MARK N. HORENSTEIN, Ph.D.
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Tel: (617)-792-4095 mhoren@mhoren.net

Areas of Expertise

Power Electronics, Electric Power Systems, High-Voltage Systems and Components, Analog and Digital Circuits, Applied Electromagnetics, Green Energy Systems.

Education

Massachusetts Institute of Technology Ph.D. Electrical Engineering 1978
(Electric Power Systems Engineering Laboratory)
Thesis Area: High-Voltage (800 kV) DC Insulators

University of California at Berkeley M.S. Electrical Engineering 1975
Research Area: Beam Plasma Interactions
(Solid State Optics Laboratory)

Massachusetts Institute of Technology S.B. Electrical Engineering 1973
Senior Thesis: Vapor Deposition from High-Voltage Power Switches

Employment History

Boston University

Professor, Dept. of Electrical and Computer Engineering*	2000 - 2020
Associate Chair for Undergraduate Programs - ECE Department	2011 - 2015
Associate Dean for Graduate Programs and Research, Engineering	1999 - 2007
Associate Professor, Dept. of Electrical and Computer Engineering	1985 - 2000
Assistant Professor, Dept. of Electrical and Computer Engineering	1979 - 1985

*Professor Emeritus as of 1/2021

Spire Corporation

High-Voltage Transmission Line Pulsed-Power Division 1978 – 1979
Worked on 400-kV energy systems for rapid deployment of stored energy.

Professional Affiliations

- Institute of Electrical and Electronic Engineers (IEEE) Life Fellow
- Electrostatics Society of America (Past President and Life Member)
- European Federation of Chemical Engineers, International Fellow in Electrostatics
- National Association of Radio and Telecommunications Engineers: Certified Electrostatic Discharge Engineer
- Registered Professional Engineer - Electrical (previously) Commonwealth of Massachusetts
- Journal of Electrostatics (Editor Emeritus; Editor for 14 years)

Current Research Activities

Self-Cleaning Solar Panels via Traveling Wave Electrodynamic Screen: Modeling and Commercialization

Teaching Experience: Electric Circuits, Analog Electronics, Power Electronics, Integrated Circuit Electronics, Electromagnetics, Antennas and Propagation, Engineering Design.

WiTricity Corp.
Exhibit 2002
Page 1

Expert Consultations Related to Electric Power Systems:

Prior Expert Witness & Litigation

Summary:
As of February 20, 2024: 50+ Cases, including >8 IPR cases, >50 Depositions, 8 Jury Trials, ≥ 5 ITC Hearings, 3 Bench Trials

Prior Litigation Work Which Reports Filed and/or Expert Testimony Given.

The NOCO Company vs. Winplus North America, Inc/ADC et a;
U.S. International Trade Commission
Case # ITC Inv. No. 337-TA-1359
Working on Behalf of Respondent Winplus
Matter: Battery Power Packs for Vehicle Starting
Law Firm: Husch Blackwell, LLP

Bel Power Solutions v Monolithic Power Systems
United States District Court for the Western District of Texas
Case No. No. 6:21-cv-00655-ADA
Worked on Behalf of Bel Power
Matter: Distributed DC Power Integrated Circuits
Expert Reports, Deposition

Ampt v. Solar Edge, Inc.
U.S. International Trade Commission
Inv. No. 337-TA-1327
Worked on Behalf of Solar Edge
Matter: Grid Interfaces for Solar Panels
Microcontroller Source Code Analysis, Report

The NOCO Company vs. Winplus North America, Inc/
U.S. International Trade Commission
Case # ITC Inv. No. 337-TA-1256
Worked on Behalf of Respondent Winplus
Matter: Battery Power Packs for Vehicle Starting
Law Firm: Desmarais

Analog Devices, Inc. vs. Xilinx, Inc.
US Patent and Trademark Office, Case IPR2020-01606
Request for *Inter Partes* Review of US Patent 7,280,590
Worked on behalf of Patent Owner Xilinx
Matter: Integrated Circuit Architectures
Declarations, Deposition
Law Firm: Morrison & Foerster

Nidec Motor Corporation, vs. Broad Ocean Motor LLC, et a. ,
United States District Court for the Eastern District Oof Missouri
Eastern Division No. 4:13-cv-01895-SEP

Work on behalf of Nidec
Matter: Motor Controllers
Declarations, Deposition
Law Firm: Husch Blackwell

CFLTechnologies LLC v. Osram Sylvania, Inc. and Ledvance, LLC.
United States District Court for the District of Delaware
C.A. No. 18-1445 (RGA)
Worked on behalf of Defendant Ledvance
Matter: Compact Fluorescent Lamp Resonant Circuits
Declarations on Claim Construction
Law Firm: Goodwin Law

Astronic Test Systems, Inc. v. Teradyne, Inc
US Patent and Trademark Office
Case IPR2021-00350
Request for *Inter Partes* Review of US Patent 7,395,479
Worked on behalf of Patent Owner Teradyne
Matter: Automated Test Equipment
Declaration, Deposition
Law Firm: Ropes and Gray, LLP

Gui Global Products, Ltd. Vs. Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc. v..,
U.S. Patent and Trademark Office Case IPR2021-00338
Request for *Inter Partes* Review of US Patent 10,589,320
Matter: Wireless Earbuds
Declaration, Deposition
Law Firm: Edmonds & Schlather PLLC

Voltstar Technologies, Inc. vs. Superior Communications and AT&T Mobility, Inc.
United States District Court, Central District of California
2:19-CV-07355-JAK-E
Matter: Qi Wireless Charging Systems
Worked on behalf of Superior/ATT
Declaration, Deposition
Law Firm: Snell & Wilmer

Copan Italia S.P.A vs. Puritan Medical Products
United States District Court, District of Maine
C.A. No. 1:18-cv-218-JDL
Matter: Electrostatic Flocking for Medical Swabs
Working on Behalf of Puritan Medical Products
Law Firm: Arent Fox (Taniel Anderson)

Bell Northern Research vs. Coolpad Technologies et. al.
United States District Court, District of Southern California
3:18-cv-01784-CAB-BLM
Matter: Mobile Phone Power Saving Features
Working on behalf of Bell Northern Research

Law Firm: Skiermont Derby (Sadaf Abdullah)

Bell Northern Research vs. ZTE et. al.
United States District Court, District of Southern California
Matter: Mobile Phone Power Saving Features
Working on behalf of Bell Northern Research
Law Firm: Skiermont Derby (Sadaf Abdullah)

Magicall, Inc. v Advanced Energy Industries et al
United States District Court, District of Colorado
3:18-cv-01784-CAB-BLM
Trade Secret Dispute
Matter: Inductors for Energy Transfer
Worked on Behalf of Plaintiff Magicall
Expert report
Law Firm: Winthrop & Weinstine (Michael Obermueller)

SnapRays LLC v. AllTrade, Enstant, et al.
U.S. International Trade Commission - Inv. No. 337-TA-1124
Matter: Electric Cover Plates
Working on behalf of Complainant SnapRay
Law Firm: Stoel Rives (Nathan Brunette)

Lincoln Electric Company v. Harbor Freight Tools
U.S. District Court for Northern District of Ohio, Eastern Division
Case Nl. 1:17-cv-02329
Matter: Driving Circuits for Welding Machines
Worked on behalf of Defendant Harbor Freight
Law Firm: Quinn, Emanuel, Urquhart, and Sullivan (Jordan Kaericher

Cequent Performance Products v. Hopkins Manufacturing
U.S. District Court for the Eastern District of Michigan
Case 2:13-cv-15293-MAG-PJK
Matter: Electronic Brake Controllers for Vehicle Trailers
Worked on behalf of Defendant Hopkins: Expert declarations, deposition
Law Firm: Hovey Williams (Scott Brown)

Hopkins Manufacturing v. Cequent Performance Products
Request for *Inter Partes* Review of US Patents 6,012,780, 6,068,352, and 6,445,993
Matter: Electronic Brake Controllers for Vehicle Trailers
Worked on behalf of Requestor Hopkins: Expert declarations, deposition
Law Firm: Hovey Williams (Scott Brown)

RB-TPG San Jose v Tyco Fire Products
U.S. District Court for the Northern District of California,
Case No: 5:17-cv-03655
Matter*: RF* Interference with Wireless Fire Alarm Systems
Worked on behalf of Plantiff RB-TPG
Law Firm: Nystrom, Beckman, Paris (Colleen Cook)

UPI v. Richtek Corp.
U.S. International Trade Commission Inv. No. 337-TA-698
Matter: Integrated Circuits for Power Applications
Worked on behalf of Richtek USA
Expert reports, deposition, testimony at hearing
Law Firm: Alston and Bird (Celine Liu)

Superior Communications v. Voltstar Technology
Request for *Inter Partes* Review of U.S. Patent 7,910,833
IPR2017-00067
Matter: Energy -Saving Chargers and Power Adapters
Worked on behalf of Requestor Superior
Law Firm: Snell & Wilmer L.L.P. (Andrew Flior)

IV v. Ricoh, Inc.
United States District Court; District of Deleware
13-CV-474 (SLR)
Matter: Scanners and Copiers
Worked on behalf of Plaintiff Intellectual Ventures
Claim construction briefs, expert reports on infringement and validity, deposition
Law Firm: Tensegrity (Stefani Smith)

Global Touch v. Microsoft et al
Request for *Inter Partes* Review of Multiple US Patents, (e.g.: US Patent 7,994,726, IPR2015-01147; US Patent 7,498,749, IPR 2015-01148; US Patent 7,329,970, IPR2015-01149)
Matter: Touch-sensitive and proximity switches
Worked on Behalf of Requestor Microsoft
Expert declarations, claim construction declarations, depositions.
Law Firm: Baker-Hofstetler (John Murphy)

Broad Ocean LLC v. Nidec Corp
Request for *Inter Partes* Review of US Patent 7,990,092
Matter: Electric Motors for HVAC Control
Worked on Behalf of Patent Owner Nidec
Expert declaration, deposition.
Law Firm: Hovey Williams (Scott Brown)

Server Technology, Inc. v. American Power Conversion Corporation,
United States District Court, District Of Nevada
3:06-CV-00698-LRH-VPC
Matter: Intelligent Power Distribution Units
Worked on behalf of Defendant American Power Corporation
Expert reports, deposition, testimony at trial
Law Firm: Jenner and Block (Michael Babbitt)

Raritan Americas v. Server Technology
Request for *Inter Partes* Review of US Patent 7,043,543
Matter: Intelligent Power Strips
Worked on behalf of Requestor Raritan

Law Firm: Alston and Bird (Michael Babbitt)

Industrial Technology Research Institute v. LG Electronics, Inc.
U.S. District Court for the District of New Jersey
CV- 2:12-949 (ES) (CLW)
Matter: Reading heads for CD and DVD optical drives.
Worked on behalf of LG
Expert reports
Law Firm: Morgan, Lewis, and Bockius

OS. Security v. BRK Brands
U.S. District Court for the Central District of California
SACV 14-00310-AG
Matter: Circuits for Electronic Safe Locks
Worked on Behalf of Defendant BRK Brands
Expert report.
Law Firm: Ice Miller (Kevin O'Shea)

L-3 Communications v. Jaxon Engineering
District Court of Colorado
10-cv-2868-MSK-KMT
Matter: Circuits for Producing High-Voltage Pulses for HEMP Testing
Worked on behalf of Defendant Jaxon
Expert report, deposition
Law Firm: McKenna Long (Derek Auito)

Superior Communications v. Voltstar Technology
Request for *Inter Partes* Review of U.S. Patent 7,910,833
Matter: Energy -Saving Chargers and Power Adapters
Working on behalf of Requestor Superior
Law Firm: Snell & Wilmer L.L.P. (Andrew Flior)

Shenzhen El Lighting Technology v. Surefire Electrical Corp.
Request for *Inter Partes* Review of US Patent 7,671,279
Matter: "Current-See" Cables for Mobile Device Chargers
Worked on Behalf of Requestor Surefire
Expert declarations, claim construction declaration
Law Firm: Robins Kaplan (Sam Walling)

O2 Micro International v. Hon Hai Precision Industry Co., et al
U.S. District Court for the Eastern District of Texas
Matter: Integrated Circuits for Driving CCFLs
Worked on behalf of Defendant Hon-Hai
Law Firm: Cooley LLP

Qimonda AG v. Seagate Technology, et al.
U.S. International Trade Commission Inv. No. 337TA665
Matter: ESD arrester architecture for integrated circuits
Worked on behalf of Defendant Seagate

Philips v. Wangs Alliance Corporation
Matter: LED Lighting Circuits
Working on behalf of WAC
Law Firm: Radulescu, LLP

LED Tech Development v. Samsung Electronics
Request for *Inter Partes* Review of US Patent 6,488,390
Matter: Circuits for maintaining constant flashlight illumination with battery discharge
Worked on Behalf of Requestor Samsung
Expert declarations, claim construction declaration
Law Firm: Fish and Richardson

Technical Witts, Inc. v. Skynet Electronic Co., Ltd, et al.
US District Court for the District of Arizona. CV042025PCTMHM
Matter: Switching Power Supplies
Worked on behalf of Defendant Skynet
Law Firm: Andrews Kurth

*Power Integrations v. ST-Microelectronic*s,
U.S. International Trade Commission.
Matter: Switching power supplies and ac-to-dc power converters.
Worked on behalf of Defendant STMicro

Monolithic Power Systems, Inc. v. O2 Micro International Ltd.
U.S. District Court for the Northern District of California. Civil Action No. 04CV2000 and 06CV2929
Matter: Integrated Circuits for Driving CCFLs
Worked on behalf of Defendant Monolithic Power Systems
Law Firm: Cooley LLP

Re Matter of the Fort Totten Metrorail Cases Arising Out of the Events of June 22, 2009
United States District Court for the District of Columbia
Natl. Transportation Safety Board Accident Number DCA-09-MR-007
Matter: Audio Track Detection Circuits
Worked on behalf of Defendant Ansaldo
Expert reports, deposition
Law Firm: LeClair Ryan (Laurin Mills)

Clearwater Dolphin Corp. v. Evapco, Inc.
U.S. District Court for the District of Connecticut C3:05cv507 (SRU)
Matter: Electrical Water Treatment Devices
Worked on behalf of Plaintiff Clearwater Dolphin
Law Firm: Levy & Grandinetti (Paul Grandinetti)

Pass & Seymour v. Shanghai Meihao Electric Inc. et al.
U.S. International Trade Commission Inv. No. 337TA615
Matter: Ground Fault Circuit Interrupters (GFCIs)
Worked on behalf of Respondent Shanghai Meihao
Law Firm: Andrews Kurth

Pass & Seymour v. Hubbell Inc. et al.
United States District Court Northern District of New York 5:07Cv00945
Matter: Ground Fault Circuit Interrupters (GFCIs)
Worked on behalf of Defendant Hubbell

Bushnell Inc., et al. v. The Brunton Company
Preliminary Injunction Hearing: US District Court for the District of Kansas No. 2:09cv2009 KHV/JPO
Matter: Laser Range Finders
Worked on behalf of Plaintiff Bushnell
Law Firm: Hovey Williams (Scott Brown)

Belden Technologies and Belden CDT v. Superior Essex/ Superior Essex Commun.
Court for the District of Delaware 1:08cv0063SLR
Matter: Data Communication Cables
Worked on behalf of Plaintiff Belden
Law Firm: Foley

Motorola v. Research in Motion
U.S. International Trade Commission, Inv. No. 337TA706
Matter: Battery Charging Circuits
Worked on behalf of Defendant Motorola; Status: Settled

LINQ Industrial Fabrics vs. Intertape Polymer,
Court for the District of Tampa.
Matter: Electrostatics of Flexible Intermediate Bag Containers (FIBC)
Worked on behalf of Plaintiff LINQ
Law Firm: Dickstein Shapiro (Charles Saber)

Thompson v BenQ,
U.S. International Trade Commission.
Matter: Switching power supplies and ac-to-dc power converters.
Worked on behalf of Defendant BenQ
Law Firm: Andrews Kurth

Clearwater Dolphin Corp. v. Evapco, Inc.
U.S. District Court for the District of Connecticut – Trade Secret deliberation
Matter: Electrical Water Treatment Devices
Worked on behalf of Plaintiff Clearwater Dolphin
Law Firm: Levy and Grandinetti (Paul Grandinetti)

MKS vs American Power
US District Court of Delaware
Matter: Electrical matching network power supplies.
Worked on behalf of plaintiff MKS

WorldHeart vs. Abiomed
US District Court of Delaware – Trade Secret Litigation
Matter: Power conversion for total artificial human heart.
Worked on behalf of Defendant Abiomed.

Technical Consulting

Griswold Corporation (Nov 2015 – Nov 2016)
Electric Water Treatment Devices
WAVE Reaction Chamber Design Review

CSL Consulting/Harvard Business School (Aug 2018)
Evaluation of Electrostatic Fields on LED Screen

Research Grants (Under Boston University)

Development of Prototype Self-Cleaning Solar: Massachusetts Clean Energy Center (Subject: Self-Cleaning Solar Collectors)

Self-Cleaning Solar Panels: US–Israel Binational Science Foundation (Subject: Self-Cleaning Solar Collectors)

Enhancement of Optical Efficiency of CSP – U.S. Dept. of Energy (Subject: Self-Cleaning Solar Collectors)

In-Air Electric-Field Sensor Circuit for Airborne Applications - U.S. Navy STTR Phase I: N68335-15-C-0271 via White River Technologies. (Subject: Electric Field-Mill UAV Sensor)

Compact Low-Power Driver for Deformable Mirror – NASA via Boston Micromachines (Subject: High Voltage MEMS Driver for Adaptive Optics)

Publications

Books:

M. N. Horenstein, *Design Concepts for Engineers, 5th Ed.*, Upper Saddle River, NJ: Prentice Hall, 2015.

M. N. Horenstein, *Microelectronic Circuits and Devices, 2nd Ed.* Upper Saddle River, NJ: Prentice Hall, 1995

Journals Articles and Conference Papers (partial list):

Bernard, A.A.R, Horenstein, M.N.; Mazumder, M.K, et al, Optimization of optical performance and dust removal efficiency of electrodynamic screen (EDS) films for improving energy-yield of solar collectors, 2018 IEEE 7th World Conference on Photovoltaic Energy Conversion (WCPEC) (A Joint Conference of 45th IEEE PVSC, 28th PVSEC & 34th EU PVSEC), p 3451-4, 2018

Morales, C., Horenstein, M.; Mazumder, M., et al, Field-evaluation of electrodynamic screens for maintaining high optical efficiency operation of solar collectors, 2017 IEEE 44th Photovoltaic Specialist Conference (PVSC), p 2870-4, 2017

Mazumder, M.K., Horenstein, M.N.; Sayyah, A.; et al, Mitigation of dust impacts on solar collectors by water-free cleaning with transparent electrodynamic films: Progress and challenges 2017 IEEE 44th Photovoltaic Specialist Conference (PVSC), p 6 pp., 2017

Sayyah, A., Crowell, D.R.; Raychowdhury, A., Horenstein, M.N. ; Mazumder, M.K. , "An experimental study on the characterization of electric charge in electrostatic dust removal", Journal of Electrostatics, June 2017, pgs. 173-9

Sayyah A, Horenstein MN, Mazumder MK, Ahmadi G, "Electrostatic Force Distribution on an Electrodynamic Screen," *Journal of Electrostatics* 81:24-36 Jun 2016

Sayyah A, Horenstein MN, Mazumder MK, "A Comprehensive Analysis of the Electric Field Distribution in an Electrodynamic Screen, *Journal of Electrostatics* 76:115-126 Aug 2015

Mazumder MK, Stark JW, Heiling C, Liu M, Bernard A, Horenstein MN, Garner S, Lin HY, "Development of Transparent Electrodynamic Screens on Ultrathin Flexible Glass Film Substrates for Retrofitting Solar Panels and Mirrors for Self-Cleaning Function, *MRS Advances* 1(15):1003-1012 2016

Dai S, Knepper RW, Horenstein MN, " 300-V LDMOS Analog-Multiplexed Driver for MEMS Devices, " *IEEE Transactions On Circuits And Systems I-Regular Papers* 62(12):2806-2816 Dec 2015
A. Sayyah, M.N. Horenstein, M.K. Mazumder, "Energy yield loss caused by dust deposition on photovoltaic panels", *Solar Energy*, v 107, p 576-604, Sept. 2014.

M. N. Horenstein, M. K. Mazumder, R. C. Sumner, J.W. Stark, T. Abuhamed, R. Boxman, "Modeling of trajectories in an electrodynamic screen for obtaining maximum particle removal efficiency", *IEEE Transactions on Industry Applications*, v 49, n 2, p 707-13, March-April 2013.

Klausner, A., Trachtenberg, A.; Starobinski, D.; Horenstein, M., "An Overview of the Capabilities and Limitations of Smartphone Sensors", *Int.. Jour of Handheld Computing Research*, v 4, n 2, p 69-80, April-June 2013

Mazumder, M. Horenstein, M.N.; Stark, J.W.; Girouard, P.; Sumner, R.; Henderson, B.; Sadder, O.; Hidetaka, I.; Biris, A.S.; Sharma, R., "Characterization of Electrodynamic Screen Performance for Dust Removal from Solar Panels and Solar Hydrogen Generators", *IEEE Transactions on Industry Applications,* v 49, n 4, p 1793-800, July-Aug. 2013

Horenstein, M.N., Mazumder, M.; Sumner, R.C., Jr., "Predicting particle trajectories on an electrodynamic screen - theory and experiment" *J. of Electrostatics*, v 71, n 3, p 185-8, June 2013

Mazumder, M.; Horenstein, M.N.; Stark, J.W.; Girouard, P.; Sumner, R.; Henderson, B.; Sadder, O.; Hidetaka, I.; Biris, A.S.; Sharma, R. "Characterization of Electrodynamic Screen Performance for Dust Removal from Solar Panels and Solar Hydrogen

Generators" *IEEE Transactions on Ind. Applications,* Volume: 49, Issue: 4, 2013

Horenstein, M.N.; Sumner, R.; Miller, P.; Bifano, T.; Stewart, J.; Cornelissen, S., "Ultralow-power multiplexed electronic driver for high resolution deformable mirror systems", *Proceedings of the SPIE* v 7930, p 79300M, 2011.

Horenstein, M.N., A Simulation Model for Understanding Propagating Brush Discharges: Comparison of Theory and Experiments, *IEEE Trans. on Ind. Applications*, 47(1), 2011, 344 - 349.

Mazumder, M.K., Srirama, P.K., Sharma, R; Biris, A.S., Hidetaka, I, Trigwell, S, Horenstein, M.N, Lunar and Martian Dust Dynamics, *IEEE Industry Applications Magazine*, 16 (4), 2010, 14-21.

M. Horenstein, Electrostatics of Nanoparticles: What's the Same, What's different*?* *Journal of Electrostatics*, 67 (2-3), May 2009, pp 384-393

M. Horenstein and M. Datta, "The Electrostatics of Charged Insulating Sheets Peeled From Grounded Conductors", J. of Physics: Conference Series 142 (2008) 012076 (refereed publication)

T. Sugimoto, K. Nonaka, and M. Horenstein, "Bidirectional electrostatic actuator operated with charge control" *Journal of Microelectromechanical Systems*, v 14, n 4, Aug. 2005, p 718-24.

J. C. Crager and M.N. Horenstein, "Distributed Parameter Model for Computing Energy Dissipation in Brush-Type Electrostatic Discharges," *Journal of Electrostatics*, 63 (2005), 239-247.

J.C. Crager and M.N. Horenstein, "Measurement of Optical Intensity and Fluence Generated by Spark Discharges", *Electrostatics 2003: Institute of Physics (UK) Conf. Series*, (178)149-154 2004

Patents:

P. Horn, M. Horenstein, and D. Parent. "Air Distributing and Ionizing Systems." (US Patent 5,491,602)

M. Horenstein, "Method and Apparatus for Detecting Leaks in Electrically-Insulative Protective Articles such as Condoms, Surgical Gloves, and the Like Using Gaseous Electrostatic Ions." (US Patent 5,455,507)

Jackson and M. Horenstein, "Nasopharyngealometric Apparatus and Method" (US Patent 5,316,002*)*

T. Bifano and M. Horenstein, "MEMS-based spatial-light modulator with integrated electronics"(US Patent 6,529,311)

Method for Linearizing Deflection of a MEMS Device Using Binary Electrodes and Voltage Modulation (US Patent 7385268)