

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
SAMSUNG ELECTRONICS AMERICA, INC., and
SAMSUNG TELECOMMUNICATIONS AMERICA, LLC,
and
LG ELECTRONICS, INC., LG ELECTRONICS U.S.A., INC., and
LG ELECTRONICS MOBILECOMM U.S.A., INC.,
Petitioners,

v.

BLACK HILLS MEDIA, LLC,
Patent Owner.

Case No. IPR2014-00711
U.S. Patent No. 8,230,099

DECLARATION OF GARETH LOY, D.M.A.

I, Gareth Loy, hereby declare and state as follows:

I. INTRODUCTION

1. I have been retained by counsel for Patent Owner, Black Hills Media, LLC (“Patentee”) to provide opinions in connection with *Inter Partes* Review No. IPR2014-00711 of U.S. Patent No. 8,230,099 to Martin Weel (Ex. 1001, “the ‘099 patent”). I am the same Gareth Loy who submitted a declaration in connection with *Inter Partes* Review No. IPR2013-00597 on the ‘099 patent and IPR2013-00598 on the U.S. Patent No. 8,214,873 (“the ‘873 Patent”), both made of record in the present IPR2014-0711 as Exhibits 2012 and 2007, respectively, and incorporated herein by reference in its entirety. A current copy of my curriculum vitae is attached hereto as Exhibit A.

2. For purposes of this declaration, I have been asked to opine on the disclosures of U.S. Patent Application No. 2002/0072817 to Champion (“Champion,” Ex. 1004) and U.S. Patent 7,668,939 to Encarnacion (“Encarnacion,” Ex. 1005). I have provided my opinions on the state of the prior art, the construction of the term “playlist,” the teachings of the ‘099 patent, and the disclosure of U.S. Patent Application No. 2002/0087996 to Bi (“Bi,” Ex. 1003) in my prior declaration, submitted as Exs. 2007 and 2012 in the instant proceeding.

II. QUALIFICATIONS

3. I am the President of Gareth, Inc., which provides software engineering, consulting, and litigation support to high-technology companies

internationally. Gareth Inc. provides research and development services including product development, coding and documentation. Gareth Inc. also provides a wide variety of software engineering services including embedded systems, real-time systems, operating systems support and development, file systems, compilers, parallel processing systems, and digital signal processing (DSP) systems.

4. Gareth Inc. has prepared and provided compilers, interpreters and assemblers, enterprise software systems, chip architectures, software architectures, realtime operating systems, home entertainment systems, embedded systems, instruction set architectures, datasheets, databooks, user guides, and custom automated documentation systems. Technology clients have included Infineon, Philips Semiconductor, Trimedia Technologies, Equator Technologies, Pixim, Inc., Palm, Inc., Sonic Solutions, Sony Corporation of America, Chromatic Research, Raza Microelectronics, Cradle Technologies, Siemens Microelectronics, Zoran Corporation, Dolby Laboratories, and C-Cube Microsystems.

5. I have over 38 years of academic and professional experience in computer science, software development, embedded systems, networking, enterprise software systems, digital audio signal processing, and music technology. I received my doctorate from Stanford University in 1980, where I studied under John Chowning at the Center for Computer Research in Music and Acoustics,

which was a center within the Stanford Artificial Intelligence Laboratory directed by John McCarthy at the time.

6. I was an early Apple Computer employee, having been hired there in 1979 full time while still in graduate school. I worked for Jef Raskin who reported directly to Steve Jobs, founder and CEO of Apple Computer. I left Apple in 1980 to teach at UCSD where I taught, for a decade, graduate and undergraduate courses in computer science and digital audio, and cofounded the Computer Audio Research Laboratory there.

7. I have published widely in various peer-reviewed journals, and have authored three books with the MIT Press, including Musimathics, a two-volume introduction and reference to the mathematics of music.

8. I have been a Software Architect for multiple consumer and professional products for large international electronics companies and have sustained a long and successful career at the cutting edge of software development and multimedia computing.

9. I am experienced in a variety of computer science domains, ranging from embedded systems, digital home entertainment systems, graphical user interfaces, real-time operating systems, parallel processing systems, signal processing computers, device drivers, and software for film, music, and audio. I have extensive experience in use of multiprocessor/multicore architectures to solve

problems in digital audio signal processing. I have also provided expertise in compiler design, file systems, operating systems, handheld networked Personal Information Management (PIM) devices, network audio streaming systems, wireless remote control systems, digital loudspeaker systems, digital home entertainment systems, enterprise email systems, software for factory automation systems, interactive databases, enterprise software for managing of music libraries, MPEG audio compression, on-line gaming, composition systems, digital camera hardware and software, digital audio hardware and software technologies, and more.

10. I also have over seventeen years of experience as an expert witness on numerous cases. Most recently, I testified at an International Trade Commission Investigation No. 337-TA-882 hearing involving the Weel '873 and '099 patents. I have also testified before a jury under oath, have provided Markman claim construction testimony, and have presented exhibits and Markman tutorials in federal court in trademark infringement, inequitable conduct, and patent technology litigation. I have been retained as an expert witness in such areas as software for handheld networked Personal Information Management (PIM) devices, digital music player software, enterprise email systems, software for factory automation systems, digital camera hardware and software, internet customer tracking systems, SAP billing systems, interactive databases, software for

management of music libraries, Digital Audio Recording Devices (DARD), MPEG audio compression, on-line gaming, human interface design, music composition systems, MIDI systems, network audio streaming systems, rendering of 3D digital audio, and digital audio hardware and software technologies.

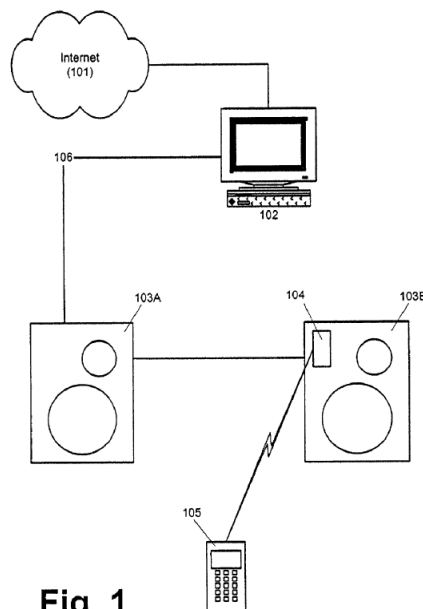
11. In connection with forming my opinions, I reviewed the '099 patent and the art on which the trial was instituted. I also reviewed the April 21, 2014, Declaration of Kevin C. Almeroth, Ph.D. and the Institution Decision as they relate to the grounds instituted by the Board. In addition, I attended Dr. Almeroth's January 9, 2015, deposition, and reviewed his deposition transcript. My opinions are set forth below. I make these statements based upon facts and matters within my own knowledge or on information provided to me by others. All such facts and matters are true to the best of my knowledge and belief.

III. DEFINITION OF THE PERSON OF SKILL IN THE ART

12. I understand that the Patent Owner proposed a definition of a person of ordinary skill in the art as having a bachelor's degree in computer science or electrical engineering and one year of practical experience with networked media. I agree with that definition.

IV. U.S. PATENT APPLICATION PUBLICATION NO. 2002/0072817 TO CHAMPION (“CHAMPION”)

13. A person of ordinary skill in the art would understand that Champion is generally directed to “. . . a system and method for requesting, obtaining and using multimedia files or data streams for audio and audiovisual entertainment on a home entertainment system” (Ex. 1004 at ¶ 0001). FIG. 1 of Champion a system that “includes a computer (102) which is connected to the Internet (101).” (*Id.* at ¶ 0030). The computer (102) can download audio or audiovisual data files that are available on the Internet. (*Id.*). Further, the computer (102) can access streams of audio or audiovisual data that are transmitted over the Internet (101). (*Id.*) The computer (102) has a digital connection (106) to a number of speakers (103). (*Id.* at ¶ 0031).



14. Champion's system further "includes a remote control unit (105) which communicates wirelessly with a wireless transceiver (104) which is located in each speaker or pair of speakers (103)." (*Id.* at ¶ 0039). The remote control unit (105) "can be used to control the audio programming output by the computer (102) to the speakers (103)." (*Id.* at ¶ 0040). FIG. 3 of Champion, which is reproduced below, provides a more detailed view of the remote control unit (105).

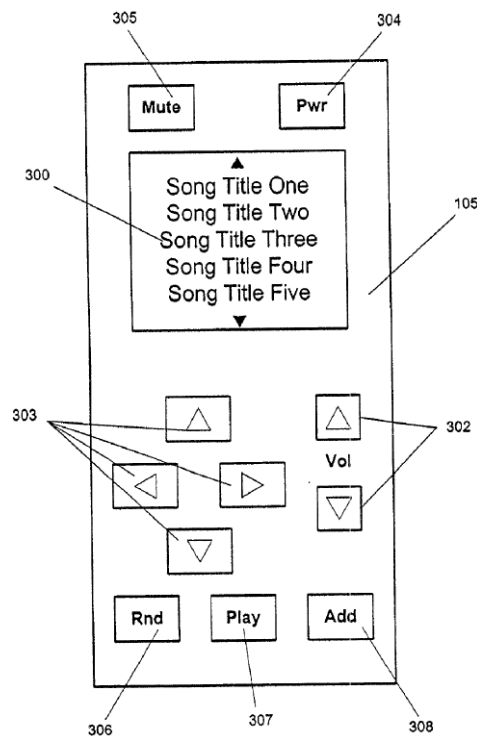


Fig. 3

15. Champion states: "As shown in FIG. 3, the remote control unit (105) preferably includes a display device (300), such as a liquid crystal display (LCD), on which information received from the computer (102) can be displayed." (*Id.* at ¶ 0042). The display (300) "may be used to display, for example, a listing of

available audio files, *e.g.*, song titles, that can be retrieved by the computer (102) and output through the speakers (103).” (*Id.*). Alternatively, the display (300) may be used to display “a listing of on-line radio stations or other streaming audio sources from which the computer (102) can receiving [sic] streaming audio over the Internet (101).” (*Id.*).

16. “In the remote control unit (105) of FIG. 3, a group of four buttons (303) is preferably provided for moving a cursor or highlight bar over the display (300).” (*Id.* at ¶ 0043). “In the listing shown in group (303) could be used to move a cursor or highlight up and down through the listing of audio files on the display (300).” (*Id.*). “When a desired audio file or audio data stream is indicated by the cursor, the user can preferably press a ‘play’ key (307) to have that audio file or audio stream sent to the speakers (103) by the computer (102).” (*Id.*).

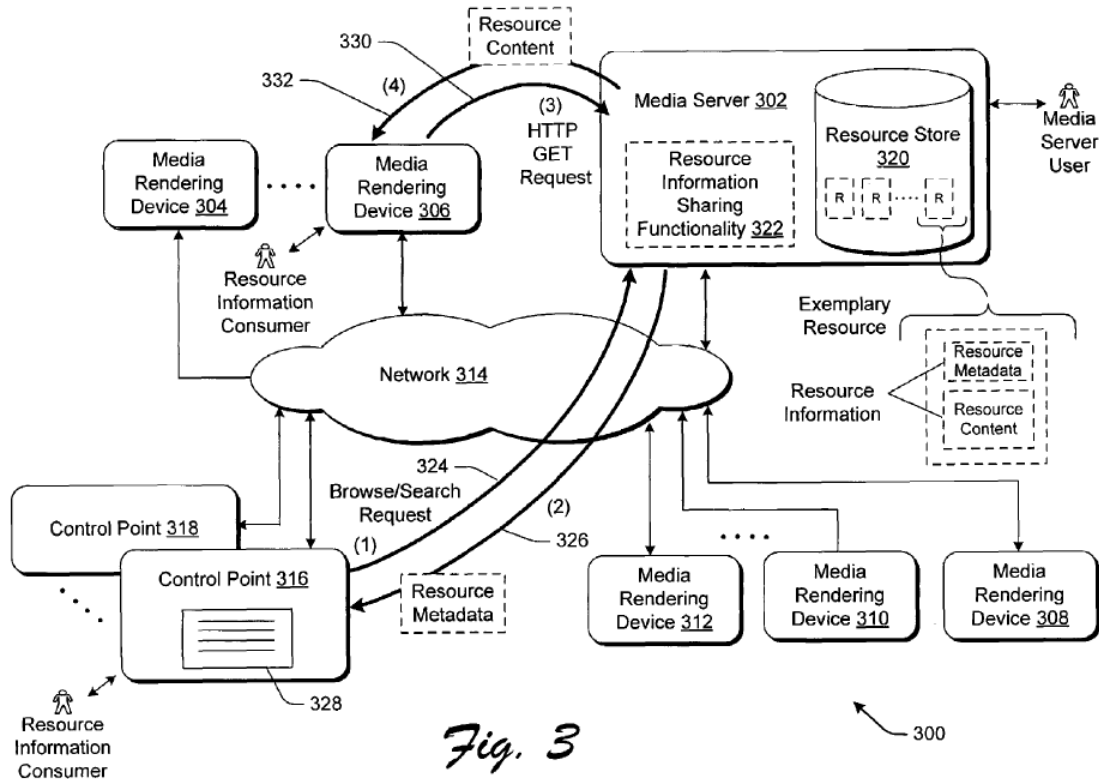
17. “Additionally, the user may want to create a listing of several audio files to be retrieved and output in a specified order, *i.e.*, a play-list.” (Ex. 1004 at ¶ 0044). Champion, however, does not disclose that its remote control unit (105) **receives** a playlist. Rather, Champion discloses that a user can employ the control unit (105) to **create** playlist. (Ex. 1004 at ¶ 0044). “Accordingly, the user can **create** such a play-list with the system of the present invention by using the four buttons (303), or an equivalent device, to indicate an audio file from the listing on the display (300) and pressing the ‘add’ key (308) to add that file to the play-list.”

(*Id.*). “When the user has successively added all the desired files to the list, the user can press the “play” key to play the list.” (*Id.*). “The audio files are preferably retrieved and output in the same order that were designated in the play-list.” (*Id.*). “Alternatively, the computer (102) may be instructed to output by files in a random order by actuation of the ‘random’ key (306) on the remote control (105).” (*Id.*). “Once the play-list is playing, the user may use, for example, the left and right buttons of the button group (303) to skip through or repeat songs from the play-list.” (*Id.*).

V. U.S. PATENT No. 7,668,939 TO ENCARNACION (“Encarnacion,” Ex. 1005)

18. Encarnacion is directed to a media server in a Universal Plug and Play (UPnP) network that is capable of controlling the distribution of resource information regarding resources to rendering devices. (Ex. 1005 at Abstract). “In one case, the resource sharing device consults a criterion to determine whether an identified network device is authorized to receive resource information. In another case, the resource sharing service consults another criterion to determine whether a specified individual associated with the media server must consent to the transfer of the resource information in order for the transfer to occur.” (*Id.* at Abstract).

19. In Fig. 3, Encarnacion illustrates a network architecture 300 that includes a plurality of UPnP devices (302-312) that are coupled together via a UPnP network 314. (Ex. 1005 at 7:65-8:2).



20. “The devices (302-312) include the above-mentioned media server 302 and a plurality of media rendering devices (304-312).” (Ex. 1005 at 8:2-4). “The UPnP network 314 also optionally includes one or more control points (316, 318).” (Ex. 1005 at 8:14-15). The control points can be integrated with one of the UPnP devices so that, for example, “a rendering device can also include control point functionality for interacting with the media server 302.” (Ex. 1005 at 8: 17-

19. “Alternatively, one or more control points can be implemented separate from the UPnP device (302-312).” (Ex. 1005 at 8:19-21). “The UPnP network 314 can use any combination of protocols to transfer information between the UPnP devices (302-312, 316 and 318), such as TCP/IP, SOAP, GENA, HTTP, and so on.” (Ex. 1005 at 8:29-32).

21. A consumer can use a control point (such as control point 316) or other device to investigate the resource information corresponding to resources provided in the resource store 320 of the media server 302. (Ex. 1005 at 8:55-58). “For instance, this operation may entail investigating the resource metadata of the resources, such as the titles of available resources, and other high level information regarding the resources.” (Ex. 1005 at 8:58-62). “After such investigation, the consumer can select resource content associated with a resource for presentation at a selected rendering device, such as the media rendering device 306.” (Ex. 1005 at 8:62-65). The control point 316 can then “provide a role in setting up the transfer of the resource content from the media server 302 to the selected rendering device 306.” (Ex. 1005 at 66-67). “In one implementation, the UPnP architecture 300 uses a non-UPnP protocol to actually execute the transfer of resource content from the media server 302 to the render device 306, such as, but not limited to, the HTTP protocol.” (Ex. 1005 at 8:67-9:4).

22. Thus, “a consumer can use control point (such as control point 316) to send a UPnP query to the media server 302. The UPnP query can be structured as a browse request or a search request. In a browse request, the consumer’s intent is to scan a collection of resource metadata associated with the resources provided by the media server 302. In a search request, the consumer’s intent is more targeted, e.g., to find specific resource metadata provided by the media server 302 identified by various search terms, etc.” (Ex. 1005 at 37:9-17). The media server 302 responds “by presenting resource metadata associated with one or more resources (e.g., files in the resource store 320) that meet the consumer’s request.” (Ex. 1005 at 37:19-21). The resource metadata can include “various high level information pertaining to the matching resources, such as title, genre, artist, date created, and so on.” (Ex. 1005 at 37:21-24). The resource metadata “can also include resource locators (such as URLs) that identify the respective network locations from which the resource content items can be retrieved from.” (Ex. 1005 at 37: 24-27).

23. After viewing the resource metadata, “the consumer selects a corresponding resource content item to be played on a rendering device, such as rendering device 306.” (Ex. 1005 at 37:36-38). The consumer “enables the rendering device 306 to transmit a request to the media server 302 that instructs the media server 302 to **retrieve** the selected resource content item.” (Ex. 1005 at 37:39-42). For example, the consumer can transfer the URL associated with the

selected resource to the rendering device 306. (Ex. 1005 at 37:42-45). The rendering device 306 responds by transmitting an HTTP GET request to the media server 302, where the HTTP GET request includes the URL corresponding to the selected resource content, which was passed to the rendering device by the control point. (Ex. 1005 at 37:46-49). The media server 302 responds to the HTTP GET request by retrieving the selected resource content item at the location specified by the URL, and provides the selected resource content item to the rendering device 306. (Ex. 1005 at 37:50-54).

24. Encarnacion describes “[a] particular kind of resource collection is a resource playlist. This resource can be implemented *as a file* that refers to a list of audio, video and/or photo resources (or other kinds of resources).” (Ex. 1004 at 6:43-46 (emphasis added)). Encarnacion does not disclose that a user **receives** a playlist on the control point. Like the other resources disclosed in Encarnacion, such as media files, playlists are not automatically sent to the control point – they must be explicitly **retrieved** via resource locators. (Ex. 1004 at 14:14-21 (“This resource locator can be used to retrieve either the playlist (e.g., a list of songs) or each of the songs in the playlist (e.g., the set of songs ‘concatenated’).”)). Encarnacion also discloses that resource location information can be formatted as XML and displayed in HTML format, such as via a web browser. (Ex. 1004 at 13:1-20, 25:36-43).

25. In Encarnacion, if the control point were to receive a resource locator for a playlist, such as via an XML message, the control point would not receive the playlist itself without **retrieving** it from the resource location, which would be based on user interaction. (Ex. 1005 at 25:36-43 (“The receiving control point device can translate the XML message into a presentation format (e.g., HTML), and then display this information for the consumer’s review.”)).

VI. COMBINATION OF BI, CHAMPION, AND ENCARNACION

26. As I have opined in my prior declaration in the ‘597 IPR (Ex. 2012 at ¶¶64-76; 93, 94, 109, 111-115, 126, 130-135), the navigator 260 in Bi is not capable of directly communicating with a media server, such as the data server 102. Rather, in Bi, it is the computing platform 100 that communicates with the data server 102 via Internet or other computer network. (Ex. 1003 at Fig. 3). A person of ordinary skill in the art would understand that Bi’s navigator 260 is an extension of the computing platform 100, and is not capable of independent communication with other devices.

27. In Encarnacion, the control points in a UPnP network architecture “define agents that can discover and control other UPnP devices.” (Ex. 1005 at 2:12-14). Bi, on the other hand, does not disclose that its navigator 260 is capable of discovering other devices, let alone discovering other UPnP devices. Rather, as stated above and in my prior declaration (Ex. 2009), Bi’s navigator 260 can only

communicate with the computing platform 100. (Ex. 1003 at ¶0028). A person of ordinary skill in the art would not consider Bi to have, as alleged by Petitioner, “all of the required functionality for a control point in Encarnacion.”

28. Like Bi’s navigator 260, the remote control unit 105 in Champion is not capable of communicating directly with the Internet or servers on the Internet. Rather, the control remote unit 105 communicates with the computer 102 via the speakers 103. Champion’s control unit 105 communicates wirelessly, using preferably infrared signaling, with a wireless transceiver 104, which is located in each speaker or pair of speakers 103. (Ex. 1004 at ¶ 0039). The speakers (103) in turn communicate with the computer 102 or the audio server 190 using the digital connection 106, which can be, for example, a universal serial bus (USB) or a firewire connection. (*Id.* at ¶¶ 0031, 0032; Figs. 1 and 5a). Therefore, in Champion, as in Bi, there is no indication that the remote control unit 105 has “all of the required functionality to operate as a control point in Encarnacion.

29. I am being compensated at my standard consulting rate of \$450/hour. My compensation is not contingent upon the substance of my advice, the opinions I render, or the testimony that I may give.

30. All of the statements made in this declaration of my own knowledge are true, and all statements made on information and belief are believed to be true. These statements were made with knowledge that willful false statements and the

like so made are punishable by fine or imprisonment, or both, under section 1001
of Title 18 of the United States Code.

Dated: 2/4/2015

Signature: Gareth L

EXHIBIT A

Curriculum **V**itae

Dr. Gareth Loy, DMA
Stanford, 1980

President, Gareth, Inc.
POB 151185, San Rafael, CA 94915
(415) 927-2916
dgl@GarethInc.com
<http://www.GarethInc.com>

Professional Summary

Dr. Loy has over 36 years of academic and professional experience in computer science, software development, embedded systems, networking, enterprise software systems, digital audio signal processing, and music technology. His practice encompasses a wide range of computer technology disciplines.

His 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 was a Researcher and a Lecturer for graduate and undergraduate courses in computer science and digital audio at UCSD for a decade, cofounded the Computer Audio Research Laboratory, conducted computer systems research, and built numerous other computer laboratories there.

He has been Software Architect for consumer and professional products for large international electronics companies, and has sustained a long and successful career at the cutting edge of software development and design using multiprocessor/multi-core architectures for signal processing and control.

Dr. Loy has over sixteen years of experience as an expert witness on numerous cases. He has testified before the International Trade Commission, and before a jury in Federal Court, has testified at Markman claim construction hearings, been deposed numerous times, authored numerous reports and declarations, and has presented exhibits and Markman tutorials in Federal Court. Case types include patent litigation, trademark infringement, copyright litigation, and inequitable conduct. He has worked on complex international patent cases, and has provided expertise on such diverse areas as compilers, file systems, operating systems, handheld networked Personal Information Management (PIM) devices, enterprise email systems, software for factory automation systems, interactive databases, enterprise software for management of music libraries, MPEG audio compression, on-line gaming, composition systems, digital

Dr. Gareth Loy – Curriculum Vitae

camera hardware and software, digital audio hardware and software technologies, and more. (See the Summary of Testifying Experience.)

Expertise

- Large Scale Software Architecture/Analysis in C, C++, ObjectiveC, Java, etc.
- Mobile phones, mobile computing, cell phones, digital cameras, PDAs, iPhone, iPad, etc.
- Software Architecture for consumer and professional computer products
- Internet commerce
- User interfaces, design, architecture
- Enterprise applications and databases
- Networked file systems
- Operating systems
- File backup/restore and archiving
- Real-time and parallel processing systems
- Enterprise networked systems
- Digital Audio Signal Processing and Acoustics
- MP3, MPEG, Audio Compression Standards
- Music Technology

Education

<u>Year</u>	<u>College or University</u>	<u>Degree</u>
1980	Stanford University	DMA – Doctor of Musical Arts in digital audio technology: computer science, digital signal processing (DSP), digital audio, computer systems for audio, real-time systems for music, music composition. Thesis research conducted at the Stanford Artificial Intelligence Laboratory (SAIL), and the Center for Computer Research in Music and Acoustics (CCRMA). Thesis: compiler for Systems Concepts Digital Synthesizer + award-winning composition <i>Nekyia</i> . 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

Projects and Skills

- 35+ years experience as a C/C++/ObjectiveC/Java software engineer, software systems architect
- Early Apple employee (1979)
- Lecturer and researcher 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

Dr. Gareth Loy – Curriculum Vitae

- 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, Mac, Windows, Developer Studio, LINUX, VxWorks, and WindRiver platforms
- 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
- Design, debug, and document complex processor Instruction Set Architectures
- Build automatic document generation systems that create finished documents directly from commented code sources, or create instruction set architecture documents directly from machine description files.
- Design, comprehend, and document software, hardware, and VLSI architectures.
- Collaborate with designers to patent intellectual property, review patents for applicability, and drive the review process with the US Patent Office.

Professional Experience

From: 1998
To: Present
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.
- Manager: Ethan Grossman (currently at Digidesign)

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

- Wrote hardware architecture documentation for next-generation multi-media

Dr. Gareth Loy – Curriculum Vitae

- processor
- Wrote software API reference documentation for multi-media processor

Senior Digital Audio Engineer

- 1994-1997:
- Reverse-engineered popular FM synthesis chip, and reduced it to software simulation running on Mpcat 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 voicers
 - Represented Chromatic at the MMA's IASIG 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 track-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:

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

Dr. Gareth Loy – Curriculum Vitae

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 in graduate computer music sequence: principles and practice of digital audio and computer science, and undergraduate musical acoustics, and electronic music
- 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.

Litigation Support Experience

Summary of Testifying Experience:

- **23 cases** as Testifying Expert, Expert of Record
- **29 total cases** to date
- **Trial testimony**
 - 2014: ITC: Black Hills Media LLC v. Samsung, et al., patent litigation
 - Two days of testimony under oath
 - 1995: Industrial Indemnity Co. v. Apple Computer, Inc., trademark infringement
 - Three days of testimony under oath
- **Markman Claim Construction hearings**
 - 2011: Gibson v. 745 (Seven45) LLC, patent infringement
 - 2011: MONKEYmedia Inc. v. Apple, Inc., patent infringement
 - 2011: MONKEYmedia Inc. v. Disney, Inc. et al., patent infringement
- **Markman tutorials**
 - 2004: Seer Systems, Inc. v. Beatnick, Inc. & Microsoft Inc., patent infringement
- **Depositions**
 - 2014: Yamaha v. Black Hills Media, LLC IPR2013-00598 re. patent 8,214,873
 - 2014: Yamaha v. Black Hills Media, LLC IPR2013-00597 Patent 8,230,099
 - 2013: ITC: Black Hills Media v. Samsung, LG, Panasonic, Toshiba
 - 4.5 days of deposition
 - 2012: MobileMedia Ideas LLC v. Apple
 - 2011: Gibson Guitar Corp. v. 745 LLC
 - 2011: MONKEYmedia Inc. v. Apple
 - 2011: MONKEYmedia Inc. v. Disney et al.
 - 2009: 1st Media. v. Electronic Arts, inequitable conduct
 - 2004: Seer Systems, Inc. v. Beatnick, Inc. & Microsoft Inc., patent infringement
 - 1995: Industrial Indemnity Co. v. Apple Computer, Inc., trademark infringement

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
Patents at issue:

- 7,365,871
- 7,643,168

Services Provided: **Testifying expert** for **plaintiff E-Watch** for infringement.
Disposition: All work for client in this matter has been completed.
Date: 2015
Contact: Adam Price, DiNovo Price, (512) 539-2632.

Expert Engagement:

Type of Matter: United States Patent Office, *inter partes* review (IPR)
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 Provided: **Testifying expert** for validity, for patent owner Black Hills Media, LLC.

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Disposition: Expert reports on validity, deposition.
Ongoing
Date: 2014 –
Contact: Lana Gladstein, Reza Mollaaghababa, Thomas Engellenner, 617-204-5168.

Expert Engagement:

Type of Matter: United States Patent Office, *inter partes* review (IPR)
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 Provided: **Testifying expert** for validity, for patent owner Black Hills Media, LLC.
Expert reports on validity, deposition.
Disposition: Ongoing
Date: 2014 –
Contact: Lana Gladstein, Reza Mollaaghababa, Thomas Engellenner, 617-204-5168.

Expert Engagement:

Type of Matter: Patent litigation before International Trade Commission
Law Firm: Mintz Levin
Case Name: “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 software, DN 2954. Filed with the ITC.”
Complainant Black Hills Media, LLC alleges violations of section 337 of the Tariff Act of 1930 (19 U.S.C. 1337).
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 Provided: **Testifying expert** for infringement and validity, for complainant Black Hills Media, LLC.
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: Ongoing
Date: 2013 –
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

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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 Provided: **Testifying expert for plaintiff Mobile Media Ideas (MMI)** for infringement and validity.
Patents at issue:

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

Disposition: Settled
Date: 2011 – 2013
Contact: Laurie Stempler, 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

Services Provided: **Testifying expert for plaintiff Mobile Media Ideas (MMI)** for infringement and validity. Reports (1/13/2012), depositions (4/13/2012).
Disposition: Jury found direct infringement and upheld the validity of the asserted patents.
Date: 2011 – 2012
Contact: Alan Federbush, 212.969.3211

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 Provided: **Testifying expert for plaintiff MMI** for infringement and validity.
Disposition: Concluded
Date: 2011 – 2013
Contact: Alan Federbush, 212.969.3211, John Kitchura, (617) 526-9676

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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 Provided: **Testifying expert for defendant 745 LLC**, 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: Patent litigation, ITC
Law Firm: Jones Day
Case Name: International Trade Commission (ITC) Investigation 337-TA-797 “On certain motion-sensitive sound effects devices and image display devices and components and products containing same”, Inv. No. 337-TA-773; ALJ Gildea;
Patent at issue:

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

Services Provided: **Testifying expert:** non-infringement/invalidity for **respondent Kyocera**. Prior art research.
Disposition: Settled.
Date: 2011.
Contact: Blaney Harper, Jones Day: 202.879.3939
Jose Patiño, Jones Day, San Diego: 858.314.1200

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 Provided: **Testifying expert for plaintiff RMail**. Software discovery, infringement analysis.
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

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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 Provided: **Testifying expert for defendant Tivo.** Report.
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

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 Provided: Consulting expert for plaintiff: infringement analysis. **Testifying expert for plaintiff MONKEYmedia:** claim construction. Markman claim construction hearing.
Disposition: Ongoing
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

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branching and/or telescopic advertising

Services Provided: Consulting expert for plaintiff: infringement analysis. **Testifying expert for plaintiff MONKEYmedia:** claim construction on Seamless Contraction Patents.

Disposition: Ongoing

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 Provided: **Consulting expert** for plaintiff (expert of record: Dr. John Levy): infringement analysis. Source code analysis. Technology analysis of Apple Computer OSX operating system 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.

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, 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 Provided: **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.

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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. 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
Patent at issue: US 5,464,946 — Karaoke information entertainment system
Services Provided: **Testifying expert:** 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 computer user
- 5,991,735 — Computer program apparatus for determining behavioral profile of a computer user

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

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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) and Nota Music Publishing, Inc. v. XM Satellite Radio Inc., 07 CV 4682 (LAK), Southern District Court of New York, Judges Batts and Kaplan
Services Provided: **Testifying expert:** 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: Flachsbar & 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 — Communications system
 - A communications system for transmitting interactive multimedia information over a communication medium having limited bandwidth

Services Provided: **Testifying expert:** Internet gambling. Forensic analysis of software application, “Full Tilt Poker” to determine infringement. Wrote expert report showing infringement of every element of asserted claims. 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 established infringement sufficient to obtain favorable settlement.
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

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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 Provided: **Consulting expert** 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
- 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 Provided: **Consulting expert** 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

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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 Provided: **Consulting expert** /software analyst 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. 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, caption 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

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 Provided: **Testifying expert** – music composition, software architecture, digital audio. Software analysis of 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 potential infringement report.

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

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Expert Engagement:

Type of Matter: Patent litigation support
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 Provided: **Consulting expert:** 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 Provided: **Testifying expert for infringement:** software architecture. 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.
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

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storing acoustical signals

Services Provided: **Testifying expert:** Mathematics of MPEG/MP3 audio, subband coding, frame size, 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: Robert Blanche, Chris Bright, Lucy Koh: 650.813.5133

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 Provided: **Testifying expert:** music composition systems, MIDI, networking. **Deposition** taken. Developed and presented **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

Patent at issue:

Services Provided: **Testifying expert:** 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 Provided: **Testifying expert:** digital audio and music technology **Deposition** taken; **testified at trial**. Presented several demonstrations of Apple Computer music and audio technology to the jury. Three days of jury testimony under oath.

Disposition: Won on appeal.

Date: 1994 – 1995.

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

Consulting Experience

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Consulting Engagement:

Client: Buchla & Assoc.
Services Provided: 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++

Consulting Engagement:

Client: Chromatic Research (bought by ATI Technologies)
Services Provided: Algorithm development for audio synthesis and processing on MPACT1 DSP.

Consulting Engagement:

Client: Frox, Inc.
Services Provided: Architected, developed, debugged, implemented, and shipped an ambitious multi-DSP digital home entertainment system

Consulting Engagement:

Client: Philips Semiconductor
Services Provided: 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

Consulting Engagement:

Client: Equator Technologies
Services Provided: Extended their C/C++ compiler to automatically document Equator's Application Programming Interface (API) source code for their DSP, written in C

Consulting Engagement:

Client: Raza Microelectronics
Services Provided: Wrote the XLR Programmer's Reference Manual for the XLR family of Threaded Processors

Consulting Engagement:

Client: Pixim, Inc.
Services Provided: Created Developer's Guide documenting features, architecture, theory of operation, hardware, software and firmware for advanced wide dynamic range video camera sensor technology

Consulting Engagement:

Client: Philips Semiconductor
Services Provided: Wrote Ethernet MAC chapter for new TriMedia processor architecture document

Consulting Engagement:

Client: Cradle Technologies
Services Provided: Developed design kit guide for their Hammerhead videoconferencing system

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including development system setup, chip architecture, software APIs, software development tools, and debugging

Consulting Engagement:

Client: Siemens Microelectronics
Services Provided: Data book for the TriCore TC10 embedded processor. User guides for TriCore simulators

Consulting Engagement:

Client: Infineon Technologies
Services Provided: Data book for Infineon MPSystem, a single-core 32-bit microcontroller DSP architecture for real-time embedded systems

Consulting Engagement:

Client: Zoran Corporation
Services Provided: User guide for Vaddis ZR36730 Integrated DVD Decoder chip

Consulting Engagement:

Client: Dolby Laboratories
Services Provided: Market evaluation for consumer application of AC3 encoding

Consulting Engagement:

Client: Sony, Inc.
Services Provided: User Guide for the Sonoma Digital Audio Workstation

Consulting Engagement:

Client: Malleable Technologies
Services Provided: Architecture documents and data sheets for VoIP DSP core

Consulting Engagement:

Client: C-Cube Microsystems
Services Provided: Ziva-Kit DVD decoder architecture documents, and white papers on DVD decoding algorithms

Consulting Engagement:

Client: TriMedia Technologies, Inc.
Services Provided: Several chapters of the TM1100 and TM1300 Data Books, including the audio and video I/O subsystems, memory management system, and instruction compression

Consulting Engagement:

Client: BOPS, Inc. ("Billions of Operations Per Second, Inc.")
Services Provided: C/C++ optimizing compiler for their scalable multi-DSP processor system

Consulting Engagement:

Client: SeaSound, LLP
Services Provided: User Guide for the SeaSound Solo digital audio processing system

Consulting Engagement:

Client: Palm, Inc.
Services Provided: C++ Generic Conduit Guide

Professional Affiliations, Achievements & Awards

- Member, Association of Computing Machinery (ACM)
- Member, Institute of Electrical and Electronics Engineers (IEEE)
- 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, “Life and Times of the Samson Box”, *Computer Music Journal*, Fall 2013, 37(3), Pages 26-48.
2. Loy, Gareth, “The Systems Concepts Digital Synthesizer: An Architectural Retrospective”, *Computer Music Journal*, Fall 2013, 37(3), Pages 49–67.
3. Loy, Gareth, “Mars in 3D”, *Computer Music Journal*, Fall 2013, 37(3), Pages 101–103.
4. Loy, Gareth, [*Musimathics — The Mathematical Foundations of Music, Vol. 2*](#), Cambridge: MIT Press. 2007. Reprinted with corrections 2013.
5. Loy, Gareth, [*Musimathics — The Mathematical Foundations of Music, Vol. 1*](#), Cambridge: MIT Press. 2006. Reprinted with corrections 2011.
6. Loy, Gareth and John Snell, “[Stephen Travis Pope: Ritual and Memory](#)”, *Computer Music Journal* 34(3), Fall 2010. Record review.
7. Loy, Gareth, “[The CARL System: Premises, History, and Fate](#),” *Computer Music Journal* 26(4), Winter 2002.
8. 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.
9. Loy, Gareth, “The Frox Digital Audio System,” *Proceedings of the International Computer Music Conference* (San Jose), San Francisco: International Computer Music Association, 1992.
10. Todd, P. and Loy, Gareth, eds., [*Music and Connectionism*](#), Cambridge: MIT Press, 1991.
11. Loy, Gareth, “[Connectionism and Musiconomy](#)”, *Music and Connectionism*, P. Todd and G. Loy, eds., Cambridge: MIT Press, 1991.
12. 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.
13. Loy, Gareth, “Second Special Issue on Parallel Distributed Processing and Neural Networks”, *Computer Music Journal*, 13(4), Winter 1989.
14. Loy, Gareth, “Special Issue on Parallel Distributed Processing and Neural Networks”, *Computer Music Journal*, 13(3), Fall 1989.
15. Loy, Gareth, “On the scheduling of parallel processors executing synchronously,” *Proceedings of the International Computer Music Conference*, San Francisco: International Computer Music

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- Association, 1987.
16. Loy, Gareth, "[Whither MIDI](#)," *Computer Music Journal*, 11(1): 9-12, 1987.
 17. Loy, Gareth, "Designing a computer music workstation from musical imperatives," *Proceedings of the International Computer Music Conference*, San Francisco: International Computer Music Association, 1986.
 18. Loy, Gareth, "Player — Tutorial Introduction," Technical Memorandum, UCSD: Center for Music Experiment, 1986.
 19. 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.
 20. 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*.
 21. Loy, Gareth, "[About AUDIUM: an interview with Stanley Shaff](#)," *Computer Music Journal*, 9(2): 41-48, 1985. Interview.
 22. Loy, Gareth, "[Musicians make a standard: the MIDI phenomenon](#)," *Computer Music Journal*, 9(4): 8-26, 1985.
 23. Loy, Gareth, "[Curtis Roads and John Strawn, editors: Foundations of computer music](#)," *Computer Music Journal*, 9(3): 80-81, 1985. Book review.
 24. 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.
 25. 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.
 26. 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.
 27. Loy, Gareth, "Player — extensions to the C programming language for parallel processing run-time music synthesis control," *Proceedings, MIDISOFT*, San Francisco, 1984.
 28. Loy, Gareth, "[Allen Strange: Electronic music — systems, techniques, and controls, 2nd edition](#)," *Computer Music Journal*, 7(4): 60-61, 1983. Book review.
 29. 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.
 30. Loy, Gareth, "[The composer seduced into programming](#)," *Perspectives of New Music*, 19(1): 184-198, 1982.
 31. Loy, Gareth, "A sound file system for UNIX," *Proceedings of the International Computer Music Conference (Venice, Italy)*, San Francisco: International Computer Music Association, 1982.
 32. 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.
 33. Loy, Gareth, "[Notes on the implementation of MUSBOX, a compiler for the Systems Concepts Digital Synthesizer](#)," *Computer Music Journal*, 5(1): 13-33, 1981.
 34. Loy, Gareth, [Nekyia](#), Ann Arbor, Michigan: University Microfilms, 1980. Stanford University Department of Music DMA thesis.
 35. Loy, Gareth, "Systems Concepts Digital Synthesizer operations manual and tutorial," Stanford University Report STAN-M-6, Stanford University: Department of Music, 1980.

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36. 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.
37. Loy, Gareth, "[New directions in music — Significant contemporary works for the computer](#)," *Computer Music Journal*, 2(4): 6–8, 1978. Record review.
38. 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](#).
39. Loy, Gareth, "Studio report, CCRMA, Stanford University," *Proceedings of the International Computer Music Conference* (UCSD), San Francisco: International Computer Music Association, 1977.
40. 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.

Recent Lectures

- 2014 "Mathematical basis for expectation in music", delivered to the International Congress on Music and Mathematics, Puerto Vallarta, Mexico, November 2014.
- 2011 "Music, Expectation, and Information Theory", lecture delivered to the American Association for the Advancement of Science (AAAS) conference, San Diego, CA, June 14, 2011.
- 2011 "Software Discovery — Best Practices", lecture 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." Lecture presented to the Ear Club, Psychology Dept., University of California, Berkeley, February, 2007.
- 2007 "Musical Scale Builders — the First Psychoacousticians." Lecture 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." Lecture 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." Lecture 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." Tutorial presented to the Audio Engineering Society 121st Convention, San Francisco, August, 2006.