
Contact: Jose Patiño, Jones Day, now at Foley, 858.847.6700
(Blaney Harper, Jones Day: 202.879.3939)

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Flachsbart & Greenspoon
Case Name: RMail Ltd. v. Amazon.com, Inc. et al., E. Dist. Texas, 2:10-cv-00258-TJW
Patent at issue:

- 6,571,334 — Apparatus and method for authenticating the dispatch and contents of documents
- 6,182,219 — Apparatus and method for authenticating the dispatch and contents of documents

Services: **Testifying expert, software discovery**, infringement analysis for **plaintiff**.
Disposition: Settled
Date: 8/5/2011
Contact: Robert Greenspoon, Flachsbart & Greenspoon 312-551-9500

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Irell & Minella, LLP
Case Name: International Trade Commission (ITC): Microsoft Corporation v. Tivo Inc., “Certain Set-Top Boxes and Hardware and Software Components Thereof”, Investigation No. 337-TA-761 (ITC), No. 2:11-cv-00134 (W.D. Wash.) ALJ: Gildea.
Complainant: Microsoft Corporation
Respondent: Tivo Inc.
Patents at issue:

- 5,585,838 — Program time guide
- 5,731,844 — Television scheduling system for displaying a grid representing scheduled layout and selecting a programming parameter for display or recording
- 6,028,604 — User friendly remote system interface providing previews of applications
- 5,758,258 — Selective delivery of programming for interactive televideo system

Services: **Testifying expert for respondent**. Report written.
Disposition: Settled
Date: 3/28/2011
Contact: Eric Carsten, Chris Vanderlaan, Irell & Minella, (310) 203-7031

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Graves Dougherty Hearon & Moody
Case Name: MONKEYmedia Inc. v. Apple, Inc. Case No. 1:2010cv00319, Texas Western District, Austin, Judge Sam Sparks, patents at issue: Seamless Contraction
Patents at issue: Seamless contraction patents:

- US 6,177,938 — Computer user interface with non-salience deemphasis
- US 6,219,052 — Computer user interface with non-salience deemphasis
- US 6,335,730 — Computer user interface with non-salience deemphasis

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Seamless expansion patents

- US 6,393,158 — Method and storage device for expanding and contracting continuous play media
- US 7,467,218 — Method and storage device for expanding and contracting continuous play media
- US 7,890,648 — Audiovisual presentation with interactive seamless branching and/or telescopic advertising

Services: **Testifying expert** for **plaintiff**: infringement, claim construction. Markman claim construction hearing.

Disposition: Concluded

Date: 2010

Contact: Steve Smit, Graves Dougherty Hearon & Moody: 512-480-5600

Expert Engagement:

Type of Matter: Patent litigation

Law Firm: Graves Dougherty Hearon & Moody

Case Name: MONKEYmedia Inc. v. Disney, Inc. et al. Case No. 1:10-cv-00533-SS, Texas Western District, Austin, Judge Sam Sparks

Patents at issue: Seamless Contraction:

- 6,335,730 — Computer user interface with non-salience deemphasis

Seamless Expansion:

- US 6,393,158 — Method and storage device for expanding and contracting continuous play media
- US 7,467,218 — Method and storage device for expanding and contracting continuous play media
- US 7,890,648 — Audiovisual presentation with interactive seamless branching and/or telescopic advertising

Services: **Testifying expert** for plaintiff: infringement analysis, claim construction.

Disposition: Concluded

Date: 2010

Contact: Steve Smit, Graves Dougherty Hearon & Moody: 512-480-5600

Expert Engagement:

Type of Matter: Patent litigation

Law Firm: Stroock & Stroock & Lavan

Case Name: Mirror Worlds, LLC v. Apple Computer, Inc. Case No. 6:2008cv00088, Texas Eastern District Court, Tyler, Judge Leonard Davis

Patents at issue:

- 6,006,227 — Document stream operating system
- 6,638,313 B1 — Document stream operating system
- 6,725,427 B2 — Document stream operating system with document organizing and display facilities

- 6,768,999 B2 — Enterprise, stream-based, information management system

Services: **Consulting expert** for **plaintiff** (expert of record: Dr. John Levy): infringement analysis. **Source code discovery**. Analysis of Apple Computer OSX operating system source code and applications software source code for products including Spotlight, CoverFlow, Finder, and Time Machine in Tiger and Leopard releases, IOS operating system and applications software source code for iPod, iPhone, Apple TV, and xServe. This was a very large-scale discovery project, requiring analysis of approximately 1.5 billion lines (not bytes, lines) of disclosed source code.

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Disposition: On 10/1/2010 a jury in EDT found Apple willfully infringed, and set a \$625 million dollar judgment. Judge Davis subsequently reversed the judgment while upholding the validity of the patents.
Date: 2009 – 2010
Contact: Kenneth Stein, Stroock & Stroock: 212-806-5491

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Robins, Kaplan, Miller & Ciresi LLP
Case Name: St. Clair Intellectual Property Consultants v. Samsung Electronics Co., Ltd., et al., Case No. 1:04-cv-1436-JJF-LPS (or 1:2004cv01436), United States District Court for the District of Delaware, Judge: Joseph J. Farnan
Patents at issue:

- 5,138,459 — Electronic still video camera with direct personal computer (PC) compatible digital format output
- 6,094,219 — Electronic still video camera with direct personal computer (PC) compatible digital format output
- 6,323,899 B1 — Process for use in electronic camera

Services: **Consulting expert for plaintiff** (expert of record: Tom Gafford): infringement analysis of digital camera technology. Reviewed thousands of digital camera technical drawings, schematics, block diagrams, parts lists, service manuals, engineering product specifications, technical manuals, industry standards, and user guides for specific analog and digital technologies such as CCDs, SDRAM, video DSPs, microprocessors, embedded software APIs, and other camera technologies at issue, wrote reports.
Disposition: All work for client completed in 2009. (Note: Samsung settled before my work on this case began.)
Date: 2009
Contact: Robins Kaplan: Seth Northrop: 612.349.8500; Brock Spect: 612.349.8500

Expert Engagement:

Type of Matter: Inequitable conduct
Law Firm: Flachsbart & Greenspoon, LLC
Case Name: 1st Media. v. doPi Karaoke, Electronic Arts, Inc., Harmonix Music Systems, Inc., Microsoft Corporation, Viacom, Inc. and Sony Computer Entertainment America, Inc., Case No. 2:07-cv-1589-JCM-RJJ, United States District Court, District of Nevada, Judge: Kent J. Dawson, reassigned to Judge James C. Mahan.
Patent at issue: US 5,464,946 — Karaoke information entertainment system
Services: **Testifying expert for 1st Media** re. Inequitable Conduct. Evaluate materiality of pertinent prior art for plaintiff's patent, rendering expert opinion, deposition, declarations, briefs.
Disposition: The Court of Appeals reversed the District Court, finding for 1st Media.
Date: 2009 – 2012
Contact: William W. Flachsbart, Robert Greenspoon, 312-551-9500

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Flachsbart & Greenspoon, LLC
Case Name: ValueClick, Inc. v. Tacoda, Inc., Case No. 2:2008cv04619, California Central District Court, Western Division - Los Angeles Office, Judge Dale S. Fischer
Patents in suit:

- 5,848,396 — Method and apparatus for determining behavioral profile of a

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computer user

- 5,991,735 — Computer program apparatus for determining behavioral profile of a computer user

Services: **Testifying expert** on infringement for **plaintiff**. Patent and technology infringement analysis of Tacoda’s internet behavioral advertising product, rendering expert opinion, declarations, briefs. **Source code analysis**.

Disposition: Dismissed.

Date: 2008 – 2010

Contact: William W. Flachsbart, Robert Greenspoon, 312-551-9500

Expert Engagement:

Type of Matter: Patent litigation

Law Firm: Quinn Emanuel Erquhart Oliver & Hedges, LLP

Case Name: Activision Publishing, Inc. v. Gibson Guitar Corporation.
Case No. CV08-01653 MRP (SHx)
Central District Court of California, Hon. Mariana R. Pfaelzer

Patent at issue:

- US 5,990,405 — System and method for generating and controlling a simulated musical concert experience

Services: **Testifying expert** for **plaintiff**: Patent infringement. Infringement analysis of Activision’s Guitar Hero product, rendering expert opinion, declarations, briefs.

Disposition: Activision sued Gibson for declaratory judgment of patent non-infringement and invalidity and related issues. Activision’s motion for Summary Judgment was granted. The parties subsequently settled.

Date: 2008 – 2009

Contact: James M. Glass (212) 849-7000, Edward J. DeFranco (212) 849-7000

Expert Engagement:

Type of Matter: Copyright litigation

Law Firm: Cooley Godward Kronish LLP

Case Name: Atlantic Recording Corp. et al v. XM Satellite Radio Inc., 06 CV 3733 (LAK)
Famous Music LLC et al v. XM Satellite Radio Inc., 07 CV 2385 (LAK)
Nota Music Publishing, Inc. v. XM Satellite Radio Inc., 07 CV 4682 (LAK)
Southern District Court of New York, Judges Batts and Kaplan

Services: **Testifying expert** for **plaintiff**: Copyright infringement. Analysis of XM Satellite *INNO* product to help determine whether it meets the statutory definition of a Digital Audio Recording Device (DARD) under the terms of the Audio Home Recording Act of 1992.

Disposition: Settled.

Date: 2008 – 2011

Contact: Steven A. Wieder (212) 479-6263

Expert Engagement:

Type of Matter: Patent litigation

Law Firm: Flachsbart & Greenspoon, LLC

Case Name: 1st Technology LLC, v. Tiltware LLC, Civil Action No. 2:06-cv-323-LDG-RJJ,
U.S. District Court, Nevada

Patent in suit:

- 5,564,001 A — Method and system for interactively transmitting multimedia information over a network which requires a reduced bandwidth

Services: **Testifying expert** for **plaintiff**: Internet gambling. Forensic analysis of software application, “Full Tilt Poker” to determine infringement. Software discovery. Wrote

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expert report regarding infringement. Analysis was performed on executable application and DLLs downloaded from Tiltware’s Internet site. Analysis was performed without benefit of source code: use of Internet packet sniffing and reverse engineering of downloaded databases.

Disposition: Settled.
Date: 2008 – 2009
Contact: Robert Greenspoon, 312-551-9500

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: McKool Smith
Case Name: Visto Corporation v. Good Technology, Inc., Case No. 2:06-cv-00039-TJW, U.S. District Court, Eastern District of Texas, Marshall Division, Judge T. John Ward

Patents at issue:

- 6023708 — System and method for using a global translator to synchronize workspace elements across a network
- 6085192 — System and method for securely synchronizing multiple copies of a workspace element in a network
- 6151606 — System and method for using a workspace data manager to access, manipulate and synchronize network data
- 6708221 — System and method for globally and securely accessing unified information in a computer network
- 7039679 — System and method for globally and securely accessing unified information in a computer network

Services: **Consulting expert** for source code discovery for **plaintiff** (expert of record: Tom Gafford): analysis of email server applications regarding synchronization of personal information management (PIM) data to portable, wireless handheld devices (Good Mobile Messaging). Conducted extensive discovery of multiple large enterprise database systems (Microsoft Exchange, Lotus Notes, others), Good’s proprietary network operations systems, and Good handheld devices for Personal Information Management (PIM) manufactured and distributed by Good over the course of 6 years. Conducted detailed review of over 12 gigabytes of C++ and Java source code to establish how PIM data were synchronized between enterprise databases and handheld devices. Longitudinal detailed review of multiple versions of Good’s system.

Disposition: Settled.
Date: 2007 – 2008
Contact: Eric Robinson, Bo Davis, McKool Smith, 214.978.4063

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: McKool Smith
Case Name: Visto Corporation v. Research In Motion, Ltd. (RIM), Case No. 2-06-CV-181-TJW, U.S. District Court, Eastern District of Texas, Marshall Division, Judge T. John Ward

Patents at issue:

- 6023708 — System and method for using a global translator to synchronize workspace elements across a network
- 6085192 — System and method for securely synchronizing multiple copies of a workspace element in a network
- 6151606 — System and method for using a workspace data manager to access, manipulate and synchronize network data

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- 6708221 — System and method for globally and securely accessing unified information in a computer network
- 7039679 — System and method for globally and securely accessing unified information in a computer network

Services: **Consulting expert** for source code discovery for **plaintiff** (expert of record: Tom Gafford): analysis of email server applications regarding synchronization of personal information management (PIM) data to portable, wireless handheld devices (Research In Motion/BlackBerry). Conducted extensive discovery of multiple large enterprise database systems (Microsoft Exchange, Lotus Notes, others), RIM proprietary network operations systems, and RIM handheld devices for Personal Information Management (PIM) manufactured and distributed by RIM over the course of five years. Conducted detailed review of over 130 gigabytes of C++ and Java source code to establish how PIM data were synchronized between enterprise databases and handheld devices. Longitudinal detailed review of multiple versions of RIM's system.

Disposition: Settled.

Date: 2007 – 2008

Contact: Eric Robinson, Bo Davis, McKool Smith, 214.978.4063

Expert Engagement:

Type of Matter: Patent litigation

Law Firm: Vanek, Vickers & Massini

Case Name: Premiere International Associates LLC v. Apple Computer, Inc. No. 05-CV-506, U.S. District Court Eastern District of Texas Marshall Division, Judge T. John Ward.

- Patents at issue:
- 6,763,345 — List building system
 - A system for creating a list of selected works
 - 6,243,725 — List building system
 - A system for creating and editing play lists

Services: **Consulting expert** for source code discovery for **plaintiff** (expert of record: Tom Gafford): white-box analysis of **Apple iTunes software source code** written in C/C++, and iTunes Store (iTMS) enterprise software source code written in java and SAP/ABAP database software. White-box source code analysis was performed on seven versions of iTunes from the original release through version 7.1 for infringement of more than 100 claims. Each version of iTunes constituted in excess of 800,000 lines of C/C++. Analysis was performed on Windows (using Visual Studio .NET IDE) and Macintosh (using XCode and CodeWarrior IDEs). Static analysis of enterprise software source code for Apple's iTunes Store, which handles transactions with iTunes users on the front end and manages a large enterprise database. Over 1.4 million lines of java. Identify relevant files and functions for the various claims, debug the code, plant breakpoints, capture and print stack traces, identify what the program was doing and identify specific lines of code for potential infringement. Conducted extensive source code review of Apple iTunes application to determine potential infringement of playlist technology. Determined the exact manner of iTunes operation for playlist management in the form of stack traces, documented significance of breakpoints to infringement arguments

Disposition: Settled.

Date: 2006 – 2007

Contact: Joe Vanek, Vanek, Vickers & Massini, 312.224.1502

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Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Quarles & Brady
Case Name: Case settled early.
Patents at issue:

- 5,693,902 — Audio block sequence compiler for generating prescribed duration audio sequences
- 5,877,445 — System for generating prescribed duration audio and/or video sequences

Services: **Testifying expert for plaintiff** – music composition, software architecture, digital audio. Analyzed Sony Corporation of America product Cinescore 1.0. Reviewed Cinescore 1.0 for potential infringement of patents relating to automatic composition of music. The patents covered a method of music composition by audio segment concatenation. Drafted infringement report.

Disposition: Settled.
Date: 2007
Contact: David R. Cross, Quarles & Brady 414.277.5669

Expert Engagement:

Type of Matter: Patent litigation
Firm: S-Systems, Inc.
Case Name: Digeo, Inc. v. Audible, Inc., Case No. C05-00464-JLR, Seattle.
Patent at issue:

- 5,734,823 — Systems and apparatus for electronic communication and storage of information

Services: **Consulting expert for plaintiff:** software architecture, digital audio. Analysis of a large (over 13,000 files) C++ project that implemented a Windows .NET application to perform management of audio content, encryption, audio downloading from the Internet, and device integration for handheld players. The assignment was to determine whether the application could be shown to infringe patent claims. I was tasked to identify the relevant files, compile them, correct program errors and create workarounds so that the executing application could be evaluated, evaluate the execution of the code, plant breakpoints, walk the stack, identify what the program was doing and identify specific lines of code for potential infringement.

Disposition: Settled.
Date: 2006
Contact: Please contact Gareth Loy for information about this reference.

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Wilmer Hale
Case Name: Information Technology Innovation, LLC v. Motorola, Inc. et al.
Patent at issue:

- 4,796,194 — Real world modeling and control process
 - A process for modeling a manufacturing plant

Services: **Testifying expert for plaintiff, source code discovery.** Wrote infringement report evaluating a 1300-line Fortran 77 software program dating from 1986. Project required me to compile and run the software, which involved identifying numerous bugs in the code and providing workarounds so that the code could be evaluated at runtime.

Disposition: Settled.
Date: 2006

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Contact: John Hintz: John.Hintz@WilmerHale.com

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: McDermott, Will & Emery
Case Name: Audio MPEG, Inc. v. Creative Labs, Inc., Creative Holdings, Inc., and Creative Technology Ltd., Case No. 2:05CV185-JBF-FBS

Patents at issue:

- Rault et. al., 5,214,678 — Digital transmission system using subband coding of a digital signal
- Lokhoff 5,777,992 — Decoder for decoding and encoded digital signal and a receiver comprising the decoder
- Lokhoff 5,323,396 — Digital transmission system, transmitter and receiver for use in the transmission system
- Lokhoff 5,539,829 — Subband coded digital transmission system using some composite signals
- Grill et al. 5,579,430 — Digital encoding process
 - A digital coding process for at least one of transmitting and storing acoustical signals

Services: **Testifying expert for defendant:** source code discovery, mathematics of digital signal processing (DSP) regarding MPEG/MP3 audio, subband coding, frame size, and intensity stereo. Detailed claims analysis. Wrote numerous reports regarding the mathematics of MPEG/MP3 encoding/decoding process. Researched the history of the development of this highly mathematical discipline from its origins in the short time Fourier transform through its modern implementations by Fraunhofer and others.

Disposition: Settled.
Date: 2005 – 2006
Contact: McDermott: Robert Blanche, Chris Bright, Lucy Koh.
Note, Lucy Koh, Creative’s lead attorney, is now a judge.

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Weil, Gotshal, Manges
Case Name: Seer Systems, Inc. v. Beatnick, Inc. & Microsoft Inc., Case No. C 03 4636 JSW (EDL), Northern District of California, San Francisco Division, Judge: Hon. Jeffrey S. White.

Patent at issue:

- 5,886,274 — System and method for generating, distributing, storing and performing musical work files

Services: **Testifying expert for defendant** Microsoft: music composition systems, MIDI, networking.
Deposition: Markman tutorial presented before Judge White.

Disposition: Settled.
Date: 2004
Contact: Jared Bobrow: 650.802.3034, Perry Clark: 415-439-1938

Expert Engagement:

Type of Matter: Patent litigation
Law Firm: Orrick, Herrington, Sutcliffe
Case Name: Aureal Semiconductor, Inc. v. Creative Technology Ltd., et al., Northern Dist. of Cal, Civil Action No. C98-4550 MHP

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Patent at issue:

Services: **Testifying expert for plaintiff:** infringement and source code discovery regarding a means of rendering 3D digital audio.

Disposition: Dismissed.

Date: 1999 – 2000

Contact: Lisa-Marie Schull (State Bar 196132)

Expert Engagement:

Type of Matter: Trademark infringement

Law Firm: Buchalter Nemer Fields & Younger

Case Name: Industrial Indemnity Co. v. Apple Computer, Inc.

Services: **Testifying expert for plaintiff:** digital audio and music technology
Deposition taken; testified before a jury at trial. Presented several demonstrations of Apple Computer music and audio technology to the jury followed by cross and direct examination. On the stand three days under oath.

Disposition: Won on appeal.

Date: 1994 – 1995

Contact: Stephen Sommerhalter: ssommerhalter@buchalter.com (retired)

Consulting Experience

- Buchla & Assoc. — Developed software architecture and implemented all software for the Buchla 259e Programmable Complex Waveform Generator. Features include dual digital oscillators (modulating and carrier) with various waveforms, FM, AM, waveshaping, soft and hard sync, MIDI control, presets, control panel, knobs, switches and control voltages. (See <http://www.buchla.com> and search for 200e and 259e). C/C++
- ATI/Chromatic Research — Algorithm development for audio synthesis and processing on MPACT1 DSP microprocessor.
- Frox, Inc. — Architected, developed, debugged, implemented, and shipped an ambitious multi-DSP digital home entertainment system
- Philips Semiconductor — Developed and licensed a custom C++ MSDEV application software to Philips that documented a large instruction set for a 64-bit media processor from the machine description sources. Developed a separate program to verify the correctness of the pseudocode implementation of all instructions
- Equator Technologies — Extended their C/C++ compiler to automatically document Equator's Application Programming Interface (API) source code for their DSP, written in C
- BOPS, Inc. — C/C++ optimizing compiler for their scalable multi-DSP processor system
- SeaSound, LLP — SeaSound Solo digital audio processing system
- Palm, Inc. — C++ Generic Conduit System
- Raza Microelectronics — XLR family of Threaded Processors, Programmer's Reference Manual
- Pixim, Inc. — Advanced wide dynamic range video camera CCD sensor technology. Developer's Guide, white papers, Theory of Operation
- Philips Semiconductor — Ethernet MAC for TriMedia processor architecture
- Cradle Technologies — Design kit guide for their Hammerhead videoconferencing system including development system setup, chip architecture, software APIs, software development tools, and debugging
- Siemens Microelectronics — Data Book for TriCore TC10 embedded processor, User Guide for TriCore simulators
- Infineon Technologies — Infineon MPSystem, a single-core 32-bit microcontroller DSP Architecture for real-time embedded systems, Data Book

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- Zoran Corporation — Vaddis ZR36730 Integrated DVD Decoder chip, User Guide
- Dolby Laboratories — Market evaluation for AC3 encoding
- Sony, Inc. — Sonoma Digital Audio Workstation
- Malleable Technologies — Architecture documents and data sheets for VoIP DSP core
- C-Cube Microsystems — Ziva-Kit DVD decoder architecture; DVD decoding white paper
- TriMedia Technologies, Inc. — TM1100 and TM1300 audio and video I/O subsystems, memory management system, and instruction compression system, Data Book

Professional Affiliations, Achievements & Awards

- Senior Member, Association of Computing Machinery (ACM)
- Senior Member, Institute of Electrical and Electronics Engineers (IEEE)
- Member, American Association for the Advancement of Science (AAAS)
- Member, International Computer Music Association (ICMA)
- Member, Audio Engineering Society (AES)
- Management Incentive Award, UCSD (1988)
- Fellow, Deutscher Akademischer Austauschdienst (DAAD), Berliner Künstlerprogramm, Berlin (1986)
- Bourges Prize, Digital Electroacoustic Music category (1981)
- National Endowment for the Arts grant recipient (1981)

Publications

1. Loy, Gareth, “Music, Expectation, and Information Theory” in G. Pareyon et al., *The Musical-Mathematical Mind — Patterns and Transformations*, Springer, 2017, ISSN 1868-0305.
2. Loy, Gareth, “Life and Times of the Samson Box”, *Computer Music Journal*, Fall 2013, 37(3), Pages 26-48.
3. Loy, Gareth, “The Systems Concepts Digital Synthesizer: An Architectural Retrospective”, *Computer Music Journal*, Fall 2013, 37(3), Pages 49–67.
4. Loy, Gareth, “Mars in 3D”, *Computer Music Journal*, Fall 2013, 37(3), Pages 101–103.
5. Loy, Gareth, *Musimathics — The Mathematical Foundations of Music, Vol. 2*, Cambridge: MIT Press. 2007. Reprinted with corrections 2013.
6. Loy, Gareth, *Musimathics — The Mathematical Foundations of Music, Vol. 1*, Cambridge: MIT Press. 2006. Reprinted with corrections 2011.
7. Loy, Gareth and John Snell, “[Stephen Travis Pope: Ritual and Memory](#)”, *Computer Music Journal* 34(3), Fall 2010. Record review.
8. Loy, Gareth, “[The CARL System: Premises, History, and Fate](#),” *Computer Music Journal* 26(4), Winter 2002.
9. Eric Lyon, Max Mathews, James McCartney, David Zicarelli, Barry Vercoe, Gareth Loy and Miller Puckette, “[Dartmouth Symposium on the Future of Computer Music Software: A Panel Discussion](#)”, *Computer Music Journal*, 26(4), Winter, 2002.
10. Loy, Gareth, et al., “Why Is Good Electroacoustic Music So Good? Why Is Bad Electroacoustic Music So Bad?”, *Computer Music Journal*, 18(3), Autumn, 1994. <https://www.jstor.org/stable/3681173>.
11. Loy, Gareth, “The Frox Digital Audio System,” *Proceedings of the International Computer Music Conference* (San Jose), San Francisco: International Computer Music Association, 1992.

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12. Todd, P. and Loy, Gareth, eds., [*Music and Connectionism*](#), Cambridge: MIT Press, 1991.
13. Loy, Gareth, "[Connectionism and Musiconomy](#)", *Music and Connectionism*, P. Todd and G. Loy, eds., Cambridge: MIT Press, 1991.
14. Loy, Gareth, "[Composing with computers — a survey of some compositional formalisms and programming languages for music](#)," *Current Directions in Computer Music*, Max Mathews, John Pierce, eds., Cambridge: MIT Press, 1990.
15. Loy, Gareth, "Second Special Issue on Parallel Distributed Processing and Neural Networks", *Computer Music Journal*, 13(4), Winter 1989.
16. Loy, Gareth, "Special Issue on Parallel Distributed Processing and Neural Networks", *Computer Music Journal*, 13(3), Fall 1989.
17. Loy, Gareth, "On the scheduling of parallel processors executing synchronously," *Proceedings of the International Computer Music Conference*, San Francisco: International Computer Music Association, 1987.
18. Loy, Gareth, "[Whither MIDI](#)," *Computer Music Journal*, 11(1): 9-12, 1987.
19. Loy, Gareth, "Designing a computer music workstation from musical imperatives," *Proceedings of the International Computer Music Conference*, San Francisco: International Computer Music Association, 1986.
20. Loy, Gareth, "Player — Tutorial Introduction," Technical Memorandum, UCSD: Center for Music Experiment, 1986.
21. Loy, Gareth, "Player — an experimental music composition language with real-time capabilities" *Proceedings of the International Computer Music Conference (Rochester)*, Computer Music Association, San Francisco, 1983.
22. Loy, Gareth and Abbott, Curtis, "[Programming languages for computer music synthesis, performance, and composition](#)," *ACM Computing Surveys*, 17(2), June, 1985. Also published in Japanese by the *ACM Computing Surveys in Bit*.
23. Loy, Gareth, "[About AUDIUM: an interview with Stanley Shaff](#)," *Computer Music Journal*, 9(2): 41–48, 1985. Interview.
24. Loy, Gareth, "[Musicians make a standard: the MIDI phenomenon](#)," *Computer Music Journal*, 9(4): 8–26, 1985.
25. Loy, Gareth, "[Curtis Roads and John Strawn, editors: Foundations of computer music](#)," *Computer Music Journal*, 9(3): 80–81, 1985. Book review.
26. Loy, Gareth, "Designing an operating environment for a real-time performance processing system," *Proceedings of the International Computer Music Conference (Vancouver)*, San Francisco: International Computer Music Association, 1985.
27. Loy, Gareth, "MIDI: a critical overview," Acoustical Society of America, Invited paper for Musical Acoustics III: Real-Time Music Synthesizers, Abst.: *JASA Suppl.* 77(1): S74, 1985.
28. Loy, Gareth, "Computer music research using SUN workstations at the Computer Audio Research Laboratory," SUN Users Group Los Angeles, SUN Users Group, Palo Alto, CA, 1985.
29. Loy, Gareth, "Player — extensions to the C programming language for parallel processing run-time music synthesis control," *Proceedings, MIDISOFT*, San Francisco, 1984.
30. Loy, Gareth, "[Allen Strange: Electronic music — systems, techniques, and controls, 2nd edition](#)," *Computer Music Journal*, 7(4): 60–61, 1983. Book review.
31. Loy, Gareth, "Applications of digital signal processing in computer music," Acoustical Society of America, Invited paper, Special Plenary Session: "Applications of Signal Processing in Acoustics", Abst., *JASA Suppl.*, 74(1): S36, 1983.
32. Loy, Gareth, "[The composer seduced into programming](#)," *Perspectives of New Music*, 19(1): 184–198,

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- 1982.
33. Loy, Gareth, "A sound file system for UNIX," *Proceedings of the International Computer Music Conference* (Venice, Italy), San Francisco: International Computer Music Association, 1982.
 34. Loy, Gareth, "System design for computer music at the Computer Audio Research Laboratory, UCSD," IEEE 1982 Region VI Conference, Invited paper for the session on Computer Systems and Applications, San Diego, 1982.
 35. Loy, Gareth, "[Notes on the implementation of MUSBOX, a compiler for the Systems Concepts Digital Synthesizer](#)," *Computer Music Journal*, 5(1): 13–33, 1981.
 36. Loy, Gareth, *Nekyia*, Ann Arbor, Michigan: University Microfilms, 1980. Stanford University Department of Music DMA thesis.
 37. Loy, Gareth, "Systems Concepts Digital Synthesizer operations manual and tutorial," Stanford University Report STAN-M-6, Stanford University: Department of Music, 1980.
 38. Loy, Gareth, "[Sonic landscapes, electronic and computer music by Barry Truax, and Studies for trumpet and computer by Dexter Morrill](#)," *Computer Music Journal*, 2(1): 60–61, 1978. Record review.
 39. Loy, Gareth, "[New directions in music — Significant contemporary works for the computer](#)," *Computer Music Journal*, 2(4): 6–8, 1978. Record review.
 40. Loy, Gareth, "The Dartmouth digital synthesizer, electronic music by Jon Appleton, Lars-Gunnar Bodin, Russell Pinkston & William Brunson," *Computer Music Journal*, 1(2): 61, 1977. [Table of Contents](#).
 41. Loy, Gareth, "Studio report, CCRMA, Stanford University," *Proceedings of the International Computer Music Conference* (UCSD), San Francisco: International Computer Music Association, 1977.
 42. Loy, Gareth, "The all-digital recording studio at Stanford University," *Proceedings of the International Computer Music Conference* (MIT), San Francisco: International Computer Music Association, 1976.

Lectures

- 2017 "A Theory of Musical Interest", Keynote presentation at the Rennselaer Polytechnic Institute Art_x Symposium on Music, Sound and Mathematics, October 25, 2017.
<http://www.hass.rpi.edu/pl/hass-events/?objectID=100004328>
- 2017 "Why do we listen?", Presented to the Hearing Seminar, Center for Computer Research in Music and Acoustics (CCRMA), Stanford University, Stanford, CA, October 20, 2017.
- 2015 "Steps to a theory of musical interest", Conference Keynote Speech, delivered to the International Conference on Mathematics and Computation in Music (MCM2015), Queen Mary University (QMUL), London, June, 2015.
- 2014 "Mathematical basis for expectation in music", delivered to the International Congress on Music and Mathematics (ICMM), Puerto Vallarta, Mexico, November 2014.
- 2011 "Music, Expectation, and Information Theory", delivered to the American Association for the Advancement of Science (AAAS) conference, San Diego, CA, June 14, 2011.
- 2011 "Software Discovery — Best Practices", delivered with Tom Gafford to the IEEE CNSV, Sunnyvale, CA, May, 2011.
- 2009 "Introduction to the Mathematics of Music" Private lecture, Fairfax, CA, February 2009.
- 2007 "A Brief History of Musical Scales." Presented to the Ear Club, Psychology Dept., University of California, Berkeley, February, 2007.

Dr. Gareth Loy – Curriculum Vitae

- 2007 “Musical Scale Builders — the First Psychoacousticians.” Presented to the Hearing Seminar, Center for Computer Research in Music and Acoustics (CCRMA), Stanford University, Stanford, CA, May, 2007.
- 2007 “Music, Expectation, and Information Theory.” Presented to the Music and Human Behavior conference, Stanford Graduate Summer Institute 2007 (SGSI07) held at CCRMA, Stanford University, Stanford, CA, facilitated by Vinod Menon and Jonathan Berger, September 2007.
- 2007 “Information Theory and Expectation in Music.” Presented to the NSF Integrative Graduate Education and Research Traineeship Program (IGERT) seminar series at UCSB, November 30th, 2007, facilitated by Stephen Travis Pope and Curtis Roads.
- 2006 “The Grand Story of Musical Scales.” Presented to the Audio Engineering Society 121st Convention, San Francisco, August, 2006.