

## Ward Arms | Forensic Electrical Engineer, PE

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### Professional Summary:

Twenty-five years of experience in root-cause failure analysis, electrical engineering, electrical design & construction, and materials science. Bachelor of Science degrees in Electrical Engineering and Materials Science & Engineering from the University of Minnesota (Minneapolis) College of Science and Engineering. Licensed Professional Electrical and Computer Engineer. Licensed Class A Journeyman and Master Electrician.

### Licenses and Certifications:

Licensed Class A Journeyman & Master Electrician, (MN - #AM007921, IA - #EL208109JA)

Licensed Professional Engineer in 44 states, including:

AZ, #50855

CA, #19254

FL, #70909

IL, #06262426

IA, #P200515

KS, #PE21321

MI, #6201056929

MN, #23384

ND, #PE-6654

NE, #E-13245

SD, #10188

TX, #105591

WI, #40906-6

CPA, State of Minnesota #21058 (Inactive)

National Council of Examiners for Engineering and Surveying Record #37301

International Association of Arson Investigators (IAAI), Certified Fire Investigation Technician

National Association of Fire Investigators (NAFI), Certified Fire and Explosion Investigator

#24214-13991

### Professional Experience:

EFI Global, Forensic Electrical Engineer, 2019 - Present

Energy Systems Group, Electrical Engineer, 2014 - 2019

NV5, Electrical Engineer, 2013 - 2014

Hallberg Engineering, Electrical Engineer, 2009 - 2013

The Egan Companies, Electrical Engineer, 2007 - 2009

Target Corp, Electrical Engineer / PM, 2002 - 2007  
Parsons Electric Corp, Electrical Engineer, 1991 – 2001  
Honeywell – Undersea Systems, Electrical & Materials Engineering Aide, 1987 - 1989

### Specialized Education:

University of Wisconsin (Madison), National Electrical Safety Code 17 hours, tested), 2021  
North Star Imaging Inc, Digital Radiography and Computed Tomography (40 hours, tested), 2021  
Boston Safety Training Inc, Arc Flash Safety Training (8 hours, tested), 2021  
Tradesmen Training, 2020 National Electrical Code (16 hours, tested), 2020  
IAAI, Expert Witness Courtroom Testimony (40 hours, tested), 2020  
IAAI, CFI Trainer, Principles of Fire Investigation Multi-Program (67 hours, tested), 2020  
IAAI, CFI Trainer, Fire Investigation for Fire Officers Multi-Program (35 hours, tested), 2020  
Rochester Institute of Technology, Computer Forensics (tested), 2020  
ABB, Designing and Building Transformers to Last (1 hour), 2020  
Western Michigan University, Investigation of Gas & Electric Appliance Fires (30 hours, tested), 2019  
NAFI, Advanced Fire, Arson, & Explosion Investigation Training Program (28 hours, tested), 2019  
Power Line System (Madison), Power Line System Design – PLS-CADD (30 hours), 2019  
Caterpillar (San Diego), Gas Turbine Operation & Maintenance Principles (30 hours, tested), 2018  
Caterpillar (San Diego), Power Generation Principles and Applications (30 hours, tested), 2018  
Microsoft Technology Associate, Software Development Fundamentals #G6084420 (tested), 2018  
Microsoft Technology Associate, Network Security Fundamentals #G6401061 (tested), 2018  
Microsoft Technology Associate, Networking Fundamentals #G4085302 (tested), 2017  
Rockwell Automation, Controllogix Fundamentals (40 hours, tested), 2016  
University of Wisconsin (Madison), Modern Power System Protection: Applications and Performance Analysis, 2013  
University of Wisconsin (Madison), Fundamentals of Substation Equipment and Control Systems, 2011  
Georgia Tech (Atlanta), Power Systems Relaying: Theory and Application, 2010  
University of Wisconsin (Madison), Principles of Substation Design and Construction, 2010  
University of Wisconsin (Madison), Coordination of Industrial & Commercial Electrical Power Systems, 1993  
University of Wisconsin (Madison), Protection of Industrial & Commercial Electrical Power Distribution Systems, 1993  
University of Minnesota (Minneapolis), Semiconductor Manufacturing Certificate, 1989

### **NFPA 1033 – 1.3.7 BASIC KNOWLEDGE REQUIREMENTS**

#### **FIRE SCIENCE**

IAAI CFI Trainer, Residential Natural Gas Systems (3 hours), 2020  
Western Michigan University, Investigation of Gas & Electric Appliance Fires (4 hours), 2019  
NAFI Advanced Fire, Arson, & Explosion Investigation, Fire Science (4 hours), 2019  
IAAI CFI Trainer, Understanding Fire Through the Candle Experiments (4 hours), 2019

#### **FIRE CHEMISTRY**

Western Michigan University, Investigation of Gas & Electric Appliance Fires (4 hours), 2019

IAAI Minnesota Conference, Fire Chemistry (2 hours), 2019  
IAAI CFI Trainer, Fire Chemistry (3 hours), 2019

### **THERMODYNAMIC**

Western Michigan University, Investigation of Gas & Electric Appliance Fires (4 hours), 2019  
NAFI Advanced Fire, Arson, & Explosion Investigation, Fire Science (3 hours), 2019  
University of Minnesota, BS Materials Science and Engineering, 1989

### **THERMOMETRY**

Western Michigan University, Investigation of Gas & Electric Appliance Fires (4 hours), 2019  
IAAI CFI Trainer, Thermometry, Heat, and Heat Transfer (3 hours), 2019  
University of Minnesota, BS Materials Science and Engineering, 1989

### **FIRE DYNAMICS**

IAAI CFI Trainer, Postflashover Fires (4 hours), 2020  
Western Michigan University, Investigation of Gas & Electric Appliance Fires (4 hours), 2019  
IAAI CFI Trainer, Introduction to Fire Dynamics and Modeling (2 hours), 2019

### **EXPLOSION DYNAMICS**

IAAI CFI Trainer, Explosion Dynamics (4 hours), 2019  
NAFI Advanced Fire, Arson, & Explosion Investigation, Explosion Dynamics (3 hours), 2019

### **COMPUTER FIRE MODELING**

IAAI Minnesota Conference, Reduced Scale Modeling (3 hours), 2019  
IAAI CFI Trainer, Introduction to Fire Dynamics and Modeling (2 hours), 2019

### **FIRE INVESTIGATION**

IAAI CFI Trainer, Electric & Hybrid Vehicle Fires (3 hours), 2021  
IAAI CFI Trainer, Fire Investigation for Fire Officers (3 hours), 2020  
IAAI CFI Trainer, Fundamentals of Interviewing (4 hours), 2020  
IAAI CFI Trainer, Writing the Initial Origin and Cause Report (3 hours), 2020  
IAAI CFI Trainer, Ethics and the Fire Investigator (3 hours), 2020  
IAAI CFI Trainer, How First Responders Impact the Fire Investigation (2 hours), 2020  
IAAI CFI Trainer, Effective Investigation and Testimony (3 hours), 2020  
IAAI CFI Trainer, The Practical Application of the Relationship Between NFPA 1033 and NFPA 921 (2 hours), 2020  
Western Michigan University, Investigation of Gas & Electric Appliance Fires (8 hours), 2019  
IAAI CFI Trainer, Arc Mapping (4 hours), 2019  
IAAI Minnesota Conference, Data from Vehicle Electronic Controls (4 hours), 2019  
IAAI CFI Trainer, Investigating Motor Vehicle Fires (4 hours), 2019  
IAAI CFI Trainer, Motor Vehicles Transmission & Accessory Systems (3 hours), 2019  
IAAI CFI Trainer, Motor Vehicles Engine & Ignition Systems (3 hours), 2019  
IAAI CFI Trainer, The Deposition – Part 1 (3 hours), 2019  
IAAI CFI Trainer, The Deposition – Part 2 (3 hours), 2019

IAAI CFI Trainer, Understanding Undetermined (3 hours), 2019  
NAFI Advanced Fire, Arson, & Explosion Investigation, Legal Aspects of Fire Investigation (2 hours), 2019  
IAAI CFI Trainer, Introduction to Appliances (3 hours), 2020

### **FIRE ANALYSIS**

IAAI CFI Trainer, The Impact of Ventilation in Building Structures on Fire Development (4 hours), 2020  
IAAI CFI Trainer, Fire Flow Analysis (3 hours), 2019  
NAFI Advanced Fire, Arson, & Explosion Investigation, Origin & Cause (4 hours), 2019

### **FIRE INVESTIGATION METHODOLOGY**

IAAI CFI Trainer, Insurance and the Fire Investigation (4 hours), 2020  
IAAI CFI Trainer, Investigating Natural Gas Systems (3 hours), 2020  
IAAI CFI Trainer, Critical Evaluation and Testing of Commonly Reported Accidental Causes (3 hours), 2020  
IAAI CFI Trainer, The Scientific Method for Fire and Explosion Investigation (3 hours), 2019  
IAAI CFI Trainer, Documenting the Event (4 hours), 2019  
IAAI CFI Trainer, Discovery in Civil Cases (3 hours), 2019  
IAAI CFI Trainer, Process of Elimination (3 hours), 2019  
IAAI, Expert Witness Courtroom Testimony, (20 hours), 2020

### **FIRE INVESTIGATION TECHNOLOGY**

IAAI CFI Trainer, Emerging Technologies in Fire Investigation (3 hours), 2022  
North Star Imaging Inc, Digital Radiography and Computed Tomography (40 hours), 2021  
IAAI CFI Trainer, Evidence Examination: What Happens at the Lab? (4 hours), 2020  
IAAI Minnesota Conference, Tools of the Trade (3 hours), 2019  
IAAI Minnesota Conference, Tomorrow's Investigations (4 hours), 2019  
NAFI Advanced Fire, Arson, & Explosion Investigation, Fire Science Photography and Diagramming (2 hours), 2019

### **HAZARDOUS MATERIALS**

IAAI CFI Trainer, Alternative Fuel Vehicles, (3 hours), 2021  
Boston Safety Training Inc, Arc Flash Safety Training (8 hours), 2021  
IAAI CFI Trainer, Fire Investigator Scene Safety (3 hours), 2020  
IAAI CFI Trainer, The HAZWOPER Standard (4 hours), 2020  
NAFI Advanced Fire, Arson, & Explosion Investigation, Safety (3 hours), 2019  
IAAI CFI Trainer, Electrical Safety (3 hours), 2019

### **FAILURE ANALYSIS AND ANALYTICAL TOOLS**

IAAI CFI Trainer, Lithium-Ion Battery Fires (1 hour), 2021  
Cozen O'Connor, Investigating & Litigating Dehumidifier Fire Claims (1 hour), 2020  
Western Michigan University, Investigation of Gas & Electric Appliance Fires (2 hours), 2019  
NAFI Advanced Fire, Arson, & Explosion Investigation, Appliance Fires (2 hours), 2019  
Sologic, Root Cause Analysis Fundamentals, (3 hours), 2019  
University of Minnesota, BS Materials Science and Engineering, 1989



## **FIRE PROTECTION SYSTEMS**

IAAI CFI Trainer, Fire Protection Systems (3 hours), 2019

## **EVIDENCE DOCUMENTATION, COLLECTION, AND PRESERVATION**

IAAI CFI Trainer, Search and Seizure, (4 hours), 2022

IAAI CFI Trainer, The Potential Value of Electronic Evidence, (4 hours), 2022

Cozen O'Connor, Avoiding Spoliation in the Time of COVID-19 (1 hour), 2020

IAAI CFI Trainer, Physical Evidence at the Fire Scene (4 hours), 2020

IAAI Minnesota Conference, Spoliation (2 hours), 2019

IAAI CFI Trainer, Digital Photography and the Fire Investigator (4 hours), 2019

IAAI CFI Trainer, Introduction to Evidence (4 hours), 2019

IAAI, Expert Witness Courtroom Testimony, (20 hours), 2020

## **ELECTRICITY AND ELECTRICAL SYSTEMS**

IAAI CFI Trainer, Photovoltaic Cells & Systems (3 hours), 2021

IAAI CFI Trainer, Electric & Hybrid Vehicle Design Basics (3 hours), 2021

Tradesmen Training, 2020 National Electrical Code (16 hours), 2020

IAAI CFI Trainer, Residential Electrical Systems (4 hours), 2019

NAFI Advanced Fire, Arson, & Explosion Investigation, Electricity and Fire (2 hours), 2019

Caterpillar (San Diego), Gas Turbine Operation & Maintenance Principles (30 hours, tested), 2018

Caterpillar (San Diego), Power Generation Principles and Applications (30 hours, tested), 2018

University of Minnesota, BS Electrical Engineering, 1991

Licensed Master Electrician (#AM007921)

### **Education:**

B.S. Electrical Engineering, University of Minnesota (Minneapolis), 1991, College of Science & Engineering

B.S. Materials Science & Engineering, University of Minnesota {Minneapolis}, 1989, College of Science & Engineering

MBA, University of Minnesota {Minneapolis}, 1998, Carlson School of Management

### **Affiliations:**

Institute of Electrical and Electronics Engineers (IEEE)

National Academy of Forensic Engineers (NAFE)

American Society for Testing and Materials, International (ASTM)

National Society of Professional Engineers (NSPE)

National Fire Protection Association (NFPA)

International Association of Arson Investigators (IAAI)



National Association of Fire Investigators (NAFI)

American Institute of Certified Public Accountants (AICPA)