

Louis F. Bilancia

PE, CFEI

SENIOR MANAGING CONSULTANT



Mr. Bilancia is an electrical engineer and Senior Managing Consultant with 14 years of experience in biomedical design of implanted pacemakers and defibrillators, with 11 years in the design and programming of industrial laser control, lumber sorting, and precision electronic instrumentation. He has more than 24 years of experience in forensic engineering, failure analysis, and expert witness testimony. He specializes in microelectronics, biomedical devices, and fire origin and cause evaluations, including those where electrical activity may have been involved.

In addition, he has been an adjunct professor at Portland State University for four terms, as well as an instructor for several classes to the International Association of Arson Investigators (IAAI) community in electrical evidence collection and the scientific method. Mr. Bilancia has performed nearly 600 fire and electrical investigations.

Education

B.S., Electrical Engineering, University of Portland, 1976

Licenses & Certifications

- State of California License No. E21366
- State of Oregon License No. 15954
- State of Arizona License No. 79647
- State of Washington License No. 53004
- Certified Fire & Explosion Investigator (CFEI), March 2019-Present

Languages

- English

Positions Held

Engineering Systems Inc., Oregon

- Senior Managing Consultant, 2023–Present
- Senior Consultant, 2019–2022

Contact Information

lfbilancia@engsys.com

(503) 908-1029

ESi Portland

15800 S.E. Piazza Avenue, Suite 105
Clackamas, OR 97015

Areas of Specialization

- Electrical equipment and instrumentation
- Electrical injury/electrocution
- Fire debris examination, documentation, testing, and analysis
- Fire origin and cause
- Product failures involving electrical, electronic, and biomedical appliances and equipment
- Wildland fire and utility power investigations

- Senior Staff Consultant, 2016–2018

MDE, Inc., Seattle, Washington

- Principal, 2014–2016

Cascade Forensic Engineering and Failure Analysis, Inc., Oregon City, Oregon

- Electrical/Electronic Forensic and Consulting Engineer, 2001–2014

HTRI & HTRI Forensics, Cross Technology Integration Specialists, Newberg, OR

- Electrical/Electronic Forensic and Consulting Engineer, 2008–2014

Synnovation Engineering, Inc., Milwaukie, Oregon

- Owner and President, 1995–present

MicroHelix, Inc., Portland, Oregon

- Principal Investigator, deep brain probe, 2001–2003

Portland State University, Portland, Oregon

- Adjunct Professor, Electrical Engineering and Computer Science, 2001–2002

Micro Systems Engineering, Inc. (Biotronik GmbH), Portland, Oregon

- Director of Design Validation, 1987–2001
- Senior Design Engineer, pacemakers and defibrillators, 1986–1987

Electro Scientific Industries, Portland, Oregon

- Senior Project Engineer, 1983–1985
- Project Engineer, 1978–1981

Datricon Corporation, Portland, Oregon

- Vice President, 1980–1983

Modular Online Systems, Portland, Oregon

- Consultant, 2001–2002

Continuing Education

- IEEE Symposium on Product Compliance Engineering (SPCE)-November 2025
- IAAI Annual Training Conference-Oregon, September 2025
- IEEE International Symposium on Product Compliance Engineering (ISPCE)-May 2025
- IEEE International Symposium on Product Compliance Engineering (ISPCE)-May 2024
- IEEE International Symposium on Product Compliance Engineering (ISPCE)-May 2023

- **Manufacturing Lithium-Ion Cells and Batteries-2020**
- **Software Defined Radio For Forensic Investigation-2020**
- **IEEE Symposium on Product Compliance Engineering-(SPCE Portland) 2020**
- **Arc Flash Awareness And Labeling-2019**
- **IEEE ISPCE International Symposium on Product Compliance Engineering-2019**
- **IEEE Symposium on Product Compliance Engineering-(ISPCE) 2018**
- **Best Practices for Electric Shock/Electrocution Investigation-ESI, 2018 Electrical Safety, Lessons Learned, ESI, 2018**
- **Combining and Expanding Electrical Safety Projects-ESI, 2018 IAAI Annual Training Conference, Oregon, 2018**
- **Insurance Fraud Conference and Expo, IASIU, Oregon Chapter-Conference & Symposium, 2017**
- **IAAI Annual Training Conference-Texas, 2017**
- **IAAI Annual Training Conference-Oregon, 2016**
- **EC&M Electrical Construction and Maintenance, Ground Fault Interrupters Webinar-2016 Directing the Future of Professional Engineers of Oregon, PEO Chapter, 2016**
- **IAAI Annual Training Conference-Utah, 2016**
- **IAAI International Training Conference-Chicago, 2015**
- **IEEE Symposium on Product Compliance Engineering-(ISPCE) 2014**
- **Ignition Matrix™, Insurance Committee for Arson Control-Florida, 2014 IAAI Rogue Valley Conference, Oregon 2014**
- **IAAI Annual Training Conference-Oregon, 2013**
- **OSBEELS Symposium-Salem, Oregon, 2013**
- **IAAI Annual Training Conference-Oregon, 2012**
- **California Conference of Arson Investigators-San Luis Obispo, California, 2012**
- **California Conference of Arson Investigators-San Luis Obispo, California,**
- **2011 IAAI Annual Training Conference-Oregon, 2011**
- **Arc Mapping Basics-CFI Trainer, 2011**
- **IAAI Tennessee Chapter Conference-2010**
- **IAAI Oregon Chapter 31, Annual Advanced Fire & Arson Seminar-2009**
- **California Conference of Arson Investigators-San Luis Obispo, California, 2007 and 2008**
- **IAAI Oregon Chapter 31, Annual Advanced Fire & Arson Seminar-2007**

- **Oregon Rogue Valley Fire & Arson Career Development School**-2004 and 2005
 - **IAAI Oregon Chapter 31, Annual Advanced Fire & Arson Seminar**-2004 and 2006
 - **IAAI 25th Fire & Arson Seminar**-Oregon, 2003
 - **Fire Cause & Origin of Mobile Equipment, Oregon IAAI 25th Fire & Arson Seminar**-2003
 - **IAAI Oregon Chapter 31, Annual Advanced Fire & Arson Seminar**-2002 and 2003
 - **Software Verification and Validation for Medical Products**-Logicon, 2000
 - **Fundamentals of GPS**-Indyne, 1999
 - **Introduction to Reliability for Software Engineers**-Software Quality Conference, 1996
 - **Hazard Analysis: FMEA & FDA/ISO**-Noblitt & Rueland, 1994
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Professional Affiliations/Honors

Presidential Award of Excellence, Oregon IAAI Chapter 31, September 2012

C. Walter Stickney Distinguished Service Award, Oregon IAAI Chapter 31, September 2008

American Academy of Forensic Sciences (AAFS)

- Member, 2004–present

International Association of Arson Investigators (IAAI)

- Member, 2003–present

Institute of Electrical and Electronics Engineers (IEEE)

- Life Member

National Academy of Forensic Engineers (NAFE)

- Member

National Society of Professional Engineers (NSPE)

- Member

Professional Engineers of Oregon (PEO)

- Member

National Association of Fire Investigators (NAFI)

- Member, Certified Fire & Explosion Investigator (CFEI), March 2019-Present

Project Experience

Investigations

Electronics and Microelectronics

- Investigation of signal propagation delay and signal integrity in electronics and computer signal paths
- Analysis and investigation of logic level compatibility and interoperability between communications and GPS modules
- Investigation and analysis of reported water damaged medical equipment, commercial wiring, and large-scale server farm equipment
- Analysis of failures and operator error in devices that caused injury or fire ignition

Power Transmission and Distribution Fires

- Inspection, collection, and analysis of equipment implicated or involved with residential, commercial, or wildland fires

Pacemakers, Defibrillators, Electrical Injury and Electrocutation

- Analysis of external defibrillator devices for potential contribution to patient death
- Analysis of pacemakers for potential contribution to patient death
- Evaluation of neuro-ablation equipment

Fire Investigation: Commercial, Residential, and Wildland Fires

- Investigation of appliances, devices, and structural wiring to determine the cause of fires, including arc-fault mapping, resistance heating, and other potential electrical ignition

Quality Standards and FDA Quality Management System

- Lead Auditor and gap assessments for ISO 9001, ISO 31485, and 21 CFR 820 medical device qualification
- Audit of quality systems for compliance including Design History File (DHA), Device Change Records, and Corrective and Preventive actions (CAPA)
- Failure Analysis (FA) and Root Cause Analysis (RCA)

Courtroom Expert Testimony

- State, Federal, and international courtroom experience, including plaintiff, defense, and criminal defense
- Case review, investigation analysis, and trial preparation of fire investigation for civil and criminal fire investigations

Design and Operational Experience

Electronic Instrumentation, Control, and Medical Device Design

- Team member on inductance-resistance-capacitance meter (Electro Scientific Industries) of analog. Digital, and embedded firmware, electronic measurement equipment and control equipment
- Process control, single board computer (SBC) design, peripheral interface electronics, and embedded firmware controller equipment (Datricon Corporation)
- Team member in the design, development, validation, and qualification of implanted medical pacemakers and defibrillators (Biotronik GmbH / Micro Systems Engineering)

Publications

"Forensic Fire Scene Reconstruction", contributing author, 3rd Edition, 2009

"Kirk's Fire Investigation", contributing author, 7th Edition, 2012

"Metal Oxide Varistors in Fires – Cause v Fire Victim", **Louis F. Bilancia**; Porter R. Ritchie; Eric M. Schultz; Keith G. Cline, 2025

"Design, Risk, and Efficacy While Testing to Standards - Tradeoffs for Surge Protective Device", Eric Marshall Schultz; **Louis F. Bilancia**; Thomas J. Bajzek, May 2024

"Electrical Fire Patterns in Vegetation", **Louis F Bilancia**, 2023

"Illumination Caused Permanent Bodily Injury, Photons Not Taken Lightly", **Louis F. Bilancia**; Ashley M. Giesa; Keith G. Cline 2019

"Arson under the Christmas Tree", **Louis F. Bilancia**; Dale C. Mann 2019

"Metalized Film Capacitors as Fire Pattern". **Louis F. Bilancia**, 2018

"Safe product design, forensic engineering, and Asimov's Laws of Robotics". **Louis F. Bilancia**, 2014

"The Beelzebub Zone: Rare but predictable failure conditions that can result in accidental fires", **Louis F. Bilancia**, 2012

Presentations

"Forensic Engineering with Both Hands and a Flashlight", SPCE November 2025

"Electrical and Electronic Measurements for Forensic Analysis", SPCE November 2025

"Arson Under the Christmas Tree", SPCE November 2025

"Design, Risk, and Efficacy While Testing to Standards - Tradeoffs for Surge Protective Device", Eric Marshall Schultz; Louis F. Bilancia; Thomas J. Bajzek, May 2024

2024 IEEE International Symposium on Product Compliance Engineering (ISPCE)

"Electrical Fire Patterns in Vegetation", 2020 SPCE and 2023 IEEE International Symposium on Product Compliance Engineering (ISPCE)

"Illumination Caused Permanent Bodily Injury, Photons Not Taken Lightly", Professional Engineers Of Oregon, 2020

"Arson Under The Christmas Tree", International Symposium on Product Compliance Engineering, May 2019

"Illumination Caused Permanent Bodily Injury, Photons Not Taken Lightly", International Symposium on Product Compliance Engineering, May 2019

"2025 Battery Evidence Collection and Battery Failure Case Studies", Oregon Chapter 31 Rogue Valley Winter School Training, January 2025

"Metalized Film Capacitors as Fire Pattern", contributing author and presenter, IEEE Product Safety Engineering Society (ISPCE), San Jose, California, USA, 2018

"Electrical Fire Causes" and "Arson Under the Christmas Tree", presenter, Oregon State Police Arson Detectives, 2018

"Ignition Matrix™ Cleveland Clinic Cold-Case Workshop", IAAI Texas, 2017

"Ignition Matrix™ Cleveland Clinic Cold-Case Workshop", IAAI Utah, 2016

"Computer Models in Fire Analysis: The Illusion of Scientific Accuracy", Tom Case, Louis F. Bilancia, DRI Fire and Litigation Conference, 2014

"Safe product design forensic engineering and Asimov's Laws of Robotics", IEEE Symposium on Product Compliance Engineering, May 2014

"Interpreting Ignition Matrix™", Insurance Committee for Arson Control, Florida, 2014

"The Beelzebub Zone: Rare but predictable failure conditions that can result in accidental fires", IEEE Symposium on Product Compliance Engineering, May 2012

"Technical Review and Analysis", California Conference of Arson Investigators, March 2011

"Ignition Matrix™ Interpretation", IAAI Tennessee Training Conference, Pigeon Forge, TN 2010

"The Scientific Method with Specific Attention to Fire Investigation", International Association of Arson Investigators of Oregon Chapter 31, several arson investigation groups in 2004 and 2007

"Fuses and Circuit Breakers in Fire Investigations", IAAI Chapter 31, September 2003

"Introduction to Computer Forensics", IAAI Chapter 31, September 2003

"Modern Equipment Control Affects Electrocution Risk", AAFS, 2003

"Metal Oxide Varistors in Fire Investigations", presenter, IAAI Chapter 31, 2002