Training Course on Digital Forensics for Automotive and Autonomous Vehicles

Professional Development Training Course Outline

Category	Digital Forensics	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The rapidly evolving landscape of automotive technology, particularly with the advent of **autonomous vehicles** and **connected car ecosystems**, presents unprecedented challenges and opportunities in the field of **digital forensics**. Modern vehicles are sophisticated data centers on wheels, generating vast amounts of information from **sensors, ECUs, infotainment systems, telematics, and V2X communication**. This intricate web of data holds critical evidence for **accident reconstruction, cybersecurity incident response, intellectual property theft, and legal investigations**. As vehicles become more automated and interconnected, the need for specialized **automotive digital forensics** expertise is paramount to ensure **safety, accountability, and legal compliance** in this emerging domain.

Training Course on Digital Forensics for Automotive and Autonomous Vehicles provides a comprehensive deep dive into the methodologies, tools, and legal frameworks essential for conducting **forensic investigations** within the complex environment of **automotive and autonomous vehicle systems**. Participants will gain practical, hands-on experience in **data acquisition, analysis, and preservation** from various in-vehicle sources, preparing them to tackle real-world **cybersecurity threats** and **forensic challenges**. The curriculum emphasizes **cutting-edge techniques** for examining **infotainment units, engine control units (ECUs), event data recorders (EDRs), and networked vehicle components**, empowering professionals to effectively respond to incidents and deliver robust forensic reports in an increasingly data-driven automotive world.

Programme Curriculum

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Course Duration

10 days

Course Objectives

1. Learn advanced techniques for forensically sound data extraction from **ECUs, infotainment systems, telematics units, and gateway modules**.
2. Understand how to interpret and analyze data from **Lidar, Radar, Cameras, and GPS** for **incident reconstruction** and behavioral analysis.
3. Develop skills to detect and analyze **CAN bus, FlexRay, and Automotive Ethernet** anomalies and malicious intrusions.
4. Acquire and examine data from **Android Auto, Apple CarPlay, and proprietary IVI systems** for user activity and connected device artifacts.
5. Utilize **Event Data Recorder (EDR)** analysis for crash dynamics, pre-crash data, and post-impact events.
6. Identify and mitigate **cyber-physical system vulnerabilities** impacting vehicle integrity and safety.
7. **Implement Forensic Readiness for Autonomous Fleets**: Design and integrate **proactive forensic capabilities** into the development and deployment of autonomous vehicles.
8. Understand the **admissibility of digital evidence** in automotive cases, **data privacy (GDPR, CCPA)**, and **product liability** concerns.
9. Gain proficiency with industry-standard **automotive forensic software and hardware**.
10. Explore techniques for acquiring and analyzing **telematics and cloud-stored vehicle data**.
11. Investigate **OTA updates, ECU firmware, and vehicle software** for unauthorized modifications or malware.
12. Formulate effective strategies for **containment, eradication, and recovery** in vehicle-related cyber incidents.
13. Explore how **AI and ML can enhance anomaly detection, data correlation, and predictive analysis** in vehicle forensics.

Organizational Benefits

- Drastically reduce response times and improve the effectiveness of investigations into automotive cyberattacks, accidents, and fraudulent claims.
- Ensure admissible digital evidence for litigation, reducing product liability exposure and financial penalties.
- Proactively identify and address vulnerabilities in connected and autonomous vehicle systems , strengthening overall security.
- Safeguard sensitive automotive design data, software algorithms, and proprietary technologies from theft and espionage.
- Meet stringent data privacy and automotive cybersecurity standards (e.g., ISO/SAE 21434, UNECE WP.29).
- Demonstrate commitment to vehicle safety and data integrity, building confidence in emerging automotive technologies.
- Provide precise, data-driven insights for traffic accident investigators, insurance companies, and law enforcement.

Target Audience

1. Digital Forensic Investigators and Cybersecurity Professionals
2. Law Enforcement Agencies and Accident Reconstruction Specialists.
3. Automotive Engineers and Vehicle Architects.
4. Legal Professionals.
5. Insurance Adjusters and Claims Investigators.
6. Vehicle Manufacturers (OEMs) and Tier 1 Suppliers
7. Researchers and Academics
8. Government Regulators and Policy Makers

Course Outline

Module 1: Introduction to Automotive & Autonomous Vehicle Forensics

- Overview of the **automotive digital ecosystem** and its forensic implications.
- Key **digital evidence sources** in modern vehicles
- Introduction to **autonomous vehicle architecture** and data flow.
- Legal and ethical considerations in **vehicle data acquisition and analysis**.
- Case Study: **Analyzing data from a connected car involved in a hit-and-run incident.**

Module 2: Automotive Digital Evidence and Chain of Custody

- Principles of **digital evidence preservation** in volatile vehicle environments.
- Establishing and maintaining an **unbroken chain of custody** for vehicle data.
- Challenges of data integrity and **anti-forensics techniques** in automotive systems.
- Best practices for **scene documentation and evidence handling**.
- Case Study: **Securing a compromised autonomous shuttle post-incident to prevent data loss.**

Module 3: In-Vehicle Infotainment (IVI) System Forensics

- Understanding various **IVI operating systems**
- Techniques for **data acquisition from IVI units**
- Analysis of **user profiles, call logs, navigation history, and connected mobile devices**.
- Forensic examination of **media files, Bluetooth pairings, and Wi-Fi connections**.
- Case Study: **Investigating driver behavior and phone interactions from infotainment logs in a distracted driving case.**

Module 4: Electronic Control Unit (ECU) & Event Data Recorder (EDR) Forensics

- Deep dive into **ECU architecture, data storage, and firmware**.
- Acquiring and interpreting data from **Event Data Recorders (EDRs)**
- Understanding the limitations and **reliability of EDR data**.
- Tools and methodologies for **EDR readout and analysis**.
- Case Study: **Using EDR data to reconstruct a complex multi-vehicle collision sequence.**

Module 5: In-Vehicle Network Forensics (CAN, FlexRay, Automotive Ethernet)

- Introduction to **Controller Area Network (CAN) bus protocol** and its forensic significance.
- Analyzing **CAN bus traffic for anomalies, spoofing, and intrusion detection**.
- Forensic implications of **FlexRay and Automotive Ethernet** in advanced vehicles.
- Tools for **in-vehicle network data logging and analysis**.
- Case Study: **Detecting a CAN injection attack used to manipulate odometer readings.**

Module 6: Telematics and Cloud-Based Vehicle Data Forensics

- Understanding **telematics systems** and their role in data collection.
- Acquiring **cloud-stored vehicle data** from manufacturers and third-party service providers.
- Legal challenges and **privacy concerns** related to telematics data.
- Analysis of **GPS tracking, driving patterns, and remote vehicle commands**.
- Case Study: **Tracing a stolen vehicle's route and unauthorized usage through telematics data.**

Module 7: Autonomous Vehicle Sensor and Perception System Forensics

- Forensic analysis of data from **Lidar, Radar, Ultrasonic, and Camera systems**.
- Interpreting **sensor fusion data** for environmental perception and object detection.
- Investigating anomalies in **perception algorithms and decision-making processes**.
- Challenges of **data volume and proprietary formats** in AV sensor data.
- Case Study: **Analyzing Lidar point cloud data to determine the cause of a near-miss incident involving an autonomous vehicle.**

Module 8: Cybersecurity Threats and Attack Vectors in AVs

- Common **attack surfaces and threat models** for connected and autonomous vehicles.
- Exploiting **firmware vulnerabilities, over-the-air (OTA) updates, and V2X communications**.
- Impact of **malware, ransomware, and denial-of-service (DoS) attacks** on vehicle systems.
- Understanding **supply chain attacks** and their implications for automotive security.
- Case Study: **Analyzing log files and network traffic to identify a targeted ransomware attack on a commercial autonomous truck fleet.**

Module 9: Digital Forensics in Automotive Cyber Incident Response

- Developing an **automotive cyber incident response plan**.
- Phases of incident response: **preparation, identification, containment, eradication, recovery, and lessons learned**.
- Collecting **volatile data from live vehicle systems**.
- Coordination with **OEMs, law enforcement, and regulatory bodies** during incidents.
- Case Study: **Responding to a reported remote compromise of a vehicle's braking system.**

Module 10: Firmware and Software Forensic Analysis

- Reverse engineering **ECU firmware and vehicle software**.
- Detecting **tampering, unauthorized modifications, and embedded malware**.
- Analysis of **over-the-air (OTA) update mechanisms** for integrity issues.
- Tools and techniques for **binary analysis and code de-obfuscation**.
- Case Study: **Identifying a malicious firmware update designed to disable a vehicle's safety features.**

Module 11: Legal, Ethical, and Regulatory Landscape

- **Admissibility of digital evidence** in court for automotive cases.
- **Data privacy regulations** (GDPR, CCPA) and their impact on vehicle data.
- **Product liability and negligence** in the context of autonomous vehicle incidents.
- International standards and regulations: **ISO/SAE 21434, UNECE WP.29**.
- Case Study: **Debating the legal responsibility of an autonomous vehicle manufacturer after a system malfunction leads to an accident.**

Module 12: Advanced Forensic Techniques and Tools

- Introduction to **chip-off forensics** for inaccessible data.
- Utilizing **JTAG and ISP (In-System Programming)** for data extraction.
- Advanced **data carving and file system analysis** for automotive systems.
- Leveraging **virtualization for forensic analysis** of complex vehicle systems.
- Case Study: **Recovering critical crash data from a severely damaged ECU using chip-off techniques.**

Module 13: Emerging Trends: AI, ML, and Blockchain in Automotive Forensics

- Application of **Artificial Intelligence (AI) and Machine Learning (ML)** for anomaly detection and pattern recognition in vehicle data.
- Exploring **blockchain technology** for secure data logging and integrity verification in autonomous vehicles.
- Future challenges and opportunities in **predictive forensics** for automotive systems.
- Role of **edge computing** and **5G connectivity** in forensic data collection.
- Case Study: **Using AI-powered anomaly detection to identify subtle signs of sensor manipulation in an autonomous driving system.**

Module 14: Practical Labs & Hands-on Exercises

- Simulated **vehicle data acquisition scenarios**.
- Hands-on experience with **automotive forensic software and hardware tools**.
- Dissection and analysis of **real-world vehicle data samples**.
- Practical exercises in **chain of custody documentation and report writing**.
- Case Study: **Performing a comprehensive forensic analysis of a provided infotainment system image from start to finish.**

Module 15: Capstone Project & Forensic Report Writing

- Applying learned skills to a **complex automotive forensic case study**.
- Developing a **comprehensive forensic report** suitable for legal proceedings.
- Presenting findings and defending conclusions to a simulated court or board.
- Ethical considerations in **expert testimony and evidence presentation**.
- Case Study: **End-to-end investigation of a simulated cyber-physical attack on an autonomous test vehicle, culminating in a full forensic report.**

Training Methodology

This training course employs a highly interactive and practical methodology designed for maximum knowledge retention and skill development. It combines:

- **Instructor-Led Sessions:** Engaging lectures and discussions covering theoretical concepts and industry best practices.
- **Hands-on Labs:** Extensive practical exercises using specialized automotive forensic tools, software, and simulated vehicle data. Participants will work on real-world scenarios in a controlled lab environment.
- **Case Studies:** In-depth analysis of actual or simulated automotive and autonomous vehicle incidents, reinforcing theoretical knowledge with practical application.
- **Group Discussions & Collaborative Exercises:** Fostering peer learning and diverse perspectives on complex forensic challenges.
- **Q&A Sessions:** Dedicated time for participants to address specific queries and challenges with expert instructors.
- **Capstone Project:** A culminating project that integrates all learned skills, requiring participants to conduct a full forensic investigation and present their findings.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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