

Richard C. Cabot PhD, PE

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Professional Profile

Four decades involvement in digital audio, digital signal processing, test and measurement, and psychoacoustics. Successful independent consultant in IP evaluation and product development. Registered Professional Engineer, Rensselaer Polytechnic Institute PhD, Pepperdine University MBA. Prolific author and seasoned speaker on technical subjects in audio and instrumentation. Experienced manager with research and development experience.

Professional Experience

XFRM, Inc. (2002 to present) President

- Evaluation of client technology for potential patentability.
- Evaluation of third party technology for potential investment
- Patent validity assessment.
- Consulting in product definition, engineering and evaluation.
- Development of new technologies, principally in audio and digital signal processing.

Qualis Audio, Qualis Test Systems, Inc. (2005 to present) President, CTO

- Design and development of surround sound monitoring and audio test equipment.
- Represent the company at trade shows and technical conferences.

Audio Precision (1984 to 2001) Principal Engineer, VP, CTO, Board Secretary

- Management authority for engineering, documentation and computer support groups totaling 20 managers, engineers, writers and technicians.
- Chief architect for new products (list below).
- Design all digital hardware
- Design all and Implement most digital signal processing software
- Research and development of new digital signal processing technologies.
- Managed several DSP engineers and consultants.
- Responsible in partnership with three other founders for general corporate management.
- Develop corporate strategic direction.
- Represent the company at technical conferences on audio.
- Represent the company's interests on international standards committees.

Tektronix (1978 to 1984). Design Engineer, Project Leader.

- Architecture and hardware design of audio frequency test and measurement products.
- Project leader on SG5010 programmable audio oscillator.
- Hardware design engineer on AA501 audio distortion analyzer.
- Hardware design engineer on 067-0938 audio distortion measurement fixture.
- Represent the company at technical conferences on audio.

Rensselaer Polytechnic Institute (1977 to 1978) Instructor

Duties included teaching undergraduate electrical engineering and acoustics classes and supervising independent study projects in audio and acoustics by undergraduate students.

National Science Foundation (summer 1977) Principal Investigator

Developed and proposed a research project "Amplified Sound as a Source of Acoustic Trauma", to study the effects of amplified sound on hearing acuity. Served as principal investigator after grant was funded. Duties included directing research, supervising 5 student researchers, drafting final report.

Selected Consulting Experience

Confidential Client, CA. Analysis of technology to guide potential investment

Confidential Client, International. Evaluation of company technology for potential patentability. Prior art research.

Momentum Data Systems, Huntington Beach CA. System and hardware design of home theater products

First Silicon Solutions, Portland OR Market research on DSP debuggers

Pioneer Laser Entertainment, Long Beach CA. Tested and evaluated power amplifiers.

Biamp Systems, Portland OR. Hardware design of graphic and parametric equalizers, power amplifiers, redesigned a four channel limiter, a multi-channel mixing console, wrote numerous user manuals.

BGW Systems, Hawthorne CA. System and hardware design of a portable powered mixing console.

Audio Control, Lynnwood WA. Redesigned real time analyzer filter bank hardware to ANSI specifications.

Broadcast Electronics, Quincy IL. Designed a cross-correlation based tape azimuth error auto-corrector

Interactive Technology, Portland OR. Designed an interface circuit and noise filter for connecting a photometric probe to the company's television data transmission equipment.

Yamaha Professional Products, Buena Park CA. Redesigned a graphic equalizer to reduce noise.

Education

- MBA, 2001, Pepperdine University (Malibu, CA)
- Ph.D. Electrical Engineering, 1977, Rensselaer Polytechnic Institute (Troy, NY)
- Undergraduate coursework in Audiology, 1976, SUNY Albany (Albany NY)
- M.S. Mechanics, 1976, Rensselaer Polytechnic Institute (Troy, NY)
- M. Eng. Electrical Engineering, 1975, Rensselaer Polytechnic Institute (Troy, NY)
- B.S. Electrical Engineering, 1975, Rensselaer Polytechnic Institute (Troy, NY)

Expertise

- IP assessment
- Patent validity assessment
- Prior art research
- Product definition
- System architecture design
- Analog and digital audio
- Digital signal processing (DSP)
- Broadcast, consumer & professional audio
- Instrumentation
- Test and Measurement
- Product design for EMI & EMC compliance
- Analog design
- Analog to digital conversion (A/Ds)
- Digital to analog conversion (D/As)
- Frequency synthesis, PLL & DDS
- Acoustics
- Psychoacoustics
- Loudness measurement
- Signal analysis. statistics, correlation
- Technical writing, training, presentation

Professional Accomplishments

- Registered Professional Engineer in Electrical and Acoustical Engineering in the State of Oregon.
- Fellow of the Audio Engineering Society (AES). Previously held the posts of President, International VP, Western Region VP, Governor, Publications Policy Committee Chair, Convention Papers Chair, Digital Audio Measurements Standards Committee Chair, Journal Review Board Member.
- Senior Member of the Institute of Electrical and Electronics Engineers (IEEE).
- Member of the European Association for Signal Processing (EURASIP).
- Member of the Acoustical Society of America (ASA).
- Member of Sigma Xi (a scientific research honorary society)
- Member of Eta Kappa Nu (an electrical engineering honorary society).
- Developed and Chaired the AES International Conference on Audio Test and Measurement (1992).
- Former Signal Processing Editor of Sound and Video Contractor Magazine.

Other Experience

- Member, Board of Directors, Momentum Data Systems, Fountain Valley, CA, 2002 to 2016
- Member, Communications Tech Advisory Committee, Amerigo Ventures, Woodland Hills, CA, 2001-2002
- Appointed by Governor Kitzhaber to the Oregon Central Business Registration Coordinating Council,

advising state government on streamlining the regulation of Oregon businesses. 1996-1999

Selected Publications

Published and/or presented numerous papers in the fields of audio frequency electronic circuit design, digital signal processing, acoustics and the perception of sound. A sampling of these are listed here.

- A Dynamic Noise Reducer for Sum-Difference Multiplex Systems JAES V 25 # 3 pp. 95-98; March 1977
- Impulse response testing of acoustic spaces, IEEE ICASSP '78, pp 820-823
- Sound Levels and Spectra of Rock Music, JAES V 27 # 4 pp. 267-284; April 1979
- A note on the application of Hilbert transform to time delay estimation, IEEE Transactions on Acoustics, Speech, and Signal Processing, V:29, # 3, June 1981
- Perception of Nonlinear Distortion, AES 2nd International Conference, May 1984
- Automated Measurements of Loudspeaker Small Signal Parameters, 81st AES Convention, Nov. 1986
- Amp performance and the system interface, Sound & Video Contractor Magazine, April 15, 1987
- Testing Digital Audio Devices in the Digital Domain, 86th AES Convention, March 1989
- Measuring AES-EBU Digital Audio Interfaces, JAES V 38 # 6 pp. 459-468; June 1990
- Fast Audio Measurements for Television Network and Satellite Service using Digital Techniques, 25th Annual SMPTE Television Conference, 1991
- Signal distribution for multiroom audio, Sound & Video Contractor Magazine, Feb. 20, 1992
- Comparison of Nonlinear Distortion Measurement Methods, AES 11th Int. Conf., May 1992
- Fundamentals of Modern Audio Measurement, JAES V 47, # 9, September 1999
- Automated Assessment of Surround Sound, 127th AES Convention, 2009
- Audio Measurements in the Program Chain, SMPTE/SBE/AES Joint Audio Seminar, Atlanta, May 2010
- Television Loudness and Meta Data Panel, 131st AES Convention, 2011
- Implementing and Managing 5.1 audio...Avoiding the Pitfalls, PBS Engineering Conference, 2013

Patents

US 9363603 Surround audio dialog balance assessment

US 8774417 Surround audio compatibility assessment

US 8214200 Fast MDCT (modified discrete cosine transform, used in MP3) approximation of a windowed sinusoid

US 8077883 Intelligent solo-mute switching

US 7692686 Method and apparatus for coding format autodetection testing

US 5995914 Method and apparatus for asynchronously measuring frequency shifted signals

US 5818240 Method and system for measuring signal transfer characteristics in the presence of WOW, flutter and intermodulation distortion

US 5749047 Method and apparatus for recognizing a test signal and determining signal transfer characteristics therefrom

US 5748001 Method and apparatus for fast response and distortion measurement

US 5649304 Method and apparatus for communicating auxiliary information in a measurement signal

US 5475315 Method and apparatus for fast response and distortion measurement

US 5420516 Method and apparatus for fast response and distortion measurement

US 5265201 Master-slave processor human interface system

US 5247458 Method and apparatus for testing a digital system for the occurrence of errors

US 5136267 Tunable bandpass filter system and filtering method

US 5089981 Hybrid form digital filter

US 4631522 Method and circuit for compensation of a multiplying digital-to-analog converter

US 4560957 Oscillator fine tune circuit

US 4560950 Method and circuit for phase lock loop initialization

US 4546270 Sample and hold droop compensation circuit

US 4344029 Automatic IM distortion test selector

US 4302738 Noise rejection circuitry for a frequency discriminator

CA 1164066 Automatic intermodulation distortion analyzer

Two additional US applications for technology in the Qualis Audio Sentinel are pending

Test and Measurement Product Designs

- Qualis Audio Sentinel, Surround sound audio metering system
- Qualis Audio Auditor, Surround sound audio monitor controller
- Qualis Test Systems, QTS series high performance matrix switchers
- Audio Precision 2700
- Audio Precision Portable One Dual Domain
- Audio Precision System Two and System Two Dual Domain
- Audio Precision System One Dual Domain
- Audio Precision DCX-127
- Audio Precision SWR-122 matrix switchers
- Audio Precision System One
- Tektronix SG5010 Programmable signal generator
- Tektronix AA501 Audio distortion analyzer

References available upon request