![Fraunhofer AISEC logo]

**Cybersecurity research at Fraunhofer AISEC**

# Automotive Security Lab

The Automotive Security Lab at Fraunhofer AISEC enables security testing of entire vehicles and offers room for test setups to analyze multiple components that interact with each other. Instead of removing or re-creating individual components for security tests, this modern laboratory environment looks at how components interact from the perspective of the system as a whole. In addition to analyzing entire vehicles, the researchers can also test vehicle components or systems tailored specifically to customer needs ("*hardware in the loop*").

## More room for security checks

Advanced, innovative lab equipment allows the researchers working at Fraunhofer AISEC to perform detailed security checks of entire vehicles up to passenger car class or of subassemblies or components, all in a secure and trustworthy environment. This eliminates the need for our customers and partners to rent suitable testing space, which can be costly, laborious, and time-consuming. Instead, they can put the lab space, equipment, and expertise of Fraunhofer AISEC to work for them.

## Confidentiality in a secure environment

The lab has space to park multiple vehicles in a secure environment inside the institute building. These spaces cannot be viewed from the outside, and only select persons have access.



**1**
*Analysis of entire vehicles*

**2**
*Electric scooter at the Automotive Security Lab*

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1

## Chassis dynamometer and vehicle lift

The vehicle lift at the Automotive Security Lab makes it possible to test vehicle underside sensors and tire pressure sensors while better targeting security checks such as penetration tests. Security-related interfaces are frequently located on the underside of the vehicle, so the lift also allows for testing of vehicles without an engine compartment, such as EVs.

A chassis dynamometer provides options for security analyses having to do with autonomous and semi-autonomous driving. Sensor data such as lidar, radar, and/or image processing data can be collected and analyzed during simulated operation. Systems can behave differently when the vehicle is in motion, so these kinds of data are an essential part of any comprehensive security analysis. The researchers can simulate attacks on driving assistance features, the braking system, and other control elements in this way.

An exhaust gas extraction system permits long-term testing of vehicles while combustion engines are running, so how the vehicle and control elements behave on long drives can be simulated and tested. The lab is also equipped with EV charging infrastructure.

## Studies of system groups and individual components

For research and demonstration purposes, the Automotive Security Lab at Fraunhofer AISEC has a demonstrator wall. Typical system groups found in a vehicle, such as networking with a CAN fieldbus system, are brought together here for testing and study. The researchers use the setups to develop new security measures, perform feasibility studies, and simulate new attacks on groups of control units for in-house research.

**1**    *Chassis dynamometer*    **2** *Automotive demonstrator wall*
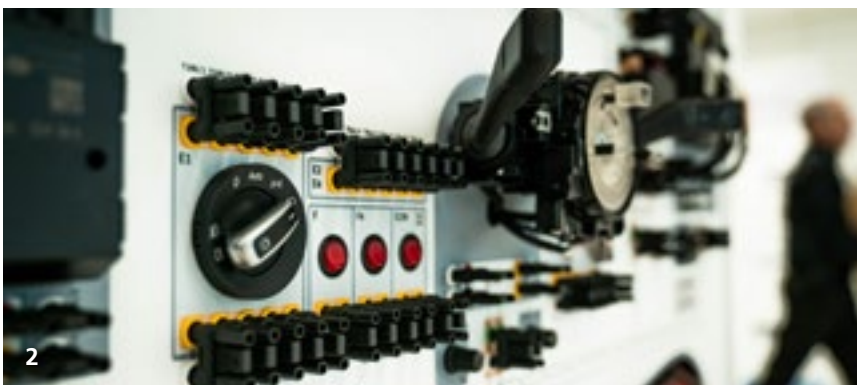


2

### What we offer

#### Testing environment modeled on real-world conditions
- Space to park multiple vehicles in a secure environment
- Facilities equipped with necessary diagnostic tools
- Development and use of security tools
- Room for test setups to study multiple components that interact with each other
- Chassis dynamometer for security analyses having to do with autonomous and semi-autonomous driving
- Vehicle lift for additional access to security-related interfaces
- EV charging infrastructure

#### Automotive security
- Risk analysis and penetration testing for connected features and services
- Security engineering and vehicle development methods
- Simulation of cyberattacks and their effects on vehicles in operation
- Checks of electronic components and digital vehicle services
- Development and testing of security measures
- Security analyses in customer-specific test environments for control units