

NETWORKED SYSTEMS | ADVANCED DRIVER ASSISTANCE SYSTEMS (ADAS)

Digital innovation in automotive vocational training

ONE-STOP TRAINING SOLUTION

Complete solution for modern engine management systems, brakes, air conditioning and airbag systems

Vivid presentation of complex educational content by means of modern training media

Training panel systems
Individual experiment set-ups

UniTrain
Individualised basic and advanced training in class groups

CarTrain
Training carried out on real components

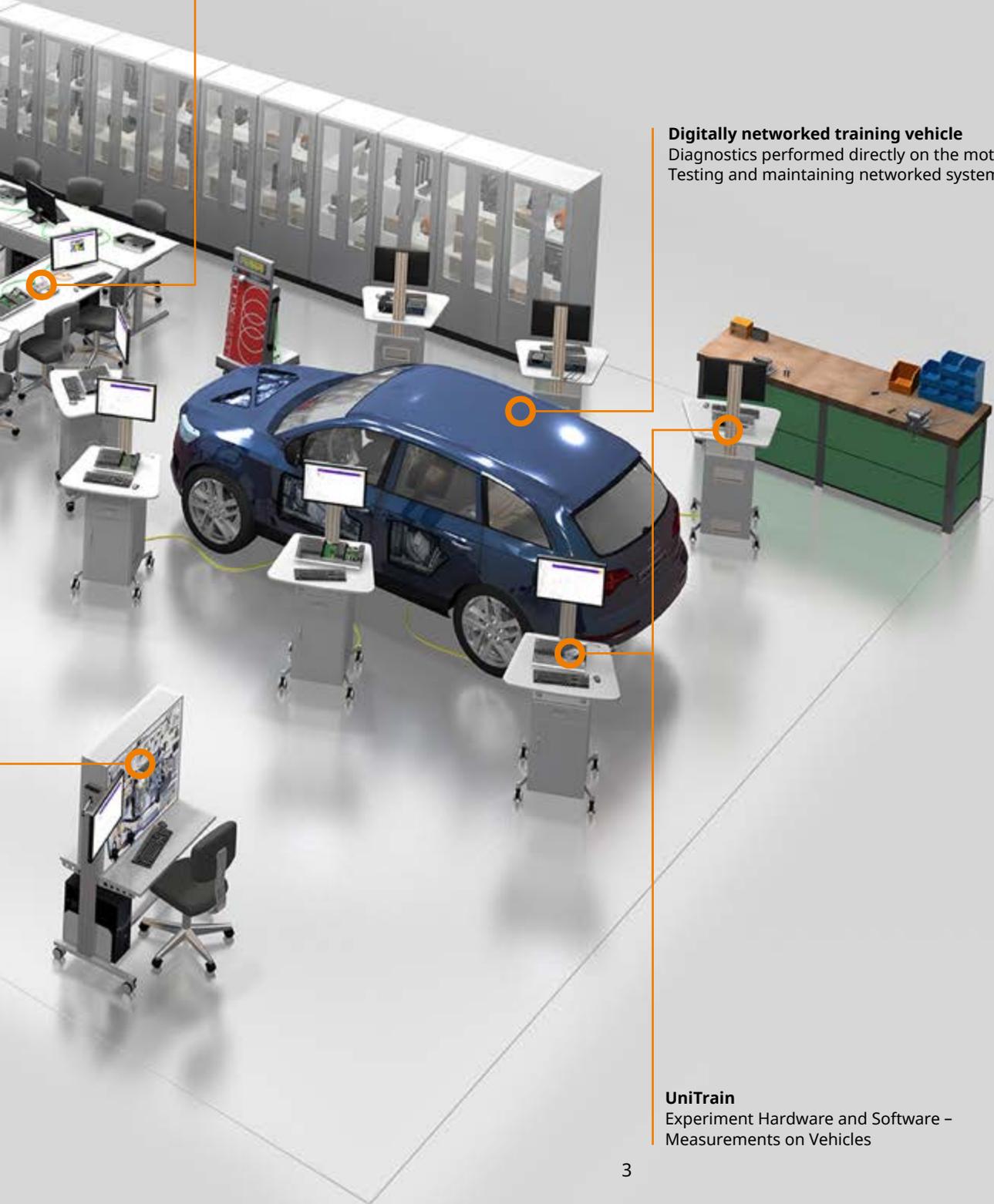


Student measurement stations

An environment capable of handling multiple signals is provided for each student as a guarantee for optimum learning success

Digitally networked training vehicle

Diagnostics performed directly on the motor vehicle – Testing and maintaining networked systems



UniTrain
Experiment Hardware and Software –
Measurements on Vehicles

UNITRAIN – NETWORKED SYSTEMS



CAN

Modern vehicles feature many electronic control units which can constantly communicate with one another via digital bus systems. CAN bus systems are as common in construction and agricultural machinery as they are in private or commercial road vehicles.

The training system teaches this key topic in a way which closely resembles authentic practice. Trainees start by learning the fundamentals of communication procedures before using simulated faults for an introduction to diagnostics.

Training contents

- Reasons for using bus systems in vehicles
- Topology and components of CAN bus systems as used in vehicles
- Differences between low-speed and high-speed CAN
- Electrical properties of a CAN bus
- Data rate, identifiers, addressing and arbitration (low-speed and high-speed CAN)
- Structure of a message frame in a CAN message
- Analysis of CAN messages using CAN monitor and an oscilloscope
- Editing and transmitting CAN messages from a PC
- Troubleshooting

Order no. CO4204-7K



CAN FD

From small private cars to the biggest commercial trucks, CAN bus systems dominate the market. However, ever-greater “networking” has driven this universal aid to the limits of its capabilities. The consequent development of CAN-FD into CAN-FD (flexible data rate) has been essential and is already breaking through into series production.

This UniTrain course explains the features introduced by this innovation in an easily understood fashion. Trainees learn efficient methods for diagnostics by means of numerous experiments. They can put their own CAN-FD networks into operation and carry out all kinds of measurements as well as diagnostic work on them.

Training contents

- Features of CAN-FD bus systems
- Diagnostics as performed in practice at real workshops
- Measurements on a genuine CAN-FD network
- Diagnostic software for read-outs from the CAN-FD bus
- Select from various pre-set data rates edit and transmit CAN messages via PC
- Troubleshooting

Order no. CO4205-1S



LIN Bus

Another type of bus is used in addition to CAN buses. LIN buses are mainly used for non-safety-relevant comfort systems. With our training system, trainees can learn how and where such buses can be used and what their limitations are. They also carry out investigations of the bus protocol and targeted fault finding on the system.

Training contents

- Development of bus systems in vehicles
- Topology and components of a LIN bus system
- Electrical properties of a LIN bus
- Addressing in a LIN bus
- Master-slave principle
- Investigation of data fields by measurement
- Structure of message frames
- Analysis of LIN messages
- Editing and transmission of LIN messages
- Troubleshooting

Order no. CO4204-7E



Optical fibres (MOST Bus)

Currently, optical bus systems are primarily used for multi-media systems using high data rates in the most expensive luxury vehicles. However, in view of the increasing data processing required in vehicles, their implementation is expanding rapidly.

Today's trainees will therefore be encountering this topic often during the course of their careers. Our training system focuses on the physical fundamentals and teaches the kind of diagnostic techniques used in practice.

Training contents

- Data networks in vehicles
- Reasons for use of fibre optics in vehicles
- Fundamentals of MOST buses
- MOST protocol and control units
- Ring-break diagnostics
- Structure of optical fibres in vehicles
- Optical bus systems in vehicles
- Fundamentals of ray optics (refraction, reflection)
- Attenuation in optical fibres
- Data transfer and optical measurements

Order no. CO4204-7H

UNITRAIN – NETWORKED SYSTEMS



FlexRay

The fact of there being more and more electronics in motor vehicles is accompanied by there being ever more complex networks. This now includes sensors, actuators and control units as well as entertainment and navigation systems.

FlexRay is the most widespread communications platform utilised in by-wire systems. The demands on such systems primarily include faster data rates, deterministic communication and a major need for systems to be both fail-safe and flexible. This UniTrain course teaches students about FlexRay in a manner closely aligned to authentic practice.

Training contents

- Bus systems in vehicles
- How a FlexRay bus works
- Communication between components via FlexRay
- Data exchange in FlexRay networks
- Practical application of the FlexRay protocol
- Identifying typical faults and how to trace them by measurement
- Functions of steer-by-wire technology and how it works
- Troubleshooting

Order no. CO4204-6Y



Workshop communication using RFID

In one way, communication with actual customers and the drafting of customer job orders forms the basis for all of a mechanic's business. On the other hand, though, technical communication with the actual vehicle via a PC is now an essential way of gaining vital information. Nowadays, vehicle data can be stored on the vehicle's key by means of RFID (radio-frequency identification) and can then be read out from there afterwards.

This course gives an insight into the principle of how this works and how it is used in vehicles. Trainees investigate aspects of energy and data transfer in the reader and transponder system.

Training contents

- Communication with internal and external clients
- Planning and preparation of working procedures
- Procedure of acceptance for servicing
- Compiling a work order
- Use of vehicle keys as instruments of communication
- Description of a key including data
- Reading data from a vehicle's key
- RFID applications in general and those specific to vehicles
- Understanding the essential components for data transfer
- Range of RFID transponders and antennae
- Physical relationships and standards

Order no. CO4205-1N



Comfort systems and keyless entry

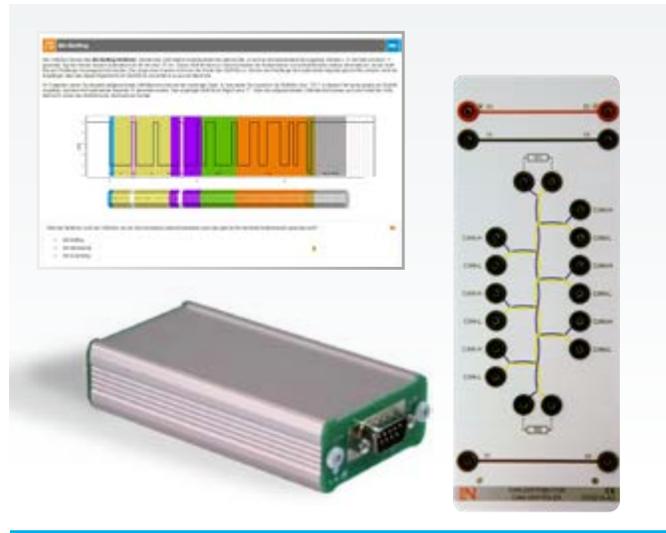
Comfort systems in vehicles make a major contribution to enhancing active safety and security. Innovative operating systems are now breaking into the marketplace and setting new standards.

Keyless entry, comfort systems, safety and security technology and door locking mechanisms, this UniTrain course offers a deep insight into all these systems. This means that trainees gain skills in essential parts of their training, such as testing, diagnostics, repairs and configuring parameters to customers' own needs and desires.

Training contents

- Comfort settings in vehicles
- Active safety
- Door-locking systems
- Central locking
- Radio remote control
- Keyless access to vehicles
- Capacitive pushbuttons
- Fundamentals of antenna technology
- How central locking works via a CAN bus and how such a system can be expanded to implement keyless systems

Order no. CO4204-6G



Use of CAN buses in cars, trucks and agricultural equipment

Here is a chance to gain an even greater understanding of CAN buses. This course helps trainees build up their own CAN network. A CAN distribution point can be used to put even a complex network into operation in rapid time.

Subsequent control of the individual CAN nodes can then be carried out by a whole group, since the educational concept provides full support for group working. The system can also be supplemented with components for a lighting installation.

Training contents

- Structure of a CAN network
- Setting up a system with the aid of a CAN distribution point
- Control of CAN nodes
- Transmitting and receiving messages
- Group work (with up to four teams)

Order no. ATS 2

UNITRAIN – NETWORKED SYSTEMS

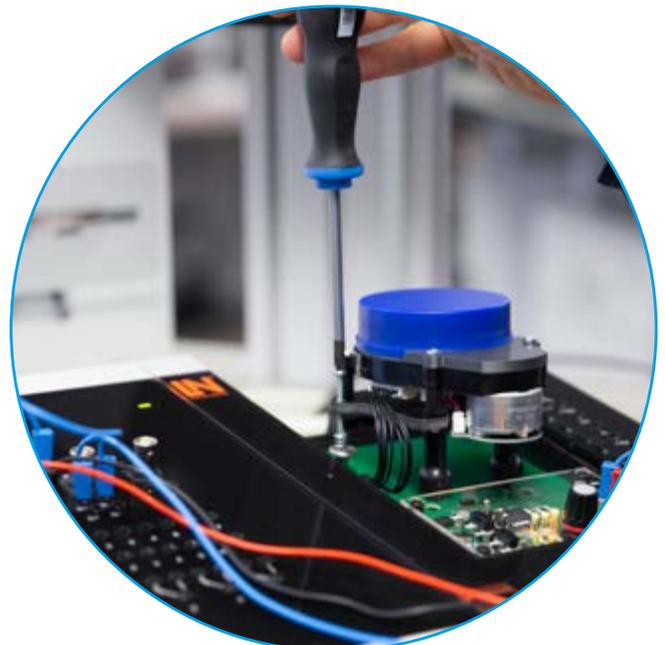


LIDAR

Delve right into the subject of „LIDAR“ (Light Detection and Ranging). This system enables you to teach essential diagnostic skills on optical distance and ranging systems. The hardware for this driver assistance system is based on an authentic LIDAR module which has been opened up to a large extent, giving trainees a unique view of the system’s structure.

Training contents

- Fundamentals of driver assistance systems
- Significance for self-driving vehicles
- Physical principles of light and lasers
- Safety regulations when handling and operating lasers
- Design and function of lidar systems in vehicles
- Calibration of lidar system by means of a calibration board
- Diagnostics for CAN bus, power supply and actuators
- Measuring techniques and reflection properties
- Signal processing and detection of surroundings
- Networked driver assistance systems and system architecture
- Fundamentals of antenna technology
- How central locking works via a CAN bus and how such a system can be expanded to implement keyless systems



Order no. CO4205-1E

UNITRAIN – ADVANCED DRIVER ASSISTANT SYSTEMS



Ethernet in Automotive

This training system enables the trainees to set up a real Ethernet network and put it into operation. As in the real vehicle, communication with the outside world in particular is realised via the existing EOBD connection. This is integrated as a real connection on one of the three modules.

The remaining two modules represent an infotainment network that communicates via Ethernet. The focus here is particularly on the transmission of real-time data. The individual control units can be configured individually using the firmware dongles supplied. Thus, one module becomes a media server and the other a control unit for the vehicle's sound system.

Training contents

- Setting up an Ethernet network in the vehicle
- Areas of application
- Real-time data transmission
- Ethernet system components
- Difference CAN to Ethernet
- Ethernet vs. automotive Ethernet
- Software updates of the vehicle systems via Ethernet
- Use of the OBD II interface through Ethernet
- Advantages and dangers

Order no. CO4205-1A



Gesture control and capacitive sensors in vehicles

This training system enables trainees to gain a deeper understanding and learn the necessary diagnostic skills for the modern operating concepts of current motor vehicles. They learn how capacitive and resistive touch screens work, as well as their differences in operation. Closely related to the capacitive touch screens are the capacitive switches, which are also a didactic component of the training system. The highlight, however, is the integrated gesture control, which trainees will learn about in detail in a practical test. The overall package is rounded off by numerous diagnostic tasks, which automatically transfer errors to the training system.

Training contents

- Fundamentals of capacitive touch sensors
- Input, processing, output principle (IPO)
- Switching thresholds of touch sensors
- Analog and digital voltage outputs
- Control of seat heating
- Fundamental of capacitive gesture control
- Opening a tailgate with a gesture
- Networking in vehicles - CAN bus
- Diagnostics
- Transmitting and receiving messages

Order no. CO4205-1U

UNITRAIN – ADVANCED DRIVER ASSISTANT SYSTEMS



Rear view camera with parking assistance

A complete system for the rear of a vehicle, composed of multiple ultrasonic sensors and a camera. This UniTrain course gives trainees a practical insight into the handling of a reversing camera with parking assistance, as well as diagnosis of the system.

The training system encompasses the technical features of the whole installation, as well as showing how the individual components operate. Trainees can therefore find out about the physical limitations of the assistant and learn diagnostic techniques for various possible malfunctions.

Training contents

- Design and function of driver assistance system
- Incorporating the camera into the overall system
- How ultrasonic sensors work
- Purpose of driver assistance system
- Learning diagnostic techniques
- Finding out limitations

Order no. CO4205-1C



ACC - Adaptive Cruise Control

This UniTrain course shows the functionality and control strategy of the dynamic adaptive cruise control (ACC) including the emergency brake assistant. In addition to the structure and networking of the system, the course also goes into detail about the individual components that make up the driver assistance system.

The main focus is on the calibration of the radar sensor. This is carried out in a practical manner with the appropriate calibration board. By means of the adjustment points on the ACC module, the module can be optimally aligned.

Training contents

- Carrying out the calibration of the radar sensor
- Calibration by laser
- Adjustment of the sensor by the trainee
- ACC system control strategy
- Networking and structure of the ACC system
- Fundamentals of radar technology

Order no. CO4205-1V





LUCAS-NUELLE, INC.

3909 Midlands Road, Suite A
Williamsburg, VA 23188

Phone: 757-808-5696

www.lucas-nuelle.com
sales@lucas-nuelle.com