

Paper No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SDI Technologies, Inc.,

Petitioner

v.

Bose Corporation,

Patent Owner

Patent No. 8,364,295

Filing Date: December 7, 2006

Issue Date: January 29, 2013

Title: Interactive Sound Reproducing

Inter Partes Review No. [UNASSIGNED]

DECLARATION OF ANDREW B. LIPPMAN

1. I, Andrew B. Lippman, hereby declare as follows:

2. I have been retained by Foley & Lardner LLP to provide my opinion concerning the validity of U.S. Pat. No. 8,364,295 (“the ‘295 patent”). I am being compensated for my time at the rate of \$550 per hour.

QUALIFICATIONS

3. My experience and education are detailed in my curriculum vitae, which is attached as Exhibit A to this report. The curriculum vitae provides a listing of all publications on which I am a named author and also identifies all cases in which I have previously provided expert testimony.

4. I am currently a Senior Research Scientist at the Massachusetts Institute of Technology (“MIT”) and Associate director of the MIT Media Laboratory, a >\$25,000,000 research and teaching facility at MIT that I helped establish in the early 1980s. In addition, I am a principle investigator and director of the Media Laboratory’s “Digital Life Consortium,” a multi-sponsor research program initiated in 1997 to address aspects of computing and personal expression. I am also co-principal investigator of the Communications Futures Program, a program that unifies diverse research across MIT that bear on the technology, policy, and economics of communications.

5. I have supervised over 50 Master's and PhD theses in the MIT Media Arts and Sciences program. Through the course of my career, I have directed and been principal investigator of research supported by the defense department (DARPA), the Office of Naval Research (ONR), The National Science Foundation (NSF), and over 50 industrial companies. I have never totaled the net research volume, but it is in excess of \$50Million. I have taught a course entitled Digital Video as well as MIT freshman physics seminars, and I direct a graduate research group that addresses the principles of Viral Communications systems that empower the end user to create innovative systems that can scale. Much of my current research in Viral Communications entails the design of the hardware and software environment for wireless, personal radio networking that can survive infrastructure failures such as a hurricane or storm.

6. I received my undergraduate degree in Electrical Engineering from MIT in 1971. I received a Master's of Science degree from MIT in 1978, and a Ph.D. degree in Electrical Engineering from the École Polytechnique Fédérale de Lausanne in 1995. My thesis was on the topic of scalable video, a technique for representing visual data in a fluid and variable networking and processing environment, much like what we today call streaming.

7. In the course of my undergraduate studies as an electrical engineering student at MIT, I worked in a research group that did early work on computer graphics and human interaction, called the Architecture Machine Group. I ultimately directed that group from 1982 until it became a foundation part of the MIT Media Lab in 1985. In the mid-1970's, at the Architecture Machine, I developed some of the first memory and display systems that allowed high quality display of text and pictures on television and commercial television-like displays. We deliberately focused on using consumer television displays because we wanted to enable them to display high quality data in a home environment.

8. I also designed data storage schemes to embed digital data in analogue video using optical videodiscs, analogue video storage devices by which entertainment and interactive programming was distributed in the 1980s and 1990s. These are all intended for consumer systems.

9. In the early 1980s, I established a research program entitled "Movies of the Future" that was a multi-sponsor program addressing image distribution, analysis and interaction. In 1986, I established the "Television of Tomorrow" program to research digital and scalable video processing technology. The Television of Tomorrow program consisted initially of nine sponsors, one each representing the television industry, the consumer

electronics industry and a content company from three regions in the world, North America, Asia-Pacific, and Europe. Some of the ideas in this work was reported in the lead article in the June, 1995 IEEE Proceedings with co-author, Arun Netravali.

10. I was a member from the second meeting of the Motion Picture Experts Group, an ISO standards committee effort that defined the standards by which “MP3” music is commonly distributed and by which “MPEG Video” is stored and distributed. I co-wrote the paper defining the requirements for the MPEG-2 standard with Okubo and McCann in 1995.

11. I have six patents in the area of video and digital processing, and I have been on advisory boards for technology companies in various fields, ranging from video conferencing to music understanding. I have authored over 65 published papers in the fields of video and television.

12. I have served as an expert for several patent and arbitration cases in the field of video communications systems and the human interface, mobile systems and music streaming, as shown in my CV, Exhibit B.

13. I understand that a claim is invalid if it is anticipated or obvious. I understand that anticipation of a claim requires that every element of a

claim is disclosed expressly or inherently in a single prior art reference, arranged as in the claim.

14. I further understand that obviousness of a claim requires that the claim be obvious from the perspective of a person of ordinary skill in the relevant art, at the time the invention was made. In analyzing obviousness, I understand that it is important to understand the scope of the claims, the level of skill in the relevant art, the scope and content of the prior art, the differences between the prior art and the claims, and any secondary considerations. I also understand that a claim of a patent is obvious if it is directed to a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, and the combination yields only a predictable result, unless other evidence shows that the claim would not have been not obvious.

15. I understand that secondary considerations can include evidence of commercial success caused by an invention, evidence of a long-felt need that was solved by an invention, evidence that others copied an invention, or evidence that an invention achieved a surprising result. I understand that such evidence must have a nexus, or causal relationship to the elements of a claim, in order to be relevant to the obviousness or non-

obviousness of the claim. I am unaware of any such secondary considerations.

16. I understand that claims in an *inter partes* review are given their broadest reasonable interpretation that is consistent with the patent specification.

17. I also understand that the earliest patent application filing leading to the '295 patent was made on October 12, 2000. I have therefore analyzed obviousness as of that day or somewhat before, understanding that as time passes, the knowledge of a person of ordinary skill in the art will increase. I understand that the owner of the patents (Bose) might try to prove an earlier date of invention. If this occurs, I reserve the right to revise my opinion.

18. In forming my opinion, I have relied on the patent claims and disclosure, the prior art exhibits to the Petition for *inter partes* review, and my own experience and expertise of the knowledge of the person of ordinary skill in the relevant art in the relevant timeframe.

19. At the time of the invention, I believe that a person of ordinary skill in the art would have had a bachelor's degree in electrical engineering and several years of experience in designing audio systems. This

description is approximate, and a higher level of education or skill might make up for less experience, and vice-versa.

20. I believe that I would qualify as at least a person of ordinary skill in the art in the relevant time frame, and that I have a sufficient level of knowledge, experience and education to provide an expert opinion in the field.

21. My testimony in this declaration is given from the perspective of a person of ordinary skill in the art at the time of the October 12, 2000 filing, and for some time before then, unless otherwise specifically indicated. This is true even if the testimony is given in the present tense.

Architecture of the Claimed System

22. Consider the elements of the system as a set or collection of functional elements organized as two separate, connectable units. The first of these is a "sound reproduction device" that includes loudspeakers, associated amplifiers, and potentially internal sources of audio¹, and a remote control. There is also the requirement for a connector, although if there is more than one physical element in the aggregation then this is inherent: multiple boxes must have a means of communication between each. The second unit, described as a computer, is used as a source of

¹ In, for example, claims 5 and 32, a radio receiver; in claim 68, more generally, for example, a CD player

audio. Colloquially, one can consider these two elements as a radio or powered loudspeaker to which one can attach and control a controllable external audio source².

23. Each of these two units can be built in a variety of ways, many of which (but not necessarily all) existed in the art at the time of the original patent filing but generally fitting the architecture described above. For example, instead of a personal computer, one could envision a disk-based music player or a solid-state memory based music player. These are both examples of the same architecture. From an engineering perspective, it would be natural to make the speaker unit as future-proof as possible so that it could accommodate new external audio sources with little or no additional work and to make the speaker unit itself as attractive for a purchaser. For example, today, one can purchase speakers that have adapters to physically support a variety of compatible music players.

The Sony Music System Combined With the Creative Nomad or Samsung Yepp

24. I understand that the first asserted ground of invalidity alleged in the petition is the combination of the Sony Music System Manual and documents describing the Creative Nomad/Samsung Yepp Portable MP3 player.

² In later claims there is a two-way control path but there is no claimed use for control flowing from the external computer to the sound reproduction device.

25. In my opinion, claims 1 and 27 would have been obvious by dint of the Sony Music System alone and in combination with the Creative Nomad or Samsung YEPP portable MP3 player. Dependent claims 2-11, 18-21, 24, 29-37, 44-47, 50, 73, and 74 would have been obvious as well, as described in the claim charts in the petition and discussed in part below.

26. The Sony Music System as described in the SMS manual adheres to the architecture described above. It included a housing, speakers, an amplifier, and a connector by which one can attach an external device. The Sony SMS manual describes attaching and using a MiniDisc (MD) recorder so that the music player could play audio from the MD recorder. These components correspond to part (A) of the claims. There is a remote control that replicates part (B). This remote control can control the MD recorder both to replay audio and to record CDs from the music player. The same remote also controlled the functions of the music player.

27. In my opinion, it would be obvious engineering to substitute a different portable device from the MD recorder. Sony chose the MiniDisc because they manufactured and sold them but they could have elected to substitute an MP3 player or devices manufactured by others. One would have been motivated to make such a combination in order to, for example,

take advantage of the additional music storage space that was available in the MP3 device. One might need to change the connector, or alter the control signals to suit the particular device. One might also have to provide an analog path for the audio from the external device or an A-D converter if the audio data is digital. Each of these alterations are well understood engineering modifications that anyone skilled in the art could accomplish. They are also quite natural product evolutions as new attached devices become available. Included among the available audio sources at the time of the alleged invention were personal computers running software, such as, WinAmp or MusicMatch, designed to play MP3 music files on the computer and to “stream” music from the Internet.

28. My opinion is based on the broadest reasonable construction of the term “computer” including a device with a processor that accepts input and provides an output (the definition advanced by Bose in the earlier litigation concerning the parent ’765 patent), and the broadest reasonable construction of the term “network” including the radio network that was accessible by the Nomad/Yepp device.

29. With respect to claims 18, 44, 73, 74, and 77 of the ’295 patent, which require that the computer provide audio information in digital form, it is my opinion that it would have been obvious to modify the MiniDisc or the

MP3 players to provide audio information in digital form, and to convert the digital information to analog format in the speaker. One would do that, for example, in order to allow for use of a higher quality D/A converter in the speaker, when the music is being amplified and broadcast to a wider area than would be the case if one were using headphones with the MiniDisc or the MP3 player. This is nothing more than a trivial exercise of moving the D/A converter from one box to the other.

**The Bose Wave CD Combined With the
Creative Nomad or Samsung Yepp**

30. I understand that the second asserted ground of invalidity alleged in the petition is the combination of the Bose Wave/CD Manual and documents describing the Creative Nomad/Samsung Yepp Portable MP3 player.

31. In my opinion, claims 1 and 27 would have been obvious in view of the Bose Wave/CD Manual alone and in combination with the Creative Nomad or Samsung YEPP portable MP3 player. Dependent claims 2-11, 18-21, 24, 29-37, 44-47, 50, 73, and 74 would have been obvious as well, as described in the claim charts in the petition and discussed in part below.

32. The system described in the Bose Wave/CD Manual operates in essentially the same manner as the speaker described in the patent (as I

understand it, the speaker that is described in the patent was a Bose Wave Radio), in that it included a remote control that allowed the user to control the speaker directly and also to control the operation of an integral digital music source also providing music through the speaker, in the form of a CD player.

33. In my view, it would have been obvious to substitute a portable MP3 player, including the Creative Nomad/Samsung Yepp, for the CD player. One would have been motivated to make such a combination in order to, for example, take advantage of the additional music storage space that was available in the MP3 device, as well as to have a portable music player in addition to the stationary one. Adapting an MP3 player like the Nomad or Yepp to be controlled by the Bose Wave/CD's remote control in the same way that the CD player was controlled by the remote would have been well within the abilities of one of skill in the art.

34. The Wave Radio/CD and Nomad/Yepp combination is an "audio reproduction system," namely the Bose radio combined with a digital audio player. The Wave Radio/CD unit included a CD player as an audio source device, but, in my opinion, it would have been obvious to one of skill in the art at the time of the invention to substitute an MP3 player, like the Nomad/Yepp, for the CD player. I believe that one of skill in the art would

have been motivated to do this in order to combine the greater music storage capacity of the MP3 player (as compared to a single CD) with the Wave Radio/CD and the convenience of its remote control. While the CD player was a fixed part of the Wave/CD, substitution of a portable MP3 player would have been a desirable modification because one would then have had the ability to play the MP3 music through the Wave radio or to take it elsewhere. The Creative Nomad/Samsung Yepp was configured to connect to a computer via a dock, and using a similar arrangement to removably connect the device to the Wave radio would have been well within the ability of one of skill in the art.

35. My opinion is based on the broadest reasonable construction of the term “computer” including a device with a processor that accepts input and provides an output (the definition advanced by Bose in the earlier litigation concerning the parent ’765 patent), and the broadest reasonable construction of the term “network” including the radio network that was accessible by the Nomad/Yepp device.

36. With respect to claim 2 of the ’295 patent, which states that the connector comprises a dedicated cable, it is my opinion that it would have been obvious to use a dedicated cable to connect the portable player,

where the integral CD player would have been connected with dedicated cables or circuits.

37. With respect to claims 18, 19, 44, 45, 73, 74, and 77 of the '295 patent, which state that the computer provides audio information in digital or analog form, it is my opinion that it would have been an obvious matter of design choice to located the D/A converter in either the MP3 player or the speaker, for the reasons described above in paragraph 29.

**The Combination of the Altec Lansing ADA310 Speakers,
the IRMan Device, and the WinAmp Software**

38. I understand that the third asserted ground of invalidity alleged in the petition is the combination of the Altec Lansing ADA310 Speakers, the IRMan Device, and the WinAmp Software.

39. In my opinion, claims 1 and 27 would have been obvious in light of this combination, and that dependent claims 2-11, 18-21, 24, 29-37, 44-47, 50, 73, and 74 would have been obvious as well, as described in the claim charts in the petition and discussed in part below.

40. The Altec Lansing ADA310 speakers were powered computer speakers that included a remote control. The WinAmp software described in the MP3! book allowed a user to play both music files stored on a personal computer music streamed over the Internet. Finally, the IRMan system provided a remote control and an IR receiver that plugged into a

computer to control software running on the computer and, in particular, to control the WinAmp software. These components, which were designed to be used together, provided all of the functionality of the system claimed in the '295 patent. Structurally, there would have been two remote controls instead of one (one to control the speaker and one to control the computer), and two IR receivers (one inside the speaker and one for the IRMan).

41. I am of the opinion that it would have been obvious to combine the remote control and IR receiver hardware, in order to reduce duplication and clutter, such that one remote would control both the speaker and the computer and using the IR receiver positioned in the speaker. I also understand that Paul Beckmann, one of the inventors of the '295 patent testified in a deposition in the earlier litigation that it would have been obvious to make that combination.

42. With respect to claims 9, 10, 35, and 36, which provide that the remote transmits signals for selecting the music source, it would have been obvious to provide the feature, which is present in the both the Sony Music System and the Bose Wave/CD, as a matter of convenience.

43. With respect to claim 21 and 47, which provides that a button on the speaker can control the computer in one mode and the radio in

another mode, it would have been obvious to provide this feature, which is present in the both the Sony Music System and the Bose Wave/CD, as a matter of convenience, where the remote was already configured to control both sources.

44. With respect to claims 5 and 32 of the '295 patent, which state that the housing includes an AM/FM radio, it is my opinion that it would have been obvious to add a radio to the speaker. The notion of a radio with a speaker is well preceded and it would have had the advantages of allowing a user to listen to the radio without using any of the computer resources and risking any reception interference from the circuitry internal to the computer. Further it is uncommon for a PC to include a standard broadcast radio receiver. However, it remains an obvious engineering combination with no undue design challenges and was well within the ability of anyone designing powered speakers for use with computers.

45. With respect to claims 6 and 33 of the '295 patent, which state that the housing includes an alarm clock, it is my opinion that it would have been obvious to add such a clock. Alarm clocks were of course well known, there would have been nothing unique or surprising about adding a clock, the patent does not identify anything unusual or surprising about it,

and it would have been well within the ability of anyone designing powered speakers for use with computers.

Multi-Level Music Sorting

46. I understand that the fourth through sixth asserted grounds of invalidity alleged in the petition are the combinations described in Grounds I-III with the addition of U.S. Patent No. 5,969,283 (“the ‘283 patent”).

47. I am of the opinion that claims 12-17, 38-43, 63, 64, 68-70, 77, and 78 would have been obvious in view of this combination.

48. The ‘283 patent concerns a music organizer and entertainment center. In the Abstract, the patent explains that “[t]he interface can be organized according to various music categories that each appear as buttons” and that “[w]ithin each button can be contained sub-categories for further organization.” (See 2:27-29.) The patent explains that “[t]he following categories, among others can be used in conjunction with the database program to catalog each individual musical selection—song title, artist, date, main music category, sub-main music category, special music category, sub-music category, music style, dance type, music speed and a subject music “energy level” determined by the service provider.” (See 6:53-60.) The mechanism for displaying the categories and subcategories is described at, for example, 10:22-34, 11:1-22, and in Fig. 7.

49. Claims 12-15 and 38-41 of the '295 patent concern using the remote control to cause the computer to select assemblages of music files based on metadata included in the files, with some claims specifically directed to metadata concerning music genre, artists, or albums. Assuming that "the music files" would include the database of the '283 patent that includes the metadata, I believe this limitation is described in the '283 patent, as explained in the preceding paragraph, and that it would have been obvious to provide such an organization feature in the systems of Grounds I-III or order to allow the user to find music in his or her collection. Sorting music, including by genre, artist, and albums, is a concept at least as old as the record store. If "the music files" would not include the database used in the '283 patent, I still believe that it these claims would have been obvious, as the location of the data used to perform the sorting is simply a matter of design choice.

50. Claims 16, 17, 42, and 43 concern the selection of a subset of the original assemblage, with claims 17 and 43 stating that the subset is based on information about the artist. I believe this limitation is described in the '283 patent, as explained above, and that it would have been obvious to provide such an organization feature in the systems of Grounds I-III in order to allow the user to find music in his or her collection.

51. Independent claim 63 is essentially the same as independent claim 27, except that it adds the sorting, where the first and second assemblages are displayed to the user. Independent claim 78 is essentially the same as claim 63, except that it adds the sorting, where the first and second assemblages are displayed to the user, and specifically claims a processor. Again, for the reasons explained above, I believe that it would have been obvious to employ the technique of the '283 patent to provide the user with the ability to find music in their collection.

I hereby declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct, and that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. § 1001).

Executed on June 12, 2013

A handwritten signature in black ink, appearing to read 'AL', with a long horizontal flourish extending to the right.

Andrew B. Lippman

Exhibit A

Andrew B. Lippman
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Education

École Polytechnique Fédérale de Lausanne (EPFL), Switzerland,
PhD, Electrical Engineering, 1995

MIT, Master of Science, Computer Graphics, 1978

MIT, Bachelor of Science, Electrical Engineering, 1971

Massachusetts Institute of Technology
(MIT, a teaching and research university)

Media Laboratory, Associate Director, 2008-present

Media Laboratory, Associate Director, 1987-2000

Massachusetts Institute of Technology, Senior Research Scientist, 2000-present

Media Laboratory, Graduate Officer, Media Arts and Sciences, 2002-2007

Massachusetts Institute of Technology, Principal Research Scientist, 1995-2000

Media Laboratory, Associate Director and Lecturer, 1987-2000

Media Laboratory, NEC Career Development Professor of Computers and Communications,
1985-1986

Architecture Machine Group, Associate Professor, 1983-1987

Architecture Machine Group, Assistant Professor, 1980-83

Architecture Machine Group, Research Associate, 1977-80

Architecture Machine Group, Research Assistant, 1976-77

Architecture Machine Group, Technical Instructor, 1975-76

Architecture Machine Group, Technical Assistant, 1971-75

Other Professional Experience

Diamond Management & Technology Consultants Fellow, 1999-present

Nortel Visiting Fellow, 2007-2008

École Polytechnique Fédérale de Lausanne, Switzerland,
Visiting Professor of Electrical Engineering, 1995

Publications

"CoCam: A collaborative content sharing framework based on opportunistic P2P networking," E. Toledano, D. Sawada, A. Lippman, H. Holtzman, F. Casalegno. Consumer Communications and Networking Conference (CCNC), 2013 IEEE, January 2013.

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"On Frame Synchronization for Multiple Access Channels," D. Shen, W. Zhang, D.P. Reed, A. Lippman, IEEE ICC - MACOM 2009, Dresden, Germany.

"Connected Consumption: The Hidden Networks of Consumption," K.H. Lee, D. Shen, D.P. Reed, A. Lippman, H. Schumacher, IEEE CCNC 2009, Las Vegas.

"Minimum Energy Cooperative Path Routing in All-Wireless Networks: NP-Completeness and Heuristic Algorithms", F. Li, K. Wu, A. Lippman, Journal of Communications and Networks (JCN), special issue on Cooperative Transmission and its Applications, June 2008.

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"*All Together Now*," A. Lippman, CONTEXT, Winter 2002/2003.

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"Transmission of Presence", International Conference of Progetts Milano, Milan, Italy, June 15, 1984.

"Optical Data Storage & Electronic Publishing", invited paper for the Optical Society of America, Monterey, CA, April 18, 1984.

"Non-Committal Computer Systems", IEEE Conference, Frontiers in Education, September 1983.

"Personal Computers as Intelligent Partners", Proceedings of IEEE Trends and Applications Conference, May 1983.

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"Video Instrument Control", Instrument Society of America (ISA), International Conference and Exhibit, Philadelphia, PA, October 1982.

"Graphics and Bandwidth Compression in Video Conferencing", with Peggy Weil, SIGGRAPH 1982, Boston, MA, July 26, 1982.

"Emerging Computer Media: On Image Interaction", SPIE Proceedings for the 1st International Conference on Picture Archiving and Communication Systems, January 1982.

"Computational Video", Proceedings for the 7th Canadian Man-Computer Communications Conference, June 1981.

"A Flat Parallax-Free Interactive Graphic Station", Journal of the Society for Information Display, Vol. 21, No. 1, 1981.

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"And Seeing through your Hand", Proceedings of the SID, Vol. 22/21 MIT, Cambridge, MA, 1981.

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"High Quality Graphic Display on Standard Television", The Journal of the Society for Information Display.

MIT Research Programs

NSF Grant CNS-0434816
(2004-2007)

Three-year grant from National Science Foundation
NeTS for research on Viral Radio

Communications Futures Program
(2003-Present)

Principal Investigator of cross-MIT research venture
along with David Reed, Media Lab; Charles Fine, MIT
Sloan School of Management; and David Clark, MIT
Computer Science and Artificial Intelligence Laboratory

Digital Life Consortium
(1997-Present)

Director of Media Laboratory consortium of sponsors
Bertelsmann, Brightstar Corporation, Cisco Systems,
France Telecom, Google, News Corporation, Nortel
Networks, NTT Comware, Panasonic Technologies
Company, Philip Morris USA, Qualcomm Incorporated,
Rodale, Inc., and Stan Winston Studio, Inc.

TV of Tomorrow Program
(1991 - 1996)

Principal Investigator, unincorporated venture
between Bertelsmann, Bell-Northern Research,
Deutsche Telekom, Hughes Aircraft Company, Eastman
Kodak Company, Intel Corporation, Philips
International, Sony Corporation, Televisa, Toppan
Printing Company and Viacom International

Media Bank
(1994 - 1998)

Principal Investigator, funded by National Computer
Board, Singapore

Movies of the Future Program
(1985 - 1991)

Principal Investigator, unincorporated venture
between Bellcore, Intel and Viacom International

Patents

A Quasi-Passive Wakeup Function to Reduce Power Consumption of Electronic Devices, US
Patent No 7864051

*Realistic Audio Communication in a Three-Dimensional Computer-Generated Virtual
Environment*, US Patent Application 12/344,542, filed 12/28/2008

Method for Automatic Signal Routing In Ad Hoc Networks, US Patent pending, filed 11/19/02

Tag Interrogation With Observable Response Signal, US Patent No. 7,109,865, filed 9/26/02

Video Image Compositing Techniques, US Patent Number: 5,262,856, filed 11/16/93

Receiver-Compatible Enhanced Definition Television System, US Patent No. 5,010,405,

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Video Graphic Arthroscopy System, US Patent No. 5,005,559, filed 4/9/91

Extended Definition Television Systems, US Patent No. 5,003,377, filed 3/26/91

Multiscale Coding of Images, US Patent No. 4,987,480, filed 1/22/91

Unrecordable Video Signals, US Patent No. 4,673,981, filed 6/16/87

Other

Director, Beonten, 2012 – present

Advisory Panel, Terrarium, 2012 - present

Advisory Board, Echonest, 2008 - present

Advisory Board, damaka, Inc., 2006-2010

Advisory Board, MiND (Media Independence), 2006-2008

Science Advisor, Public Radio International's *PRI at Night*, 2006

Member of Advisory Board to Board of Directors, MaMaMedia, Inc., 1997-2003

Member of Scientific Advisory Board, Centre for User Oriented IT Design,
Stockholm, Sweden, 1997-2004

Member of Technical Advisory Board, VTEL (Austin), 1992-2000

Member of International Steering Committee, International Workshop on Coding Techniques for
Very Low Bit-rate Video, 1995

Member of the Science Council of the Cross Industry Working Team (XIWT), Corporation for
National Research Initiatives (CNRI), 1993-present

Founding Member of the Editorial Board for Multimedia Systems Journal, 1992

Member of the International Organizing Committee for the Picture Coding Symposium, 1989-1993

Chairman, International Organizing Committee, Picture Coding Symposium, 1990

Member of Strategic Advisory Council of the Research and Demonstration Center on Remote
Medical Consultation Via High-Definition Television, Texas Children's Hospital, 1990-91

Member of Editorial Board of Image Communication Journal, 1989-2003

Member of the Steering Committee for International Workshop on Advanced Techniques for
Transmission of Video at 64 kbit/s or less, Hannover, West Germany, 1988-90

Board Member of Technology Broadcasting Corporation (WMBR), 1983-1989

FCC Advisory Committee Member of Advanced Television Service, 1989-90

Member of the US CCIR Study Group 11 (Television), 1990

Member of Editorial Board of ACM TOIS (Transactions on Information Systems), 1989-1990

Chairman of the Board of Advisors, Medical Simulation Foundation, 1987-1988

Medical Simulation Foundation: Principal Investigator for "The Video-Graphic Arthroscope" Project, 1987-88

Graduate Student Council (GSC) Teaching Award for the Architecture Department, 1986

DARPA: Principal Investigator for "Synthetic Teleportation" project, 1985-1987

1983 Nebraska Interactive Videodisc Award for Best Technical Achievement, Lincoln, NE, September 15, 1983

MIT Committee member of the Computing Environment, 1983-84

Member of Project Athena Technical Committee, 1983-84

Review Board, NSF, Applications of Interactive Videodisc to Science Education, 1977-1979, 1981

Member of the School Committee, City of Salem, MA. 1987-1993

Memberships

ACM; IEEE; IEEE Computer Society

Theses Supervised

Nadav Aharony	<i>Virtual Private Milieus: Sharing Our Digital Aura through Social and Physical Proximity</i> , MS, September 2008
Matthew Antone	<i>Synthesis of Navigable 3-D Environments from Human-Augmented Image Data</i> , ME EECS, September 1996
Barry Arons	<i>The Audio-Graphical Interface to a Personal Integrated Telecommunications System</i> , MS, September 1984
Derek Atkins	<i>Access and Access Control</i> , MS, June 1995
Dave Backer	<i>Structure and Interactivity in Media: A Prototype for the Electronic Book</i> , PhD, April 1988
Alex Benenson	<i>VideoLogo: Synthetic Movies in a Learning Environment</i> , MS, June 1990
Matthew Blackshaw	<i>The broadcast marketplace : Designing a more efficient local marketplace for goods and services</i> , MS June 2012
Aggelos Bletsas	<i>IntelligentAntenna Sharing in Cooperative Diversity Wireless Networks</i> , PhD, August 2005
Aggelos Bletsas	<i>Time Keeping in Myriad Networks: Theories, Solutions, and Applications</i> , MS, June 2001
Katherine Blocher	<i>Affective Social Quest (ASQ) Teaching Emotion Recognition</i>

	<i>with Interactive Media and Wireless Expressive Toys</i> , MS, June 1998
Guillaume Boissiere	<i>Personalized Multicast</i> , SM MAS, June 1988
V. Michael Bove	<i>Synthetic Movies Derived from Multi-Dimensional Image Sensors</i> , PhD, June 1989
V. Michael Bove	<i>Personalcasting: Interactive Local Augmentation of Television Programming</i> , MS, September 1985
V. Michael Bove	<i>A Flexible Integrated Framestore System</i> , BS, May 1983
Eric Brown	<i>Optical Publishing</i> , MS, February 1983
William Butera	<i>Multiscale Coding of Images</i> , MS, July 1988
Mark Callahan	<i>A 3-D Display Head-set for Personalized Computing</i> , MS, June 1983
Ken Carson	<i>A Color Spatial Display Based on a Raster Framebuffer and Varifocal Mirror</i> , MS, September 1984
William Capolongo	<i>Color Spatial Animation Using a Varifocal Mirror Display</i> , BS, May 1985
Sailabala Challapalli	<i>Modeling the Temporal Components of Video Structure</i> , MS, May 2001
Xiang Chen	<i>Adaptive Bit Allocation for Spatiotemporal Subband Coding Using Vector Quantization</i> , MS, June 1990
Pascal Chesnais	<i>A Graphic/Photographic Arthroscopy Simulator</i> , MS, February 1988
Constantine Christakos	<i>Taking Advantage of Distributed Multicast Video to Deliver and Manipulate Television</i> , MA June 2000
Constantine Christakos	<i>Distributed-in/Distributed-out Sensor Networks: A New Framework to Analyze Distributed Phenomena</i> , PhD, June 2006
Lawrence N. Claman	<i>A Two Channel Spatio-Temporal Encoder</i> , BS, May 1988
James Cooley	<i>A Day in the Life of the RF Spectrum</i> , MS, September 2005
Judith Donath	<i>Inhabiting the Virtual City: The Design of Social Environments for Electronic Communities</i> , PhD MAS, June 1996
Judith Donath	<i>The Electronic Newsstand: Design of an Intelligent Interface to a Variety of News Sources in Several Media</i> , MS, September 1986

Chen-Koung Dong	<i>Measurement of Printer Parameters for Model-Based Halftoning</i> , MS, May 1992
Daniel Dreilinger	<i>Scale Free Information Retrieval</i> , EECS, Meng, June 1998
Steve Gano	<i>Forms for Electronic Books</i> , MS, June 1983
William Gardner	<i>Machine-Aided Visualization of Molecular Vibration</i> , BS, June 1982
David Gauthier	<i>Distributed, Mobile and Pervasive Systems Design</i> , MS, September 2009
Carol Ginsberg	<i>Human Body Motion as Input to an Animated Graphical Display</i> , MS, June 1983
Jeffrey Halbig	<i>Construction and Analysis of a Wireless Antenna-Sharing Scheme</i> , June 2004
Walid Hamdy	<i>Hardware Implementation of Dynamic Video on Personal Computers</i> , BS, May 1986
Michael J. Hawley	<i>Structure out of Sound</i> , PhD, September 1993
Mohamed Atef Hendawi	<i>Multimedia Capture of Events to Support Passive Virtual Attendance</i> , MS, June 1995
Henry N. Holtzman	<i>Three-Dimensional Representations of Video using Knowledge Based Estimation</i> , MS, September 1991
Leonard Hourvitz	<i>Stills from Movies: Personal Photography and the Personal Computer</i> , MS, August 1984
Giridharan Iyengar	<i>Video Retrieval for Reuse</i> , PhD MAS, June 1998
Giridharan Iyengar	<i>Information Theoretic Measures for Encoding Video</i> , MS, September 1995
Frank Kao	<i>Parallel Processing Interfaces to Television</i> , MS, June 1995
Karrie Karahalios	<i>Salient Movies</i> , MEng, June 1995
Karrie Karahalios	<i>Merging Static and Dynamic Visual Media Along an Event Timeline</i> , SM MAS, February 1998
Jeffrey Keast	<i>The Design and Application of a Personal Printer/Scanner System</i> , MS, June 1985
Roger Kermode	<i>Smart Network Caches: Content and Application Mediated Delivery of Multimedia Over the Internet</i> , PhD MAS, March 1998
Roger G. Kermode	<i>Building the Big Picture: Enhanced Coding from Resolution</i> , MS, June 1994

Shyam Krishnamoorthy	<i>Minerva: A Smart Video Assistant for the Kitchen</i> , MS, June 2001
Gene S. Lee	<i>Progressive Transmission of Digitally Compressed Color Images</i> , BS, June 1989
Sung Hyuck Lee	<i>XCast: A Personalized and Groupwise Broadcasting System for Social Event Networking</i> , MS, September 2008
Fulu Li	<i>Community Storage</i> , PhD, June 2009
Fulu Li	<i>Cooperative Multicast in Wireless Networks</i> , MS, June 2005
Inna Lobel Koyrakh	<i>Increasing the Bandwidth of Social Navigation during the Prototyping Process</i> , MS, February 2011
Julia Ma	<i>Interest networks : understanding the influence of interesting people in an organization</i> , MS, June 2012
Bruce McHenry	<i>Multi-Modal Communication in the Computer Medium</i> , BS, June 1984
Patrick Campbell McLean	<i>Structured Video Coding</i> , MS, June 1991
Christopher Metcalfe	<i>Media Jacket: An Integrated Clothing Based Personal Communications System</i> , MS, June 1999
Iliia Mirkin	<i>Reliable Real-time Stream Distribution Using an Internet Multicast Overlay</i> , February 2006
Robert Charles Mollitor	<i>Image Sequence Compression via Code Encyclopedias</i> , BS, May 1988
Paul Thomas Monaghan	<i>Codebook Replenishment of Vector Quantized Movies by use of a Megatable</i> , BS, May 1989
Casey R. Muller	<i>Design and Performance of a Viral Network</i> , MS, June 2003
Eugene N. Opsasnick	<i>Color Correction for the Eikonix Digitizing Scanner</i> , BS, May 1988
Durga Pandey	<i>UniPlug: A Framework For Ad-hoc Invention Sharing Over A Campus Network</i> , MS, September 2007
Peter Pathe	<i>A Virtual Vocabulary Speech Recognizer</i> , MS, June 1983
Manuela Pereira	<i>Video Coding in a Broadcast Environment</i> , MS, September 1993
Steven L. Rohall	<i>A Graphical Interface for Cooperative Problem Solving</i> , MS, May 1988
Pasquale Romano	<i>Vector Quantization for Spatiotemporal Sub-band Coding</i> , MS, February 1990

James B. Salem	<i>Computers in the Audio Domain; creating an audio news system</i> , BS, June 1984
Gitta Salomon	<i>Design and Implementation of an Electronic Special Interest Magazine</i> , MS, June 1986
Robert Schaeffer	<i>Audio Augmentation of Video Disc Training Systems</i> , BS/SM, May 1983
Dawei Shen	<i>Co-channel Digital Signal Separation: Application and Practice</i> , MS, February 2008
Dawei Shen	<i>Design of A Market-Incented Wisdom Exchange for Organizations and Communities</i> , PhD, June 2012
Jeremy Silber	<i>A Cooperative Communication Protocol for Wireless Ad-Hoc Networks</i> , ME, June 2002
Abha Singh	<i>Variable Resolution Video</i> , MS, June 1991
Scott T. Smith:	<i>Scalable Distributed Resource Location</i> , ME EECS, May 1998
Marc Spehlmann	<i>A Speech Peripheral for an IBM Personal Computer</i> , MS
Joseph B. Stampleman	<i>Multiscale Codebooks</i> , BS, May 1989
Joseph B. Stampleman	<i>Scalable Video Compression</i> , MS, June 1992
Dang Van Tran	<i>Multimedia Applications and Network Management Support in Video DialTone ATM Network</i> , MS/BS, May 1994
Edison Thomaz Services	<i>Developing Distributed Contextualized Communication</i> MS, September 2002
Tri D. Tran	<i>Low Delay MPEG2 Video Encoding</i> , BS /MEng EECS, June 1997
Nuno Vasconcelos	<i>A Bayesian Framework for Content Characterization, Summarization, Indexing, and Retrieval</i> , PhD, MAS, November 1997
Nuno Vasconcelos	<i>Library-based Image Coding using Vector Quantization of the Prediction Space</i> , MS, September 1993
Dimitrios Vyzovitis	<i>An Active Protocol Architecture for Collaborative Media Distribution</i> , MS, June 2002
Anders Richard Wallgren	<i>Movies on the Workstation</i> , BS, May 1989
John A Watlington	<i>Synthetic Movies</i> , MS, September 1989

John A. Watlington	<i>A Decoder for Vector Coded Color Motion Picture Sequences</i> , BS, May 1987
Grace Woo	<i>Demonstration and Evaluation of Co-channel DBPSK Source Separation</i> , MS, June 2007
Grace Woo	<i>VR Codes : embedding unobtrusive data for new devices in visible light</i> , PhD, June 2012
Steven Yelick	<i>The Authoring of Optical Videodiscs with Digital Data</i> , MS, June 1982
Steven Yelick	<i>Anamorphic Image Processing</i> , BS, June 1980
Polychronis Ypodimatopoulos	<i>Cerebro: Forming Parallel Internets and Enabling Ultra-Local Economies</i> , MS, September 2008
Polychronis Ypodimatopoulos	<i>An Open Application Framework For Social Discovery</i> , PhD, June 2012
Hector Yuen	<i>An Ad-Hoc Wireless Communication System</i> , MS, August 2006

Panels and Presentations

Keynote Speaker, Ernst & Young Global Media & Entertainment Industry Meeting, Orlando, Florida, December, 2012

Keynote Speaker, AT&T Technical Leaders Forum, Orlando, Florida, November, 2012

Keynote Speaker, AT&T Technical Leaders Forum, San Juan, Puerto Rico, February, 2012

Panel Speaker, PWC Global Communications Forum, London, June, 2011

Keynote Speaker, Fidelity Executive Forum, Orlando, May 2011

Keynote Speaker, AT&T Technical Leaders Forum, Los Angeles, November 2010

Keynote Speaker, HSM World Marketing & Sales Forum, Lisbon, November 2009

Keynote Speaker, 16th CLSA Investors' Forum, Hong Kong, September 2009

Keynote Speaker, HSM World Marketing & Sales Forum, Mexico City, July 2009

Keynote Speaker, Gartner Wireless and Mobile Summit, Chicago, February 2009

Keynote Speaker, TelephonyLIVE, Chicago, September, 2008

Keynote Speaker, The Future of Computing, Dell Mexico, Monterey, Mexico, September, 2008

Keynote Speaker, Product Development & Management Association's International Conference, Orlando, September, 2008

Keynote Speaker, Wainhouse Research, Cambridge, MA, July 2008

Keynote Speaker, Gartner Group Future of Technology, Orlando, June 2008

Keynote Speaker, HSM World Marketing & Sales Forum, São Paulo, Brazil, June 2008

Keynote Speaker, Photo Marketing Association International, Las Vegas, February 2008

Speaker, eg07, Los Angeles, December 2007

Speaker, Gartner Networking Summit, Nashville, December 2007

Keynote Speaker, SSPA Services Leadership Conference, New Orleans, October 2007

Keynote Speaker, SonyBMG Music Entertainment Worldwide Information Technology Conference, Miami, April 2007

Panelist, NSF Cognitive Ratio and Cooperative Communication, Washington, DC, April 2007

Keynote Speaker, IEEE/CTIA Portable'07 Conference, Orlando, March 2007

Panelist, The New New Media, Realscreen Summit, Washington, DC, January 2007

Keynote Speaker, World Science Forum, New York, NY, November 2006

Keynote Speaker, Playback Mobile Forum, Toronto, Canada, May 2006

Keynote Speaker, Media Summit/Digital Hollywood, New York NY, February 2006

Panelist, Telecoms Transitions, Lisbon, Portugal, June 2005

Keynote Speaker, IT MIDIA, Sao Paulo, Brazil, June 2005

Speaker, IDG Communications Meeting, Cadiz, Spain, May 2004

Speaker, Samsung Tech Fair 2003, Seoul, Korea, July 2003

Workshop Co-Director: United Nations: The Wireless Internet Opportunity for Developing Nations, New York, June 2003

Keynote speaker, Worldcom Customer Summit, Orlando, FL, February 2003

Keynote speaker, Nextel Indirect Conference, Las Vegas, January 2003

Presentation before Congressional Internet Caucus, Washington, DC, July 2002

"Not Your Victorian Internet," speaker, MIT On the Road, The Association of Alumni and Alumnae of MIT, West Palm Beach, FL, January 2001.

"Digital Extremism," speaker, The Leadership Center, Atlanta, GA, November 2000

"Digital Entertainment," speaker, Minnesota TEKNE Awards, Minneapolis, MN, November 2000

"Digital Life: Clearing the Cobwebs from the Net," speaker, New York State Annual Meeting, Lake Placid, NY, June 2000

"The Future is Now," keynote speaker, South Dakota Governor's Economic Development Conference, Pierre, SD, April 2000

"Always On," keynote speaker, Canadian Music Week conference, Toronto, March 2000

"Accessible Computers for All," speaker, INET'2000, Sao Paulo, Brazil, July 2000

"Taking the Lead – Issues of the Future," keynote speaker, Canadian Association of Broadcasters, Montreal, Canada, November 1999.

"The New Technology Changing the World," keynote speaker, Mgate New-Biz Forum, Athens, Greece, January 1999.

"The Developing Relation Between Digital Broadcasting and the Internet," workshop speaker, Conference on the Hong Kong TV Broadcasting Industry: Towards the 21st Century, Hong Kong, November 1998

"Transparent Technology," Keynote speaker, CUE Telecon XVII, Anaheim, CA, October 1998.

"The New World for Technology," invited speaker, Federation of European Direct Marketing, Brussels, Belgium, April 1998.

"Future of TV Networks," invited panelist, Aspen Comedy Festival, Aspen, CO, March 1998.

"The Future of Media Technology," invited speaker, Fischer, Justus Communicacao Total, Sao Paulo, Brazil, January 1998.

"The New Multimedia Environment," invited panelist, United Nations World Television Forum, New York, NY, November 1997.

TED6, Technology, Entertainment & Design, invited speaker, New York, NY, September 1997.

"The Future of Technology," Technology Forum, California State University, Hayward, CA, May 1997.

"The Future of the Newspaper in the Digital Age," International Seminar on the Future of the Daily Newspaper, Belo Horizonte, Brazil, April 1997.

"How Future Communications Impact You," Meetings & Exhibitions Technology Conference, Rosemont, IL, April 1997.

"Digital Life: Media & Community in a Connected World," ECON Zukunftstag, Dusseldorf, Germany, April 1997.

"The Future of Technology," Technology Forum, California State University, Hayward, CA, May 1997.

"QoS & Mobile Multimedia," Nomadic 97, panel member, Santa Clara, CA, August 1997.

"Nomadicity, Wearability & The Technologies of Community," Arthur Andersen High Tech Advanced Industry Seminar, keynote speaker, San Jose, CA, September 1997.

Speaker, TED6, Technology, Entertainment & Design, New York, NY, September 1997..

"The New Multimedia Environment," invited panelist, United Nations World Television Forum, New York, NY, November 1997.

"The Impact of Future Communications on the Printing Industry," keynote speaker at Tech Alert 96 Conference, Graphics Arts Technical Foundation, Pittsburgh, PA, January 1996

"Internet Entertainment," Singapore Digital Media Consortium Symposium, speaker, Singapore, February 1996.

"How Future Communications Impacts You," First Swiss Telecom Symposium, speaker, Lugano, Switzerland, May 1996.

"Telecommunications, Telematics & Social Change," ARTIS Seminar, speaker, Firenze, Italy, June 1996.

"The Future of Television," Medientage Munchen '96, speaker, Munich, Germany.

"The Future of Video Coding: What Will Be New," International Symposium on Circuits & Systems, panel member, Atlanta, May 1996.

"Emerging Architecture," invited panel participant at NII 2000 Forum of the Computer Science and Telecommunications Board, Washington, DC, May 23, 1995.

"Multimedia Revolutions: past, present and future," speaker at Management Circle Conference on Datenautobahn und Multimedia, Frankfurt, Germany, June 19-21, 1994.

"Coding Content instead of Pixels," keynote speaker at the VLBV 94 conference, Colchester, Essex, UK, April 6-8, 1994.

"Technology Day Panel," invited panel participant at the 1994 MTV Networks Management Retreat, San Juan, PR, February 8, 1994.

"Selling Value in the New Media 90s," Guest Speaker at Advanstar Communications 1994 International Sales Meeting, Cleveland, OH, January 14, 1994.

"The 5 Year Prospective for Digital Television," Panel Moderator, IEEE Digital Video Workshop, Cambridge, MA, October 1993.

"Television of Tomorrow," Interactive Panel session at the World Economic Forum Industrial Summit, MIT/Harvard, Cambridge, MA, September 10, 1993.

"Life After HDTV," panel speaker at session on "MIT in the 21st Century", Enterprise '93 Conference, Boston, MA, June 17, 1993.

"Digital Television," invited speaker at Advanced Seminar on "Desktop Video Communications: The Final Step in the Merger of Computers and Video", sponsored by Applied Business telecommunications, Atlanta, GA, May 3, 1993.

"Jumping Into the Frame: Past Interaction, Into Participation," invited speaker for AECT 1993 National Convention, New Orleans, LA, January 14, 1993.

"Telecommunications Future," panel speaker at the PLI Telecommunications Policy and Regulation Conference, Washington DC, December 3, 1992.

Television of Tomorrow: HDTV or Video home computer? ", seminar speaker at the Association Descartes Conference on "Images, Screens, Networks", Paris, France, November 27, 1992.

"Variable Resolution Video on Demand", panel speaker at the EIA Digital Video Workshop, Boston, MA, October 1, 1992.

"The Communication Revolution Now: The Atlantic Connection", panel speaker at the 41st Annual IPI General Assembly, Budapest, Hungary, May 19, 1992.

"Workstations of the Future: A User's Perspective", presenter for the IEEE Satellite Videoconference, April 30, 1992.

"Television of Tomorrow/How Now PTV", presentation and panel speaker at Pacific Mountain Network Conference "Making the Most of Multichannel", La Jolla, CA, April 14, 1992.

Television of Tomorrow", speaker at the 22nd T&M Seminar "The Digital Challenge: Future Tools for Film & TV Makers", Stockholm, Sweden, February 20, 1992.

"The Potential of All-digital High Definition Television Systems", panel speaker at the Financial Times Cable Television and Satellite Broadcasting Conference, London, UK, February 19, 1992.

"How Technology will Reshape Communication", and *"Consumers — Taking Command of their Media Flow"*, speaker at the World Communication Summit, Crans-Montana, Switzerland, October 6, 1991.

"Advanced Television Systems: Anything but HDTV", invited banquet speaker at IEEE Multidimensional Signal Processing Conference, Lake Placid, NY, September 24, 1991.

"Inventing the Future at MIT's Media Lab", presentation to the CCIA Board of Director's meeting, Boston, MA, September 12, 1991.

"Movies of the Future", speaker at the CRAI Multimedia Systems: From Technologies to Applications, Capri, Italy, June 2-7, 1991.

"Television of Tomorrow: Signals with a Sense of Themselves", keynote speaker, 36th Annual IEEE International Computer Conference, COMPCON '91, San Francisco, CA, February 27, 1991.

"Digital Television", banquet speaker at the 1991 SPIE Symposium on Electronic Imaging: Science and Technology, San Jose, PR, February 26, 1991.

"The Future Path for Broadband", plenary session speaker at the 1990 ComForum Conference "Broadband: Converging on the Future", Orlando, FL, December 10-14, 1990.

"Digital Video Terminals", speaker and round table participant, EIA/IEEE 2nd International Workshop on Digital Video Communications, Cambridge, MA, November 27, 1990.

"Computing with Feeling: Directions for the Human Interface to Personal Computing in the Coming Years", invited speaker at SOFTWORLD '90 Conference, Chiba, Tokyo, Japan, August 3, 1990.

"Perspectives on Media Technology", guest speaker at the James Martin World Seminar, (TTI), Cambridge, MA, May 2, 1990.

"Information Technology Seminars", a series of talks presented at the Institute of Systems Science, National University of Singapore, Singapore, April 23-27, 1990

"HDTV Update: Current Status, Issues and Trends", NCGA '90 Tutorial speaker, Anaheim, CA, March 19, 1990.

"Electronic Document Delivery", keynote speaker at the first Bellcore/BCC Conference on Electronic Document Delivery, New Brunswick, NJ, March 12, 1990.

"Communications and Information in the Next Millenium", keynote speaker at the 1990 HIMSS Conference, New Orleans, LA, February 20, 1990.

"Focusing on the Future of the Media", keynote speaker at the Digital Photography Conference, Washington DC, February 8-10, 1990.

"Communications in the Year 2001", keynote speaker at the Dallas Communications Council conference "Communications: The Economic Wave of the Future", Dallas, TX, October 16, 1989.

"Movies of the Future: Computing in your Television, and Television in your Computers", CCISP Seminar Series, University of Pennsylvania, Philadelphia, PA, October 11, 1989.

"Video Technologies of the Future", panelist at National Communications Forum, Chicago, IL, October 3, 1989.

"Inventing the Future", keynote speaker, "Interchange '89 Conference organised by Monsanto, St. Louis, MS, September 21, 1989.

"Advances in Media Technology: The Innovations at MIT's Media Laboratory", pre-conference workshop at HCI International '89 Conference, Boston, MA, September 18, 1989.

"HDTV and the Future of Home Communications", speaker at SEMI conference "HDTV: The Impact of New Age Electronics", San Francisco, CA, June 29, 1989.

"Information in the Next Millenium", speaker at the International Thomson Professional Publishing Conference, Boston, MA, June 28, 1989.

"Media Technology", keynote address, IEEE International Workshop on Microelectronics and Photonics in Communications, New Seabury, MA, June 7, 1989.

"The Face of Communications in the Year 2001", keynote address, Video 9 Conference and Exhibition, Quinnipiac College, CT, May 25, 1989.

"Open Architecture Television", speaker at University of North Carolina/IBM Technical Symposium, Chapel Hill, NC, May 17, 1989.

"Movies of the Future", speaker at the Image and Sound Film Festival, Den Haag, The Netherlands, April 27-28, 1989.

"The Way We Like It: Concurrent, Redundant and Plural", speaker at OCRI MultiMedia '89 Conference, Ottawa, Canada, April 21, 1989.

"Human Interfaces for Multimedia Systems", speaker at Open Software Foundation University Symposium, Cambridge, MA, April 18, 1989.

"The Face of Communications in the Year 2001", keynote speaker for "Advanced Communications Technologies in Pennsylvania and the Public Interest" seminar, sponsored by PPTN, Hershey, PA, April 6, 1989.

"The Future of Television", invited speaker, 99th meeting of the National Council of the Arts, Washington DC, February 3, 1989.

"Opportunities in Communications: The Technology View", speaker for the San Diego Communications Council Conference on Technology, November 15, 1988, San Diego, CA.

"Computing and Communications in the Year 2001", speaker for Hewlett Packard Seminar, Cupertino, CA, November 15, 1988.

"The Future: Home Communications", speaker for Intel Technology Seminar, Sedona, AZ, November 2, 1988.

"The Future: Home Communications", speaker for Ameritech Presidents Conference, Phoenix AZ, November 2, 1988.

"The Face of Communications in the Year 2001", speaker for Ameritech Corporate Strategy Conference, Chicago, IL, October 26, 1988.

"Media Technology", Chairman of SIGGRAPH panel, Atlanta, GA, August 4, 1988.

"The 135 Mb Living Room", speaker for ITS Seventh International Conference, MIT Cambridge, MA, June 29, 1988.

"HDTV...The Systems Under Development", panelist at NAB Broadcast Engineering Conference, Las Vegas, NV, April 10, 1988.

"News and Movies in the 135 Megabit Living Room", speaker for Bellcore/MIT Conference "Towards a Universal Broadband Infrastructure for the US", Salt Lake City, UT, April 7, 1988.

"HDTV: Benefits, Costs and Issues", Tutorial Instructor, NCGA '88, Anaheim, CA, March 21, 1988.

"The Future Impact of HDTV Standards and Digital Television Technologies on Computer Graphics", Technical Speaker for NCGA '88, Anaheim, CA, March 2, 1988.

"Adaptive Vector Quantization of Moving Images", speaker at seminar in "Visual Communications", Columbia University, New York, NY, November 13, 1987.

"New Publishing Technologies: The Day after Tomorrow", speaker at the American Association of University Presses' Northeastern Regional meeting, Cambridge, MA, October 18, 1987.

"Electronic Futures: Technology Directions for Publishing", speaker at the Corporate Electronic Publishing Systems Conference, Boston, MA, October 28, 1987.

"Where Do User Interfaces Come From?", panelist at SIGGRAPH Conference, Anaheim, CA, July 1987.

"Digital Television: An Overview", IEEE International Symposium on Circuits and Systems, speaker, Philadelphia, PA, May 4, 1987.

"Interactive 3-D Imaging for Remote Presence and Simulation", speaker at The Institute for Graphic Communication Conference "Real-Time Stereoscopic Video Display System", Bedford, MA, March 24, 1987.

"Computing with Television", invited speaker for Images, Information, & Interfaces: Directions for the 1990s, New York Telephone, New York, NY, November 19, 1986

Workshop on Interactive 3-D Graphics, University of North Carolina, Chapel Hill NC, October 1986.

"Advanced Television Concepts", ICCE panelist for Consumer Electronics Conference, Chicago, IL, June 5, 1986.

"Unproven Guidelines for the Human Interface", invited Tutorial at Eurographics, Nice, France, September 1985.

"The Advanced Television Research Program at MIT", HDTV Conference, invitational conference of young researchers in television, Rennes, France, September 1985.

"Computer Graphics & the Media Technology" Invited Speech for Texas A&M Symposium, April 1985.

"Optical Videodiscs and Electronic Publishing", speaker for Continuing Education Institute, Los Angeles, June 1984.

"Optical Storage in the House", presentation for Technical Opportunity Conference, San Francisco, CA, December 1983.

"Exploring the Future", invited speaker for the American Press Institute, Reston, VA, November 1983.

"Interactive Three-Dimensional Computer Graphics", speaker for the Institute for Graphic Communication Conference on 3-D Display Techniques Andover, MA, November 1983.

"The Human Interface to Personal Computers", Federal Computer Conference, Washington, DC, September 1983.

"Audio-visual Communications: Tomorrow's World", speaker for the International Institute of Communications Conference, Aruba, Spain, September 1983.

"Artists Interfacing with Technology", panelist for SIGGRAPH Conference, Detroit, MI, July 1983.

"Media Technology - Past, Present, Future", speaker for the Biological Photographic Association, Dallas, TX, July 1983.

Computer & Communications Industry Association Conference, presentation, Calsbad, CA, November 5, 1982.

"Computer Graphics and the Man/Machine Interface", speaker for the First Annual Pacific Northwest Computer Graphics Conference, Eugene, OR, October 1982.

"A Conversational Model for the Human Interface to Graphics", speaker for the NCGA, Anaheim, CA, June 1982.

"Computational Video", invited speaker for the Whitney Symposium on Science and Technology, Rochester, NY, May 1982.

"Picture Archiving & Communications Systems for Medical Imaging", speaker for the First International Conference and Workshop on Picture Archiving and Communication Systems for Medical Applications Paper, Newport Beach, CA, January 17, 1982.

Advanced Research in Computer Graphics Conference, NCGA, speaker, June 1981.

"NTSC Compatible Text and Graphics", speaker for the IEEE 21st Annual Chicago Spring Conference on Consumer Electronics, June 1981.

"Computational Video: Television as a Human Interface", Canadian Man-Machine Society, June 1981.

"Video at the Learning Interface", Society for Applied Learning Technology Symposium, February 1981.

"Introduction to Dataland", speaker for the Association of Educational Communication and Technology Convention, April 1980.

"Computers in Everyday Life", Session Chairman of Technical Committee, International Federation of Information Processing (IFIP) 8th World Congress, 1980.

"Personalized Movies, Society for Applied Learning Technology", speaker for Third International Congress, January 1980.

"The Case for TV Compatibility in Computer-Aided Design", speaker for the Detroit Engineering Society, April 1979.

"Videodiscs in Cataloging", speaker for the Art Libraries Society of North America (ARLIS) Conference, March 1979.

"Interactive Computing", panelist for SIGGRAPH Conference, 1976.

Law Cases

Jongerius Panoramic Technologies v Google and Apple, Norther District of California, 4:12-cv-03797, Greenberg Traurig on behalf of Google, and Ropes and Gray obo Apple, 2013 --

Rovi v Amazon et al, CIV-1:11-cv-00003, US dist court, Delaware. Boies Schiller on behalf of Amazon. 2012 Case dropped.

Rovi v Vizio, ITC 337-TA-820 and ITC-TA-845, Akin Gump, on behalf of Vizio. Both actions dropped. 2012.

Patent Harbor, LLC v. The Walt Disney Co. & Buena Vista Home Entertainment, Rothwell Figg, on behalf of Disney, 2011 – June, 2012

Reexamination of U.S. Patent Nos. 7,467,218 and 7,890,648, U.S. Patent and Trademark Office, Kenyon & Kenyon LLP, August 2011 – present, on behalf of Sony Electronics and Sony Entertainment America

Bose Corporation v SGI, Inc et al. D. Mass. Case No. 09-cv-11439-WGY. Foley, Lardner (Boston) on behalf of SGI, et al, Deposition January, 2012

S3G V Apple Computer, Finnegan Henderson et al, Washington, Finnegan, on behalf of plaintiff S3G, testified in ITC April 2011

LG v. Vizio, Jones Day, on behalf of Vizio, testified in ITC June 2010

DIRECTV, Inc. v. Gemstar TV-Guide Interactive, Inc. (Commercial Arbitration). Jones Day, on behalf of DirecTV, testified December 2009

MPT and Sony v. Vizio, Jones Day, 2009, Hired by Jones Day on behalf of Vizio

Superguide v. DirecTV, Jones Day, 2008 -2009, hired by Jones Day on behalf of DirecTV

Beery – DirecTV, Jones Day, hired by Jones Day, 2008

Guardian v. Toshiba America Consumer Products, Knobbe Martens, 2008 –2009, hired on behalf of Toshiba America

Microsoft '682, Fish and Richardson, on behalf of Microsoft, 2007

United States of America v. American Society of Composers, Authors and Publishers (for determination of reasonable license fees,) arbitration, White Case, 2007, on behalf of ASCAP

Digital Choice of Texas v. Sichuan Changhong Electric Co, Mayer Brown Rowe & Maw, 2006, on behalf of SCE, deposed September, 2006

Acacia v. New Destiny Internet Group et al, Jones Day, 2005 to present, hired on behalf of several of the defendants, idle

Kyocera v. Nokia, Jones Day, September 2005, on behalf of Nokia

Antal Media Corporation v. Apple Computer et al, Weil Gotschal and Manges, 2004 hired on behalf of Microsoft and Real Networks.

Hewlett Packard v. Intergraph, Civil Action 03-2517 (MJJ). McDermott, Will and Emery, November 2003 on behalf of Intergraph

Collaboration Properties v. Polycom, USAOP-23M40533. Keker and Van Ness, 2003 - 2004, Deposed December 2003 on behalf of Polycom

Gemstar, MDL-1274-WBH , Morrison and Foerster, Banner and Witcoff, September 2002-April 2003, Deposed February 2003, multi-client litigation

Electronic Industries Alliance and Consumer Electronics Association – Technical Consulting, Dickstein, Shapiro, Morin & Oshinsky, April 2002.

Certain Set-top Boxes, 337-TA-454 (Vogel). Kirkland and Ellis, July-December 2001, Deposed October 2001

Pegasus Development v. DirecTV, et al, CA 00-1020 (GMS). Jones, Day, 2001, Idle for >12 months