Prof. Chris Kyriakakis

Contact

USC Viterbi School of Engineering (1996 – Present)
Ming Hsieh Department of Electrical Engineering
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Wikipedia: http://en.wikipedia.org/wiki/Chris_Kyriakakis

Education

PhD	**University of Southern California (USC)**	
1993	Electrical Engineering	
MS	**University of Southern California (USC)**	
1987	Electrical Engineering	
BS	**California Institute of Technology (Caltech)**	
1985	Engineering and Applied Science	

Positions

Associate Professor	**USC**
2002-Present	Electrical Engineering
Assistant Professor	**USC**
1996-2002	Electrical Engineering
Research Fellow	**USC**
1993-1996	Electrical Engineering
CTO	**Audyssey Laboratories**
2002-2018	
Chief Audio Scientist	**SYNG**
2019-Present	

Research Areas

Immersive audio signal processing, machine learning for audio and acoustics, room equalization, room acoustics, headphone acoustics, multichannel audio streaming, microphone array processing, head-related transfer function modeling, adaptive algorithms for virtual microphones, virtual loudspeakers, multichannel audio rendering, archaeoacoustics.

Honors and Awards

2018	Elected as Senior Member of the Institute of Electrical and Electronics Engineers (IEEE)
2006	World Technology Network Award

Samsung v. Zophonos
IPR2026-00085
Exhibit 1003

James P. Clark, Chairman of the World Technology Network: "The World Technology Awards program is a very inspiring way to identify and honor the most innovative people and organizations in the technology world…We look forward to assisting Prof. Kyriakakis continue to help create our collective future and change our world."

2004 National Academy of Engineering: Frontiers of Engineering Session Chairman

2003 Best Paper Award: IEEE 37th Asilomar Conference on Signals, Systems, & Computers

Professional Service (Past and Current)

Society Memberships

Member of the Audio Engineering Society (AES)

Senior Member of the IEEE

Member of the Acoustical Society of America (ASA)

Member IEEE Technical Committee on Multimedia

Member of AES Technical Committee on Multichannel and Binaural Audio

Member of AES Technical Committee on Audio for Games

Reviewer

National Science Foundation

IEEE Transactions on Multimedia

IEEE Transactions on Signal Processing

IEEE Transactions on Audio, Speech, and Language Processing

European Association for Signal Processing (EURASIP)

IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)

IEEE Workshop on Applications of Signal Processing to Audio (WASPAA)

IEEE Workshop on Multimedia Signal Processing

ACM Special Interest Group on Graphics and Interactive Techniques (SIGGRAPH)

European Signal Processing Conference (EUSIPCO)

Audio Engineering Society

Acoustical Society of America

Books

1. S. Bharitkar and C. Kyriakakis, "Immersive Audio Signal Processing," Springer-Verlag, New York, (2006).
2. D. Yang, C.-C. Kuo, and C. Kyriakakis, "High Fidelity Multichannel Audio Coding," Hindawi Press, New York, (2004).

Patents

1. Systems and Methods for Audio Upmixing. 12,069,466 (2024)
2. Systems and Methods for Spatial Audio Rendering. US20240107258A1 (2024)
3. WO2024186771A1 Systems and Methods for Hybrid Spatial Audio
4. Systems and Methods for Loudspeaker Layout Mapping W02023070105A2 (2023)
5. Systems and Methods for Audio Upmixing EP 4252432 (2023)
6. Systems and Methods for Spatial Audio Rendering. 11,722,833 (2023)
7. Systems and Methods for Audio Upmixing WO2022132197A1 (2022)
8. Systems and Methods for Spatial Audio Rendering. 11,206,504 (2021)
9. Systems and Methods for Audio Upmixing US202220400351A1 (2021)
10. Systems and Methods for Spatial Audio Rendering. WO2020206177 A1 (2020)
11. Audio Output Device Specific Audio Processing. 9,860,641 (2018)
12. Audio Content Enhancement Using Bandwidth Extension Techniques. 8,705,764 (2014)
13. Room Acoustic Response Modeling and Equalization with Linear Predictive Coding and Parametric Filters. 8,363,853 (2013)
14. Cross-Over Frequency Selection and Optimization of Response Around Crossover. 8,363,852 (2013)
15. Stereo Expansion with Binaural Modeling. 8,229,143 (2012)
16. Phase Equalization for Multi-Channel Loudspeaker-Room Responses. 8,218,789 (2010)

17. Combined Multirate-Based and FIR-Based Filtering Technique for Room Acoustic Equalization. 8,077,880 (2011)
18. System and Method for Automatic Multiple Listener Room Correction with Low Order Filters. 8,005,228 (2011)
19. Personal Audio Docking Station. D629,391 (2010)
20. Cross-Over Frequency Selection and Optimization of Response Around Cross-Over. 7,826,626 (2010)
21. System and Method for Automatic Room Acoustic Correction in Multi-Channel Audio Environments. 7,769,183 (2010)
22. Phase Equalization for Multi-Channel Loudspeaker-Room Responses. 7,720,237 (2010)
23. System and Method for Automatic Multiple Listener Room Acoustic Correction with Low Filter Orders. 7,567,675 (2009)

Selected Press Coverage

April 16, 2022	**Joe N Tell:** interview on acoustics and psychoacoustics https://www.youtube.com/watch?v=82QTD0RoB0Q
January 10, 2021	**The New Yorker:** The origins of video-chat voice https://www.newyorker.com/tech/annals-of-technology/the-origins-of-video-chat-voice
May 11, 2019	**Observer:** Inside the world of sound designers who create tech's noisy notifications https://observer.com/2019/05/app-sounds-notifications-design/
May 1, 2019	**New York Magazine:** I tried a $500 sound-therapy machine https://www.thecut.com/2019/05/i-tried-a-usd500-sound-therapy-machine.html
June 28, 2018	**Sputnik News International:** Will spherical music venues in London and Las Vegas really produce great sound? https://sputniknews.com/20180628/msg-sphere-london-acoustics-1065851435.html
December 2, 2017	**BBC World Service:** Symphony of the Stones http://www.bbc.co.uk/programmes/w3csvq4j
February 28, 2017	**National Herald:** Professors Recreate the Sounds of an Ancient Greek Church in LA https://www.thenationalherald.com/152455/professors-recreate-sounds-ancient-greek-church-la/
September 2016	**USC Trojan Family Magazine:** He uses sound to travel through time https://news.usc.edu/trojan-family/he-uses-sound-to-travel-through-time/
March 9, 2016	**Open Culture:** Museums of Lost Sound http://www.openculture.com/2016/03/mapping-the-sounds-of-greek-byzantine-churches-how-researchers-are-creating-museums-of-lost-sound.html
February 26, 2016	**CBC Radio:** Mapping the Sound of Byzantine Churches http://www.cbc.ca/radio/spark/311-unscrambling-encryption-history-in-3d-and-more-1.3465784/mapping-the-sound-of-byzantine-churches-1.3465806

February 19, 2016	**The Atlantic:** Hearing the Lost Sounds of Antiquity http://www.theatlantic.com/technology/archive/2016/02/byzantine-angel-wings/470076/
September 14, 2015	**UCLA Newsroom:** Measuring the sound of angels singing http://newsroom.ucla.edu/stories/measuring-the-sound-of-angels-singing
February 5, 2015	**Gizmodo:** No, women's voices are not easier to understand than men's voices http://gizmodo.com/no-siri-is-not-female-because-womens-voices-are-easier-1683901643
September 30, 2014	**IEEE Spectrum:** Why mobile voice quality still stinks and how to fix it http://spectrum.ieee.org/telecom/wireless/why-mobile-voice-quality-still-stinksand-how-to-fix-it
June 21, 2012	**NPR All Things Considered:** He'll Retune Your Living Room http://www.npr.org/blogs/therecord/2012/06/21/155501975/hell-retune-your-living-room
Sept. 5, 2011	**New York Times:** Sound, the Way the Brain Prefers to hear it http://www.nytimes.com/2011/09/06/science/06sound.html?_r=1&pagewanted=all
Nov. 29, 2006	**Widescreen Review:** Chris Kyriakakis wins 2006 World Technology Award http://www.widescreenreview.com/news_detail.php?id=12381
Oct. 27, 2006	**USC News:** Immersive Sound-The Next Step in Audio http://www.usc.edu/uscnews/stories/12915.html

Journal Publications

1. S. Gerstel, C. Kyriakakis, S. Antonopoulos, K. Raptis, and J. Donahue, "Holy, Holy, Holy: Hearing the Voices of Angels", Gesta, 60(1) 2021
2. S. Gerstel, C. Kyriakakis, S. Antonopoulos, K. Raptis, and J. Donahue, "Soundscapes of Byzantium: The Acheiropoietos Basilica and the Cathedral of Hagia Sophia in Thessaloniki," Hesperia, Issue 87.1, January-March 2018
3. S. Gerstel, C. Kyriakakis, S. Antonopoulos, K. Raptis, and J. Donahue, "Soundscapes of Byzantium", Speculum 92(5), October 2017
4. S. Gerstel and C. Kyriakakis, "Uncovering the Acoustic Mysteries of Byzantine Thessaloniki", Faith and Form, 49(3), Oct. 2016
5. C. S. Lin and C. Kyriakakis, "High Definition Audio Spectrum Separation via Frequency Response Masking Filter Banks", Journal of the Audio Engineering Society, 57(10), 807-821, (2009)
6. C. S. Lin and C. Kyriakakis, "Removing Additive Noise via Neuro-Fuzzy Based Reinforcement Learning," Journal of the Acoustical Society of America, 124(2), 1026-1037, (2008)
7. D. Cantzos and C. Kyriakakis, "Quality Enhancement of Compressed Audio Based on Statistical Conversion," EURASIP Journal on Audio, Speech, and Music Processing, vol. 2008, p. 1-15, (May 2008).
8. S. Bharitkar and C. Kyriakakis, "Visualization of Multiple Listener Room Acoustic Equalization with Sammon Map," IEEE Transactions on Speech and Audio Processing, 15(2), 542-551, (2007).
9. P. G. Georgiou and C. Kyriakakis, "Robust Maximum Likelihood Source Localization: The Case for Sub-Gaussian versus Gaussian," IEEE Transactions on Speech and Audio Processing, 14(4), 1470-1480, (2006).
10. P. G. Georgiou and C. Kyriakakis, "Maximum Likelihood Parameter Estimation under Impulsive Conditions, a Sub-Gaussian Signal Approach," EURASIP Signal Processing Journal, 10, 3061-3075 (2006).

11. A. Mouchtaris, S. S. Narayanan, and C. Kyriakakis, "Multichannel Audio Synthesis by Subband-Based Spectral Conversion and Parameter Adaptation," IEEE Trans. Speech and Audio Processing, 13(2), 263-274, (2005).
12. S. Bharitkar and C. Kyriakakis, "Robustness of Spatial Average Equalization: A Statistical Reverberation Model Approach," Journal of the Acoustical Society of America, 116(6), 3491-3497, (2004).
11. R. Zimmermann, C. Kyriakakis, C. Shahabi, C. Papadopoulos, A. A. Sawchuk, U. Neumann, "The Remote Media Immersion System: Internet Meets the Future Home Theater," IEEE Multimedia Magazine, March 2004.
12. S. Bharitkar and C. Kyriakakis, "Selective Signal Cancellation For Multiple-Listener Audio Applications Using Eigenfilters," IEEE Transactions on Multimedia, vol. 5(3), 329-338, (2003).
13. D. Yang, H. Ai, C. Kyriakakis, and C. –C. Jay Kuo, "High-Fidelity Multichannel Audio Coding With Karhunen-Loeve Transform," IEEE Transactions on Speech and Audio Processing, 11(4), 365-380, (2003).
14. A. Mouchtaris, S. S. Narayanan, and C. Kyriakakis, "Virtual Microphones for Multichannel Audio Resynthesis," EURASIP Journal on Applied Signal Processing, Special Issue on Digital Audio for Multimedia Communications, 10, 968-979, (2003).
15. D. Yang. Ai, C. Kyriakakis and C.-C. Jay Kuo, "Progressive Syntax-Rich Audio Coding for Multichannel Audio Sources," EURASIP Journal on Applied Signal Processing, Special Issue on Digital Audio for Multimedia Communications, 10, 980-992, (2003).
16. A. Mouchtaris, P. Reveliotis, and C. Kyriakakis, "Inverse Filter Design for Immersive Audio Rendering over Loudspeakers," IEEE Transactions on Multimedia, **2**(2), 77-87, (2000).
17. P. Georgiou, C. Kyriakakis, and P. Tsakalides, "Alpha Stable Modeling of Noise and Robust Time-Delay Estimation in the Presence of Impulsive Noise," IEEE Transactions on Multimedia, **1**(3), 291-301, (1999).
18. C. Kyriakakis, P. Tsakalides, and T. Holman, "Surrounded by Sound: Immersive Audio Acquisition and Rendering Methods," IEEE Signal Processing Magazine, **16**(1), 55-66, (1999).

19. C. Kyriakakis, T. Holman, J.-S. Lim, H. Hong, and H. Neven, "Signal Processing, Acoustics, and Psychoacoustics for High Quality Desktop Audio," Journal of Visual Communication and Image Representation, **9**(1), 51-61, (1998).
20. C. Kyriakakis, "Fundamental and Technological Limitations of Immersive Audio Systems," Proceedings of the IEEE, **86**(5), 941-951, (1998).

Technical Conference Publications

1. Wang, Z., Kensek, K., Kyriakakis, C., Zyda, M., and Narhi, E. "Augmented Reality in Room Acoustics: A simulation tool for mobile devices with auditory feedback", 7th International Conference on Architecture and Built Environment (April 2020)
2. D. Cantzos, A. Mouchtaris, and C. Kyriakakis, "Perceptually-Driven Scalable MDCT Enhancement of Compressed Audio Based on Statistical Conversion", Proceedings of IEEE International Symposium on Multimedia, Dec. 2011.
3. S. Bharitkar and C. Kyriakakis, "Comparison between Spherical Headmodels and HRTFs in Upmixing for Headphone Based Virtual Surround and Stereo Expansion", Proceedings of the AES 129th Convention in San Francisco, CA, November 4-7, 2010.
4. C. S. Lin, "Design of Phase Equalizer for Rational Filter Banks Using Minimax Approach", IEEE International Symposium on Industrial Electronics, June 2009.
5. D. Cantzos and C. Kyriakakis, "Bandwidth Extension of Low Bitrate Compressed Audio Based on Statistical Conversion", Proceedings of IEEE ICME 2009.
6. S. Bharitkar, C. Kyriakakis, T. Holman, "Variable-Octave Complex Smoothing for Loudspeaker-Room Response Equalization", IEEE International Conference on Consumer Electronics (ICCE 2008), Las Vegas, NV, 9-13 Jan., 2008.
7. D. Cantzos, A. Mouchtaris, and C. Kyriakakis, "Synthesis of Enhanced Audio from Low Bitrate Compressed Audio Based on Unit Selection and Statistical Conversion

Methods," 42nd Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, Oct. 26, 2008.

8. S. Bharitkar, Y. Zhang, and C. Kyriakakis, "Room Acoustic Response Modeling and Equalization with Linear Predictive Coding and Parametric Filters for Speech and Audio Enhancement," in *Proc. 40th IEEE Asilomar Conf. on Signals, Systems, & Computers*, Pacific Grove (CA), Oct. 2006.
9. S. Bharitkar and C. Kyriakakis, "Cascaded FIR Filters for Multiple Listener Low Frequency Room Acoustic Equalization," accepted in *2006 IEEE Intl. Conf. Acoust., Speech, & Signal Proc.* (ICASSP-2006), Toulouse, France, May 2006.
10. C. -S. Lin and C. Kyriakakis, "A Morphing Approach for Synthesizing Multichannel Recordings," 39th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA, November, 2005.
11. J. Peterson and C. Kyriakakis, "Analysis of Fast Localization Algorithms for Acoustical Environments," 39th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA, November, 2005.
12. S. Bharitkar and C. Kyriakakis, "Comparison Between Time Delay Based and Nonuniform Phase Based Equalization for Multichannel Loudspeaker-Room Responses," 39th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA, November, 2005.
13. S. Bharitkar and C. Kyriakakis, "Optimization of the Bass Management Filter Parameters for Multichannel Audio Applications," 39th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA, November, 2005.
14. S. Bharitkar and C. Kyriakakis, "Objective Function for Automatic Multiposition Equalization and Bass Management Filter Selection," Audio Engineering Society, New York, October, 2005.
15. S. Sundaram and C. Kyriakakis, "Phantom Audio Sources With Vertically Separated Speakers," Audio Engineering Society, New York, October, 2005.
16. S. Bharitkar and C. Kyriakakis, "Optimization of Crossover Frequency and Crossover Region Response for Multichannel Acoustic Applications," 13th European

Signal Processing Conference (EUSIPCO 2005), Antalya, Turkey, September, 2005.

17. J. Peterson and C. Kyriakakis, "Hybrid Algorithm for Robust, Real-Time Source Localization in Reverberant Environments," International Conference on Acoustics, Speech, and Signal Processing (ICASSP '05), Philadelphia, March 2005.
18. J. Peterson and C. Kyriakakis, "Choosing Candidate Locations for Source Localization," Joint Workshop on Hands-Free Speech Communication and Microphone Arrays (HSCMA '05), Rutgers, March 2005.
19. C. Papadopoulos, C. Kyriakakis, A. A. Sawchuk, X. He, "Cyberseer: 3D Audio-Visual Immersion for Network Security and Management," Workshop on Visualization and Data Mining for Computer Security (VizSEC/DMSEC) 2004, Fairfax, VA, October, 2004.
20. H. Huang and C. Kyriakakis, "Binaural Noise Reduction Combining Binaural Analysis and Spectral Subtraction," Proc. 38th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA. Nov. 2004.
21. H. Huang and C. Kyriakakis, "Computationally Efficient Blind Dereverberation of Audio Signals," Proceedings of the 117th Convention of the Audio Engineering Society, New York, October, 2004.
22. M. Boueri and C. Kyriakakis, "Audio Signal Decorrelation based on a Critical Band Approach," Proceedings of the 117th Convention of the Audio Engineering Society, New York, October, 2004.
23. S. Bharitkar and C. Kyriakakis, "Nonlinear Projection Algorithm for Evaluating Multiple Listener Equalization Algorithm Performance," Proceedings of the 117th Convention of the Audio Engineering Society, New York, October, 2004.
24. R. Sadek and C. Kyriakakis, "A Novel Multichannel Panning Algorithm for Standard and Arbitrary Loudspeaker Configurations," Proceedings of the 117th Convention of the Audio Engineering Society, New York, October, 2004.
25. A.A. Sawchuk, E. Chew, R. Zimmermann, C. Papadopoulos and C. Kyriakakis, "Distributed Immersive Performance," Corporation for Education Network Initiatives in California (CENIC) Eighth Annual Conference, March 15-17, 2004, Marina del Rey, CA.

26. C. S. Lin and C. Kyriakakis, "Multi-Frequency Noise Removal Based on Reinforcement Learning," Preprint No. 5966, presented at the 115th AES Convention, New York, NY, October, 2003.
27. S. Bharitkar, P. Hilmes, C. Kyriakakis, "Sensitivity of Multichannel Room Equalization to Listener Position," in Proceedings of the AES 115th Convention, NY, Oct 2003.
28. H. Huang and C. Kyriakakis, "Subband Adaptive Filtering For Acoustic Noise Reduction," in Proceedings of the AES 115th Convention, NY, Oct 2003.
29. S. Bharitkar and C. Kyriakakis, "The Influence of Reverberation on Multichannel Equalization: An Experimental Comparison Between Methods," Proc. 37th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA. Nov. 2003. **(Best Paper Award)**
30. J. M. Peterson, P. Georgiou, and C. Kyriakakis, "The Use of Fractional Lower-Order Statistics in acoustical environments," in Proceedings of Asilomar Conference on Signals, Systems, and Computers, 2003.
31. C. S. Lin and C. Kyriakakis, "Frequency Response Masking Approach for Designing Filter Banks with Rational Sampling Factors," IEEE WASPAA 2003, Mohonk, NY, October, 2003.
32. S. Bharitkar and C. Kyriakakis, "A Comparison Between Multi-channel Audio Equalization Filters Using Warping," 2003 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA 2003), New Paltz, NY. Oct. 2003.
33. S. Bharitkar and C. Kyriakakis, "Sensitivity of multichannel room equalization to listener position," Proc. IEEE Conf. on Multimedia & Expo (ICME), Baltimore. July 2003.
34. S. Bharitkar, P. Hilmes, C. Kyriakakis, "Analysis of Multiple Listener Equalization Performance Due to Displacement Effects,"145th Meeting of the Acoustical Soc. America. Nashville (TN). May 2003.
35. A.A. Sawchuk, C. Kyriakakis, R. Zimmermann, C. Papadopoulos, C. Shahabi, U. Neumann and T. Holman, "Remote Media Immersion," Corporation for Education Network Initiatives in California (CENIC) Seventh Annual Conference, May 7-9, 2003, Santa Barbara, CA.

36. S. Rishi, C. Papadopoulos, and C. Kyriakakis, "Loss Concealment for Multichannel Streaming Audio," Network and Operating System Support for Digital Audio and Video (NOSSDAV '03), Monterey, CA, June, 2003.
37. P. G. Georgiou and C. Kyriakakis, "A new model of source dependent noise for robust array signal processing," in Second IEEE Sensor Array and Multichannel Signal Processing Workshop, Aug. 2002.
38. P. G. Georgiou and C. Kyriakakis, "Signal Parameter Estimation and Localization via Maximum Likelihood Using and Sensor Array in the Presence of Levy Noise," ICSP 2002, Beijing.
39. S. Bharitkar and C. Kyriakakis, "Perceptual Multiple Location Equalization with Clustering," in Proc. 36th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA, Nov. 2002.
40. S. Bharitkar, P. Hilmes, and C. Kyriakakis, "Robustness of Spatial Averaging Equalization Methods: A Statistical Approach," in Proc. 36th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA, Nov. 2002.
41. G. Georgiou and C. Kyriakakis, "A novel model for reverberant signals; robust maximum likelihood localization of real signals based on a Sub-Gaussian model," in Proc. 36th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA, Nov. 2002.
42. A. Mouchtaris, S. S. Narayanan, and C. Kyriakakis, "Maximum Likelihood Constrained Adaptation for Multichannel Audio Synthesis," in Proc. 36th IEEE Asilomar Conference on Signals, Systems, & Computers, Pacific Grove, CA, Nov. 2002.
43. S. Bharitkar and C. Kyriakakis, "Visualization of Multiple Listener Room Response Equalization using Sammon Map," in Proc. IEEE Intl. Conf. on Multimedia & Expo (ICME 2002), Lausanne, Switzerland, Aug. 2002.
44. A. Mouchtaris, S. S. Narayanan, and C. Kyriakakis, "Multiresolution Spectral Conversion for Multichannel Audio Resynthesis," in Proc. IEEE International Conference on Multimedia and Expo (ICME 2002), vol. 2, p. 273-276, Lausanne, Switzerland, Aug. 2002.
45. A. Mouchtaris, S. S. Narayanan, and C. Kyriakakis, "Efficient Multichannel Audio Resynthesis by Subband-

Based Spectral Conversion," in Proc. European Processing Conference (EUSIPCO), vol. 1, p. 413-416, Toulouse, France, Sept. 2002.

46. P. G. Georgiou and C. Kyriakakis, "A robust array signal processing maximum likelihood estimator based on sub-gaussian signals," in Proc. European Processing Conference (EUSIPCO), Toulouse, France, Sept. 2002.
47. D. Yang, H. Ai, C. Kyriakakis, and C. -C. Jay Kuo, "Design of Progressive Syntax-Rich Multichannel Audio Codec," Proc. SPIE Vol. 4674, p. 121-123, Media Processors 2002, San Jose, CA, January, 2002.
48. D. Yang, H. Ai, C. Kyriakakis and C.-C. Jay Kuo, "Error-Resilient Design of High Fidelity Scalable Audio Coding," Proc. SPIE Vol. 4740, Digital Wireless Communications IV, Orlando, Florida USA, April 1-5, 2002.
49. J. M. Peterson and C. Kyriakakis, "Using subband filters to reduce the complexity of real-time signal processing," Preprint No. 5663, presented at the 113th AES Convention, Los Angeles, CA, October, 2002.
50. D. Yang, H. Ai, C. Kyriakakis, and C. -C. Jay Kuo, "Design of Error-Resilient Layered Audio Codec," Preprint No. 5681, presented at the 113th AES Convention, Los Angeles, CA, October, 2002.
51. S. Bharitkar, P. Hilmes, and C. Kyriakakis, "A Statistical Analysis of the Robustness of Room Equalization Using Spatial Averaging," Preprint No. 5669, presented at the 113th AES Convention, Los Angeles, CA, October, 2002.
52. P. G. Georgiou and C. Kyriakakis, "A Novel Method for Source Localization using Microphone Arrays in Reverberant Environments," Preprint No. 5643, presented at the 113th AES Convention, Los Angeles, CA, October, 2002.
53. A. Mouchtaris, S. S. Narayanan, and C. Kyriakakis, "Gaussian-Mixture-Model-Based Methods for Multichannel Audio Resynthesis," Preprint No. 5647, presented at the 113th AES Convention, Los Angeles, CA, October, 2002.
54. C.-S. Lin and C. Kyriakakis, A Fuzzy Cerebellar Model Approach for Synthesizing Multichannel Recordings," Preprint No. 5675, presented at the 113th AES Convention, Los Angeles, CA, October, 2002.
55. S. Bharitkar and C. Kyriakakis, "A Cluster Centroid Method for Room Response Equalization at Multiple

Locations," IEEE WASPAA 2001, Mohonk, NY (WASPAA: Workshop on Applications of Signal Processing to Audio and Acoustics).

56. J. –S. Lim and C. Kyriakakis, "Multirate Adaptive Filtering for Immersive Audio," ICASSP '01, Salt Lake City, Utah, May, 2001 (ICASSP: International Conference on Acoustics, Speech, and Signal Processing).
57. D. Yang, H. Ai, C. Kyriakakis, and C. –C. Kuo, "Adaptive Karhunen-Loeve Transform for Enhanced Multichannel Audio Coding, SPIE, San Diego, 2001.
58. Yang, H. Ai, C. Kyriakakis, and C. –C. Kuo, "Embedded High-Quality Multichannel Audio Coding," Conference on Media Processors, Symposium on Electronic Imaging 2001, San Jose, CA, January 21-26, 2001.
59. S. Bharitkar and C. Kyriakakis, "A Classification Scheme for Room Acoustical Responses," ICASSP 2001, Salt Lake City, Utah.
60. J. –S. Lim and C. Kyriakakis, "Adaptive Synthesis of Immersive Audio Rendering Filters," 111th AES Convention, New York, NY, 2001.
61. S. Bharitkar and C. Kyriakakis, "New Factors in Room Equalization Using a Fuzzy Logic Approach, , 111th AES Convention, New York, NY, 2001.
62. A. Mouchtaris and C. Kyriakakis, "Time Frequency Methods for Virtual Microphone Signal Synthesis," 111th AES Convention, New York, NY, 2001.
63. S. Bharitkar and C. Kyriakakis, "Eigenfilters for Signal Cancellation," ISPACS 2000, Hawaii.
64. C. Kyriakakis and A. Mouchtaris, "Virtual Microphones for Multichannel Audio Applications," ICME 2000, New York, July 2000.
65. S. Bharitkar and C. Kyriakakis, "Selective Signal Cancellation for Multiple Listener Audio Applications: An Information Theory Approach," ICME 2000, New York, July 2000.
66. P. Georgiou and C. Kyriakakis, "A Multiple Input Single Output Model for Immersive Audio Rendering in Real Time," ICME 2000, New York, July 2000.
67. S. Rizzo, J. G. Buckwalter, L. Humphrey, C. van der Zaag, T. Bowerly, C. Chua, U. Neumann, and C. Kyriakakis, "A Virtual Reality Classroom Scenario for ADHD Assessment," The 28th Annual Conference of the

International Neuropsychological Society, Denver, Colorado, February, 2000.

68. P. G. Georgiou and C. Kyriakakis, "Modeling of Head-Related Transfer Functions for Immersive Audio Using a State-Space Approach," 33rd Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, California, October, 1999.
69. A. Mouchtaris, Z. Zhu, and C. Kyriakakis, "High-Quality Internet Audio over ATM Networks," 33rd Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, California, October, 1999.
70. C. Kyriakakis, S. Zeadally, and T. Holman, "Multichannel Audio over Internet2 Using ATM," Audio Engineering Society, preprint no. 5000, (1999).
71. C. Kyriakakis, "Immersive Audio Rendering on the TI C62 DSP Platform," TI DSPFest, Houston, TX, August, 1999
72. P. G. Georgiou, P. Tsakalides, and C. Kyriakakis, "Alpha-Stable Robust Modeling of Background Noise for Enhanced Sound Source Localization," ICASSP '99, Phoenix, Arizona, March, 1999.
73. A. Mouchtaris, P. Reveliotis, and C. Kyriakakis, "Non-minimum Phase Inverse Filtering Methods for Immersive Audio Rendering," ICASSP '99, Phoenix, Arizona, March, 1999.
74. C. Kyriakakis and T. Holman, "Video-Based Head Tracking for Improvements in Multichannel Loudspeaker Audio," Audio Engineering Society, preprint no. 4845, (1998).
75. A. Mouchtaris, J.-S. Lim, T. Holman, and C. Kyriakakis, "Head-Related Transfer Function Synthesis for Immersive Audio," Proceedings of the IEEE Multimedia Signal Processing Workshop (MMSP '98), Redondo Beach, California, December, 1998.
76. C. Kyriakakis and T. Holman, "Immersive Audio for Desktop Systems," Acoustical Society of America International Conference on Acoustics, Seattle Washington, June, 1998
77. C. Kyriakakis and T. Holman, "Immersive Audio for the Desktop: Signal Processing Requirements," ICASSP '98, Seattle, Washington, May, 1998.

78. A. Mouchtaris, J.–S. Lim, T. Holman, and C. Kyriakakis, "Signal Processing Considerations for Immersive Audio Rendering," Proceedings of the 10th Tyrrhenian Conference on Multimedia Communications, Ischia, Italy, (1998).

79. P. Georgiou, C. Kyriakakis, and P. Tsakalides "Microphone Arrays for Speaker Direction Identification," Proceedings of the IEEE on Applications of Signal Processing to Audio and Acoustics, WASPAA, (1997).

80. T. Holman and C. Kyriakakis, "Acoustics and Psychoacoustics of Desktop Systems," 134th meeting of the Acoustical Society of America, San Diego, CA, (1997).

Chris Kyriakakis
Expert Witness Experience

Expert for **Mojawa Intelligent Electronics** v. Shenzen Wenming Technology Co. in **IPR 2025-00842** and **IPR 2025-00843**
Area: Bone conduction headphones
Law Firm: DLA Piper

Expert for **Røde** v. Zaxcom in **IPR 2025-00230, IPR 2025-00231, IPR 2025-0022**
Area: Wireless multitrack audio recording
Law Firm: Dechert

Expert for **Dolby** v. Roku in **5:24-cv-04660-EJD**
Area: Audio signal encoding and compression, codecs
Law Firm: King & Spalding

Expert for **Dolby** v. Roku in **IPR 2024-01354**
Area: Audio signal encoding and compression, codecs
Law Firm: Fish & Richardson

Expert for **Samsung** in **IPR 2024-01003, IPR 2024-01004, IPR 2024-01015, IPR 2024-01033, IPR 2024-01034** Samsung v. Staton Techiya
Area: Noise suppression, voice activity detection, beamforming
Law Firm: Arnold & Porter

Expert for **Meta** v. 8KHZ in **IPR 2023-01003, IPR 2023-01004, IPR 023-01005**
Area: Spatial Audio
Law Firm: Allen & Overy and Paul Hastings

Expert for **The Nielsen Company** v. TVision Insights in **1:22-cv-0057-CJB**
Area: Audio fingerprinting
Law Firm: Kelley Drye & Warren

Expert for **Poly** in case **IPR 2022-01503**, **IPR 2022-01504**, Plantronics/Polycom “Poly” v. Koss Corporation
Area: Wireless headphones
Law Firm: Winston & Strawn

Expert for **Samsung** in case **IPR 2022-00302, IPR 2022-00410** Samsung v. Staton Techiya, LLC
Area: Headphones/Earphones
Law Firm: Arnold & Porter

Expert for **Samsung** in **IPR 2022-00213, IPR 2022-00865** Samsung v. Jawbone
Area: Noise suppression, voice activity detection, beamforming
Law Firm: Arnold & Porter

Expert for **Google** in Case No. **2:21-cv-124-JRG** Vocalife v. Google LLC
Area: Noise suppression, beamforming, echo cancellation
Law Firm: Munger, Tolles & Olson

Expert for **Google** in Case No. **3:20-cv-00881-ADA** Sonos v. Google LLC
Area: Audio signal processing
Law Firm: QuinnEmanuel

Expert for **Google** in Case No. **6:20-cv-03845-EMC** Google LLC v. Sonos
Area: Audio signal processing
Law Firm: QuinnEmanuel

Expert for **Apple** in Case **IPR 2020-00204** Apple v. Maxell
Area: Mobile device audio
Law Firm: O'Melveny

Expert for **Google** in case **T-952-20**, Google LLC vs Sonos, Inc. (Canada)
Area: Noise suppression and echo cancellation
Law firm: Goodmans LLP

Expert for **Samsung** in **IPR 2019-00105** Kurtz v. Samsung
Area: Earphones
Law Firm: DLA

Expert for **Navistar** in Case No. **2:19-cv-00403-JRG** Blitzsafe v. Navistar
Area: Bluetooth and USB audio
Law Firm: DLA

Expert for **Samsung** in Case No. **2:19-cv-00387-JRG** Snik LLC v. Samsung Electronics
Area: Headphones/Earphones
Law Firm: Arnold&Porter

Expert for **Daimler AG** in **IPR 2018-01211, IPR 2018-01209** Daimler v. Blitzsafe
Area: Bluetooth and USB audio
Law Firm: QuinnEmanuel

Expert for **Subaru** in Case No. **2:17-cv-00421-JRG-RSP** Blitzsafe v. Subaru
Area: Bluetooth and USB audio
Law Firm: DLA

Expert for **Samsung** in Case No. **2:17-cv-7665** Kurtz v. Samsung
Area: Earphones
Law Firm: DLA

Expert for **Hyundai-Kia** in **IPR 2016-01533, IPR 2016-01557** Hyundai-Kia v. Blitzsafe
Area: Bluetooth and USB audio
Law Firm: DLA

Expert for **Hyundai-Kia**: in Case No. **2:15-cv-01274-JRG-RSP** Blitzsafe v. Hyundai-Kia
Area: Bluetooth and USB audio
Law Firm: DLA

Expert for **Apple** in: SST (formerly THX), Ltd. v. Apple, in Case No. **13-cv-01161-HSG**
Area: Speakers/Acoustics
Law Firm: Wilmer Hale

Expert for **Apple** and **Samsung** (joint) in: Andrea Electronics v. Apple and Samsung, **ITC Inv. No. 337-TA-1026**
Area: Signal Processing/Noise Cancellation
Law Firms: Sidley (Apple) and Covington (Samsung)

OTHER

Expert for **Public Defender's Office** in: Fuiava v. Chappell, **CV 12-10646-VAP**, Santa Ana, CA
Public Defender of Santa Ana, CA
Forensic report (gunshot analysis)