

Stay ahead in the evolving automotive landscape with our cybersecurity workshops, designed to empower you with **practical, hands-on** skills and insights into embedded and vehicle security.

Explore the fundamentals of automotive protocols, ECUs, and attack surface identification. Learn cutting-edge techniques in hacking real cars, from firmware reverse engineering to OEM design philosophies. **Fully customizable**, our workshops ensure you gain the expertise to safeguard interconnected vehicles against emerging cyber threats.



Features:

- **Attack Surface Identification:** Learn to pinpoint vulnerabilities on Electronic Control Units (ECUs) for effective security assessments
- **Low-Level CAN Communication:** Understand the intricacies of CAN communication and vulnerabilities at the protocol's foundational level
- **Vehicle Architecture Overview:** Gain insights into prevalent vehicle architectures and network topologies for comprehensive understanding
- **Relevant Protocols Mastery:** Acquire knowledge about essential protocols utilized in contemporary vehicles for targeted security analyses
- **Hands-On Network Scanning:** Engage in practical automotive network scans to identify potential vulnerabilities and weaknesses
- **Diagnostic Protocol Exploitation:** Explore techniques to attack diagnostic protocols, including firmware dumping and reverse engineering for in-depth analysis
- **Security Access Breaching:** Break through security access mechanisms deployed in modern vehicles to assess system vulnerabilities effectively
- **Immobilizer Basics:** Get an overview about current immobilizer systems

Exercise Environment

Remote ECU: The remote system facilitates the handling of the ECUs by avoiding wiring efforts. Available Manufacturers: BMW, VW, Opel, Tesla, Mercedes, Audi. The following ECU types are available: Body Domain Controllers, Gateway ECUs, Telematics ECUs, Airbag ECUs, Dashboard ECUs, Immobilizer ECUs

Physical ECU: Various ECUs will be brought on-site for training in hardware reverse engineering as well as handling ECUs

Virtualized Vehicle: By simulating a vehicle and CAN messages while driving, participants can learn how to handle low-level CAN messages and how to manipulate them

Virtualized ECU: A modified digital twin of a real ECU, which includes various IT security exercises that can be performed by the participants independently

Security Testing, simplified.

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Module Outline

- **Fundamentals of vehicular networks and protocols**
- **Controller and Networks**
 - Low-Level Attacks
 - Scapy CAN layer
 - DBC file format
 - MITM attacks
 - AUTOSAR SecOC
 - Fuzzing techniques
- **ISOTP**
 - Basics
 - MITM attacks
 - Network Scanning
- **UDS/GMLAN**
 - UDS and GMLAN in Scapy
 - Security Access
 - Network Scanning
- **DoIP / HSFZ**
 - Basics of protocols
 - DoIP and HSFZ in Scapy
 - Handling and tools
- **SOME/IP**
 - Basics of SOME/IP
 - Tools
- **CCP / XCP / OBD2**
- **OEM-specific knowledge**
 - Attacks on vehicles
 - Security access implementations
 - Update processes
 - Overview of OEM-specific tools
 - Electronic immobilizers
- **Hardware reverse engineering**
 - Identification of interfaces
 - Basics of JTAG
 - Ways to read out firmware
- **Reverse Engineering**
 - Ghidra basics
 - Overview of common processor architectures
 - Handling memory maps
 - Reverse engineering of peripheral components
 - Handling of interrupt vector tables
 - Identification of automotive protocols e.g. UDS
 - Reverse engineering of security access algorithms
 - Intercommunication of bootloader and flashloader
 - Reverse engineering of state machines and AUTOSAR

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