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Education

Ph.D. Electrical Engineering, 1990
University of Colorado, Boulder, CO
M. S. Electrical and Computer Engineering, 1988
University of Colorado, Boulder, CO
B. S. Electrical Engineering and Applied Physics, 1982
Case Western Reserve University, Cleveland, OH

Professional Academic Experience

UNIVERSITY OF COLORADO, Department of Electrical, Computer and Energy Engineering, Boulder, Colorado.
Professor Adjunct, Assistant Research Professor and Lecturer, June 1990 to present
Teaching and research in electrical and biomedical engineering in the electrical and aerospace engineering departments in the areas of electronic, optical, and ultrasonic systems and devices.

Representative Courses Taught (University of Colorado, Department of Electrical and Computer Engineering, 1990-present)

Microelectronic Devices (ECEN 3250): Lecture and laboratory course covering active CMOS, BJT and GaAs semiconductor devices and circuits, including device physics, software-based modeling and simulation, analog and digital discrete and integrated circuit applications, semiconductor lasers, LEDs, photodiodes/transistors.

Introduction to Signal Processing (ECEN 2260): Lecture and laboratory covering signal processing circuits, systems, and software algorithms, including frequency domain analysis and second-order system response in the time and frequency domains.

Circuits and Electronics I (ECEN 2250): Lecture and laboratory covering fundamental principles of AC and DC electronic circuits, systems, and devices, software-based modeling and simulation.

Introduction to Optical Electronics (ECEN 4645/5645): Lecture course covering gas and solid state laser theory, Gaussian optics, single/multimode wave propagation in optical fibers, optoelectronic modulators, nonlinear optics, electrooptical sensors and detectors, and related optical devices and systems.

Introduction to Digital and Analog Electronics (ECEN 1400): Lecture and laboratory covering analog and digital circuit analysis and design.

Design of Implantable Medical Devices (ECEN 4021/5021): Senior/Graduate - level course covering engineering applications in medicine emphasizing design of implantable devices, including cochlear implants, spinal cord stimulators, injectable microstimulators, retinal and visual-cortex implants, and the artificial β -cell; biomaterials and tissue/material interface processes, electrochemical and optical sensors, and engineering analysis applied to physiological systems.

Engineering Applications in Medicine and Biology (ECEN 4011/5011): Senior/Graduate - level courses covering engineering applications in medicine, emphasizing implantable devices for the cardiovascular system, such as pacemakers, implantable cardioverter-defibrillators, total artificial hearts, left-ventricular assist devices, and laser angioplasty devices.

Neural Signals (ECEN 4811/5811): Lecture course covering biophysical bases of electrical signal generation and propagation in nerve cells and other excitable tissues. Topics include membrane electrochemical equilibrium, generation of transmembrane potentials, control of ionic conductance, sensory transduction, synaptic transmission, and active transport processes.

Doctoral Dissertation Research Supervision/Committees:

Characterization and Design of Low-power Wireless Power Delivery Systems; E. Falkenstein, doctoral dissertation, 2010-present. RF front ends and multi-band antenna/rectenna elements for harvesting power broadband (2.4-24 GHz) power/telecom applications.

Broadband Components for RF Front Ends; E. Cullens, doctoral dissertation, 2009-10. Microwave front ends and multi-band antenna elements for broadband (2.4-24 GHz) telecommunications/radar applications.

Haptic Interfaces; Aerospace Engineering doctoral dissertation, 2003. Design of haptic interfaces for providing touch/tactile feedback for virtual environments.

Nonlinear Analytical Model of the Autonomic Basis of Heart Rate Variability (HRV); D. Becker, Ph.D., 2000. Time-dependent spectral analysis and signal processing techniques.

Prediction and Verification of Internal Electric Current Distribution in Muscle from Surface Application; W. Waugaman, Ph.D., 1999. Application of Finite Element Method (FEM) to modeling of current densities in tissue.

Automated tissue classification and feature extraction from digital images using artificial fuzzy neural networks; Mehdi Sedighi, Ph.D., 1998. Optical image processing and feature extraction.

Fast Electromagnetic Simulations using Wavelets; David L. Gines, Ph.D., 1997. Wavelet methods for computationally intensive electromagnetic simulations for GHz waveguide designs.

Super-Resolution Methods for Single Trial Neuromagnetometry; John W. Hobbs, Ph.D., 1997. Signal processing/filtering and feature extraction from neuromagnetometry data.

The Effects of DC and ELF AC Magnetic Fields on the Division Rate of Mastocytoma Cells; Cynthia Leigh Bingham, Ph.D., 1996. Electromagnetic field interaction with biological systems.

UNIVERSITY HOSPITAL, *Department of Experimental Surgery, Groningen, The Netherlands*
Visiting Scientist, 1982 - 1984. Development of glucose sensor and wearable insulin infusion system.

UNIVERSITY OF COLORADO, *Department of Electrical and Computer Engineering, Boulder, Colorado.*
Research Assistant, 1985 to 1990. Development of laser-based devices and systems; high-power ultrasound modulation of nerve and cardiac tissue.

CLEVELAND CLINIC FOUNDATION, *Department of Artificial Organs, Cleveland, OH*
Research Associate, 1979-1982. Fabrication/mechanical design of insulin-infusion devices.

Professional and Technical Consulting:

Technical Consultant, Echostar Communications (Dish Network), Englewood CO, 2009 – 2012

- Technology analysis and intellectual property assessment for DVR technology used in Direct Broadcast Satellite (DBS) digital television networks.

Technical Consultant, VUE Technology, Lake Forest CA, 2005 – 2008 (Acquisition by Tyco International, Oct 2008)

- Technology analysis and intellectual property assessment for radio-frequency (RF) network system designs, networked antenna systems and data networks for radio frequency identification systems.

Technical Consultant, HID Corp./Assa Abloy Corp, 1995 – present

- Contactless Smart Card systems and networks, radio frequency identification systems, access networks and systems. Technology development and analysis, intellectual property assessment, reverse engineering of RFID transponders and readers.
- Evaluation of intellectual property portfolios associated with due diligence in corporate acquisitions.

Technical Consultant, Intrado, Inc., Longmont, CO, 2008

- Consulting addressing cellular telecommunication network technologies for emergency response systems.

Technical Consultant, Terraspark Geosciences, Inc., Denver, CO, 2007 – present

- Technology analysis of feature extraction/pattern recognition algorithms and related software technology applied to the analysis of 3D seismic data for gas and oil exploration.

Technical Consultant, Synthes, Inc., West Chester, PA, 2010-2012

- Technical consulting addressing characterization of cervical and lumbar spinal implant devices

Technical Consultant, FreeWave Technologies, Inc., Boulder, CO, 2006

- Comprehensive analysis of spread-spectrum radio data transceivers and technology used in point-to-point and point-to-multipoint data telemetry networks.
- Analysis of emerging and competitive broadband wireless data technologies and platforms.

Technical Consultant, Maxtor Corporation, 1997 – 2006

Product analysis and intellectual property assessment for computer disk drive and data storage systems.

- Technical analysis in support of licensing/ cross-licensing negotiations with major competitors
- Reviewed and assessed entire Maxtor/Quantum US Patent portfolio as part of acquisition of Quantum Corporation (approx. 850 patents).
- Reverse engineering of data storage products.
- Analysis of emerging data storage technologies/ manufacturing data.
- Technical presentations to Board of Directors

Technical Consultant, Boston Scientific Corp, 2004 – 2005

- Technology analysis and intellectual property portfolio assessment associated with due diligence activities in corporate acquisitions.

Technical Consultant, Sokymat, SA, Granges Switzerland, 2005

- Analysis and reverse engineering of radio-frequency identification (RFID) transponders and RF reader systems.

Technical Consultant, Sonic Innovations, Inc. Salt Lake City, UT, 2004-2007

- Analysis of digital signal processing algorithms for auditory prostheses.

Technical Consultant, Synthes Inc, 2007

- Development of measurement and analysis system for 2-dimensional mapping of pressure v. position profiles over compliant, contoured surfaces.

Technical Consultant, PixSys, Inc./ SNT, Boulder CO, 1994-6

- Development of diffractive lens system and associated electro-optical systems for CCD camera arrays utilized for real-time three-dimensional tracking of surgical instruments with mapping to CT/MRI data sets.

Technical Consultant, Interim Director of Research and Development, DDX, Inc., 1992 – 1993

- Development of laser-based optical biosensor technology and RF wireless data telemetry systems for agricultural management systems.
- Principle investigator on successful phase I and II SBIR proposals for development of semiconductor laser optical sensor/assay system based on patterned bioactive sensors formed on silicon substrates.

Doppler Radar Signal Processing Algorithm/Software Development

- Development of Doppler radar hardware and signal processing algorithms and software implementations in Delphi Pascal and C++ for monitoring flight parameters of small projectiles. Two patents issued and licensed: “Spin Determination for a Rotating Object” (US 6,244,971 B1) and “Launch and Aim Angle Determination for an Object” (US 6,547,671).

Legal and Litigation Consulting, Trial and Deposition Testimony: Previous 5 years and additional representative matters

Telecommunications/networking, RF networks, computing, signal processing, medical devices/systems, and related fields.

Technical Expert Witness for major semiconductor manufacturer.

Subject: Expert witness in multiple IPR filings addressing patents directed to Near Field Communication (NFC) readers and systems.

Status: In process, 2016

Technical Expert Witness for Defendant Schrader International: Bridgestone Americas v. Schrader-Bridgeport International, et al., U.S. District Court for the District of Delaware, Case No. 13-763-GMS.

Subject: Expert witness at jury trial for non-infringement of two patents directed to power management and wireless transmission capabilities of RFID/TPMS devices on behalf of Defendant Schrader International. Prepared and submitted expert report addressing non-infringement of both patents; testimony at trial and in deposition, 2014-2015.

Status: Both patents found not infringed by DE District Court Jury at trial, June 2015.

Counsel: Holland and Hart LLP, Denver/Boulder, CO

Technical Expert Witness for all Defendants: In Re: TransData, Inc. Smart Meters Patent Litigation, U.S. District Court, Western District of Oklahoma, CA No. 12-ML-2309-C.

Subject: Expert witness on behalf of multiple defendants. Prepared and submitted expert reports addressing invalidity and non-infringement of three patents directed to wireless transmission capabilities integrated with digital electric meters, testimony in deposition, 2013-present.

Status: In process.

Counsel: Perkins Coie, LLP, Seattle, WA; Ballard Spahr, Atlanta, GA; Yetter Coleman, Houston, TX.

Technical Expert Witness for Defendant Intel Corp: e.Digital Corporation v. Intel Corporation, et al., U.S. District Court, Southern District of California, Case No. 3:13-cv-2905-H-BGS.

Subject: Expert witness on behalf of Defendant Intel. Prepared and submitted expert declarations in an IPR addressing invalidity of a patent directed to file management systems used in conjunction with nonvolatile flash memory, 2014.

Status: Settled, 2014

Counsel: Kirkland & Ellis LLP, New York, NY

Technical Expert Witness for Defendants Texas Instruments, ST Microelectronics, Samsung Electronics, Freescale Semiconductor, Xerox Corp, Epson America, Ricoh Americas, Oki Data Americas: USEI v. Texas Instruments No. 6:11-cv-491-LED (E.D. Tex.); USEI v. Ricoh, et al. No. 6:12-cv-235

Subject: Expert witness on behalf of Defendants, testifying at trial on three patents addressing network interface controllers and network adapter technology, Ethernet MACs. June 2013 – June 2014

Status: Two of three patents dropped after invalidity trial, third patent ruled invalid in post-trial ruling.

Counsel: Covington & Burling, LLP – San Francisco, CA (Texas Instruments), K&L Gates – Dallas, TX (ST Micro), Akin Gump Strauss Hauer & Feld LLP – Washington, DC (Samsung), Amster Rothstein & Ebenstein LLP – New York, NY (Rico), Bracewell Guiliani LLP – Austin, TX (Freescale Semi), Locke Lord LLP – Dallas, TX (Xerox), Nagashima & Hashimoto – Reston, VA (Oki Data)

Technical Expert Witness for Defendants Belkin Intl., Inc., D-Link Corp., NetGear, Inc., Zyxel Comm. Corp.: *Fujitsu Limited v. Belkin Intl., Inc., D-Link Corp., NetGear, Inc., Zyxel Comm. Corp.*

Subject: Expert witness on behalf of Defendants. 'Twice-reexamined patent asserted against defendants' wireless network adapters and routers/access points providing connectivity in wireless local area networks (LANs). Trial testimony as invalidity expert on behalf of defendants, Nov-Dec. 2012.

Status: Patent found invalid by jury at trial, San Jose, CA, Dec. 2012.

Counsel: Reed Smith (NetGear, Inc.), Winston Strawn (Belkin), Law Off. S.J.C Yang, LLP (D-Link and Zyxel)

Technical Expert Witness for Plaintiff, *HID Global Corp. et al. v. Farpointe Data, Inc., United States District Court, Central District of California, Southern Div., Case No. SACV 10-01954 JVS (RNBx), 2011-2012*

Subject: Assertion by Plaintiff of infringement of two patents claiming programmable multi-technology radio frequency identification (RFID) reader technology. Testimony on behalf of plaintiff addressing infringement and validity of both patents.

Status: Both patents found valid and infringed in Summary Judgment Ruling.

Counsel: Rutan & Tucker, LLC, Costa Mesa CA.

Technical Expert Witness for HTC, Corp.: *HTC Corp. v. Apple Inc., United States International Trade Commission: Certain Portable Electronic Devices and Related Software, Investigation No. 337-TA-721*

Subject: Technology tutorial before the International Trade Commission, and expert testimony at ITC trial on validity of two of Complainant HTC's patents. Asserted patents address power management and data preservation methods for smart phones and portable electronic devices. 2010 – 2012.

Status: Both patents found to be valid at trial; HTC-Apple Global Settlement, 2012.

Counsel: Finnegan, Henderson, Farabow, Garrett & Dunner, LLP; Washington, D.C.

Technical Expert Witness for Defendant Itron, Inc., *Eon Corp. IP Holdings, LLC, Plaintiff v. Landis+GYR Inc., et al (incl. Itron) U.S. Dist. Court for the Eastern Dist. of TX, Tyler Division, Civil Action No. 6:11-cv-00317-LED-JDL, 2013*

Subject: Expert Witness on behalf of defendant Itron addressing non-infringement of patents directed to Smart Meter Radio Frequency networks and associated technologies.

Status: Settled, 2013

Counsel: Andrews Kurth, LLP, Dallas, TX.

Technical Expert Witness for Axxess International, Inc.: *Axxess International v. Savi Technology, Inc., U.S. Dist. Court for the Northern Dist. of TX, Dallas Division, No 3:10-cv-01033-F*

Subject: Asserted patent directed to a high-sensitivity demodulator for active radio frequency identification (RFID) transponders. 2011 - present

Status: Stayed pending reexamination of patent.

Counsel: Strook, Strook & Lavan, NY, NY

Technical Expert Witness for HTC America: *Levine v. Samsung Telecommunications, Sprint Solutions, AT&T Mobility, HTC America, LG Electronics, Motorola, Inc., Nortex Communications, Palm, Inc., T-Mobile, Verizon Wireless*

Subject: Expert witness on behalf of HTC America. Patents asserted against cellular providers and handsets providing map and navigation services over cellular broadband networks. 2012 - 2013

Status: Settled, 2013

Counsel: Patterson & Sheridan, LLC, Houston, TX

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