Online Calibration Tool

Technical Whitepaper

VEMAC

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„The challenge of always combining the highest quality with creative ideas is what drives us. This field of tension repeatedly gives rise to innovative solutions, which we want to share with our partners, customers, and suppliers.“

- Prof. Dr.-Ing. Michael Reke

1. Introduction

1.1 Challenges of Industry 4.0

The automotive industry and E/E development is currently influenced by different buzz topics:

- digitalisation
- connectivity
- cost-cutting

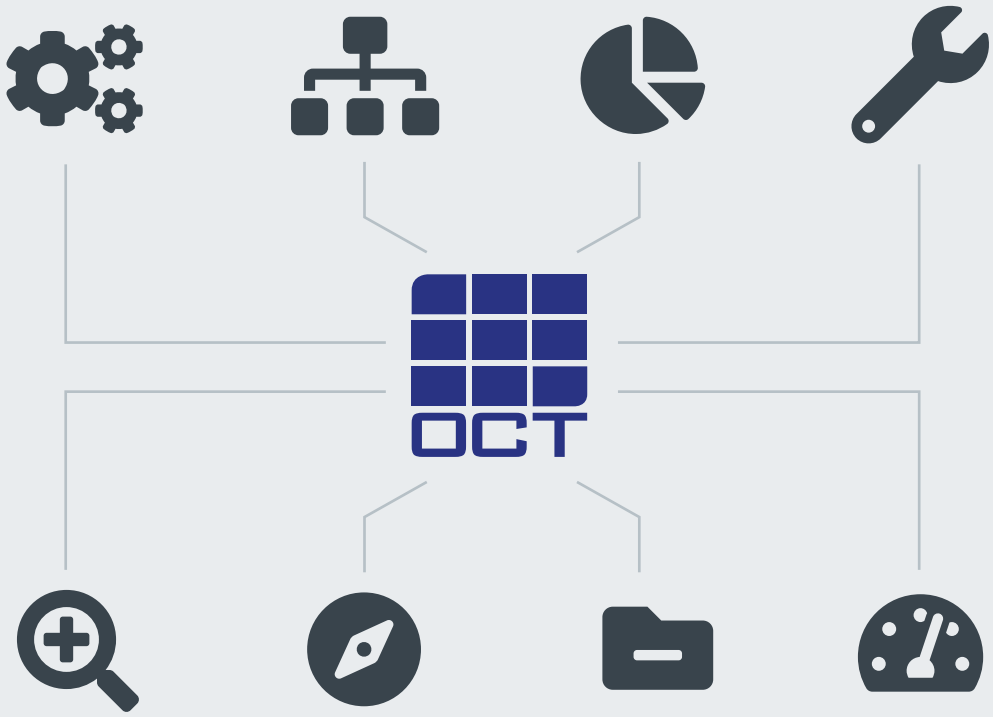
Digitalisation in particular combines a large part of the current challenges of the modern working world. Therefore, companies that have invested in digitalisation in recent years are experiencing greater economic success and are well positioned for developments in the market. This is accompanied by the topics of networking and integration, innovation and flexibility. They are the prerequisite for the success of future-oriented companies and must thus be implemented in a modern corporate policy with a cost-adjusted strategy.

At congresses, in research committees and in professional journals, the importance of innovative approaches is emphasised again and again and necessary changes in daily work are pointed out. What is missing in most cases are realistic, affordable and creative solutions.

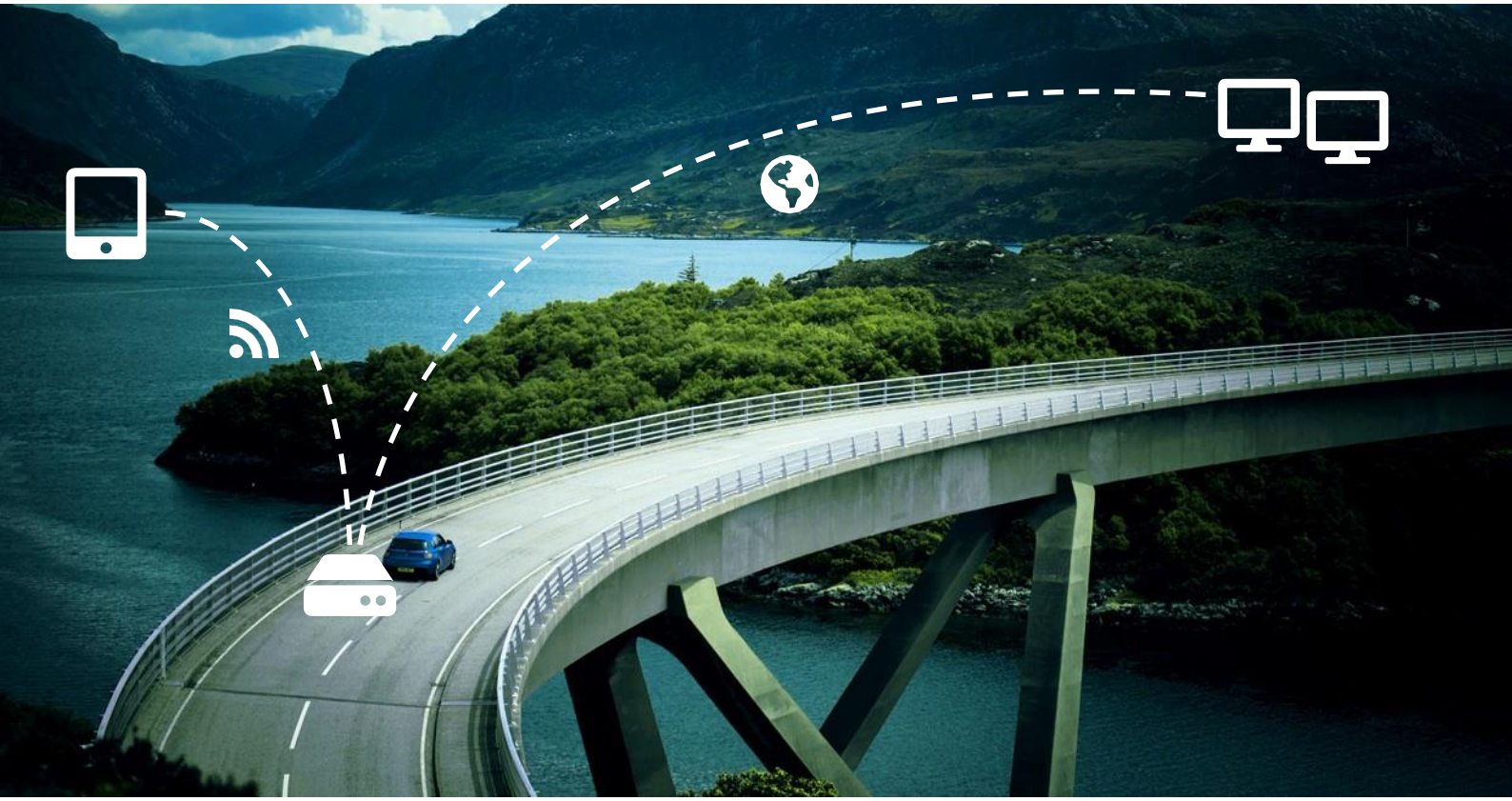
In many companies around the automotive and cross-sector industry

- calibration
- data-entry
- visualisation

belongs to daily work. Standard processes and tools are often not suitable for teamwork or location-independent collaboration. Especially in the case of software tools, there are massive restrictions regarding access by several people at the same time or on different platforms. Companies and development teams in the automotive sector are forced to struggle with inflexible and expensive solutions for data acquisition and calibration.



OCT is a user-friendly plug and play solution for a wide range of development applications.



1.2 Online-Calibration-Tool enables flexible Collaboration

VEMAC recognised the need for a flexible and cost-efficient alter- native early on and developed its own solution with the OCT (Online Calibration Tool). The compact control unit enables the processing and modulation of data using browser-based terminals. By using the OCT (Online Calibration Tool), you achieve completely new degrees of freedom for working in a team and across distributed locations.

As a service provider in automotive development, including the series development of control units, we must meet high quality standards and need the appropriate tools. OCT is designed for precisely these processes and offers a multitude of new functions and advantages compared to tools previously used on the market:

- simple installation & administration
- intuitive operation
- remote access via browser
- low-cost

In the context of digitalisation and the associated dynamics, you need tools that meet the constantly increasing demands of development processes. Flexibility, know-how and costs determine the success of your projects and thus of your company. With the OCT, you use the latest technology to stay ahead of the competition.

2. Use Cases

2.1 Vehicle Calibration

Data acquisition, visualisation and calibration play an important role in the entire development process. Due to exhaust regulations, consumption-optimising measures and the high complexity of modern comfort functions, the functional scope of the control units is constantly growing. Optimisation of the devices in these areas is therefore becoming increasingly important.

In modern vehicles, up to 60 control units for different applications are not uncommon. Many developers already use various simulation tools in their areas to safeguard their work. After technical simulation, every development and adaptation always ends with a test in the vehicle or on the test bench.

These tests take place all over the world: On the one hand, different climatic conditions must be mapped, on the other hand, employees from different locations often work together on the same tasks.

A good example of such tests are test drives that serve to validate a development phase under the extreme conditions relevant to the target market. Entire project teams of highly qualified engineers regularly travel to cold zones, hot zones and mountains for this purpose. This causes a high financial and time expenditure. In addition, the collected measurement data often cannot be evaluated in sufficient depth on site and the validation goal is not achieved.

The OCT has many advantages:

Compact Calibration Tool
OCT combines hardware and software in one: it contains CAN interfaces that establish calibration access to several ECUs via XCP or CCP. It is also possible to integrate CANdbc sources. A browser-capable device is used to display this data; no further software licences are necessary.

App-Compatible
By using apps, the data can already be evaluated at the time of collection. As a user, you can call up results or interim results quickly and easily. The use of voice instructions for the correct execution of driving manoeuvres is also a possible app application.

Automated Calibration
On the basis of individualised adjustments, you can use automated calibration processes: The data is not only stored but also evaluated and the results are used for continuous or step-by-step optimisation of the calibration task.

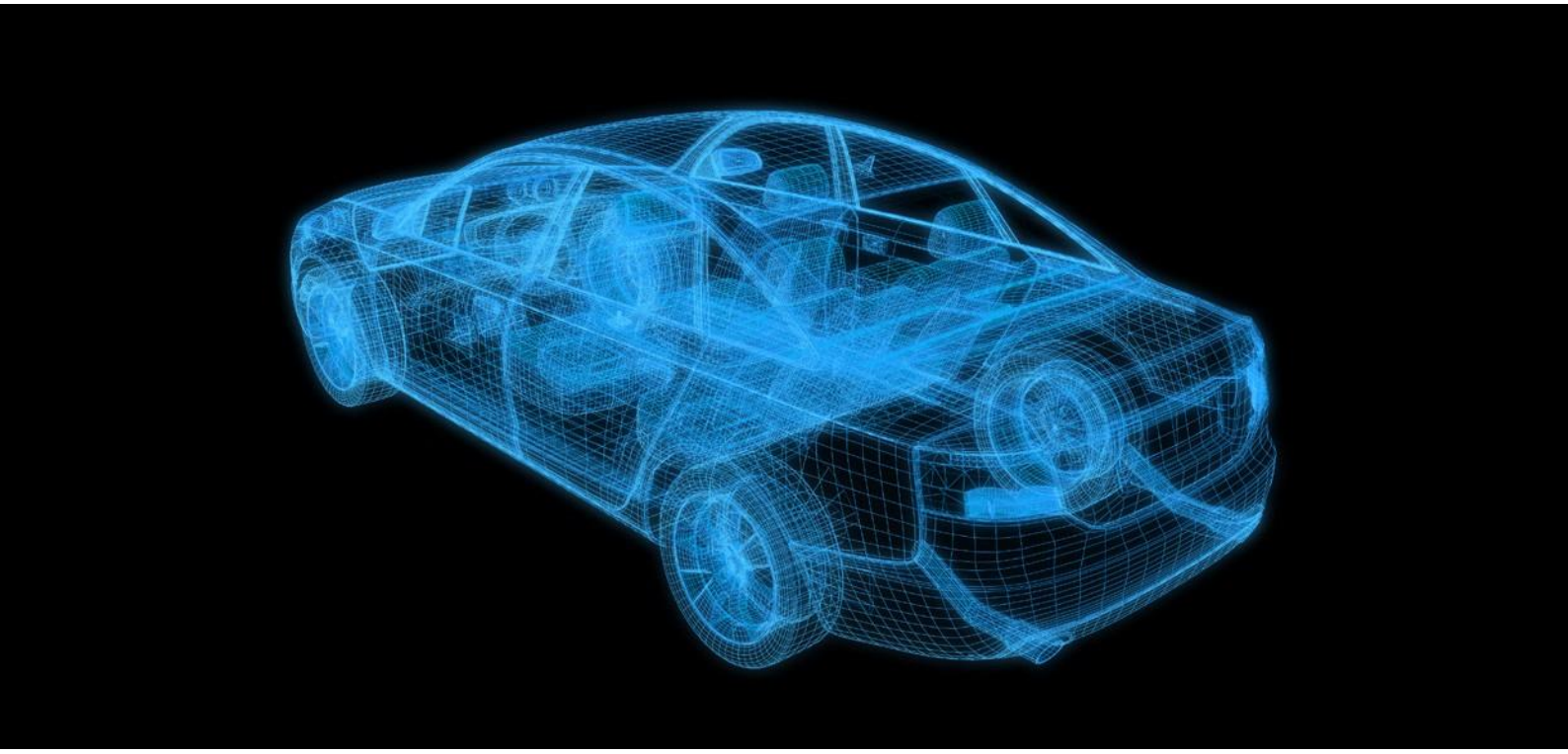
Remote-Access
The operation and display of the calibration parameters and measured values are carried out in a browser window. Therefore, the display does not necessarily have to be in the vehicle. Remote access to the OCT is possible via 4G/5G, so that you can call in experts from all over the world at short notice. Calibration meets IoT – Welcome Industry 4.0.

"Real-Time" Data Logging
OCT can serve as an intelligent data logger in endurance fleets, informing you in real time about critical or faulty measurement results. In this way, you avoid unrecorded measurement channels or malfunctions in the vehicle and measurement equipment that are discovered too late in advance.

With OCT, we provide the development-engineer with the right tool for calibration, which offers the following advantages over conventional systems:

- Out-of-the-Box-Application
- No licensing with dongle or network server
- Platform-independent access via browser
- User interfaces adapted to the respective end-device (laptop/tablet))

Due to these features and the possibility of individual customisation, completely new perspectives for joint development open up for your teams.



2.2 Test Bench Operation

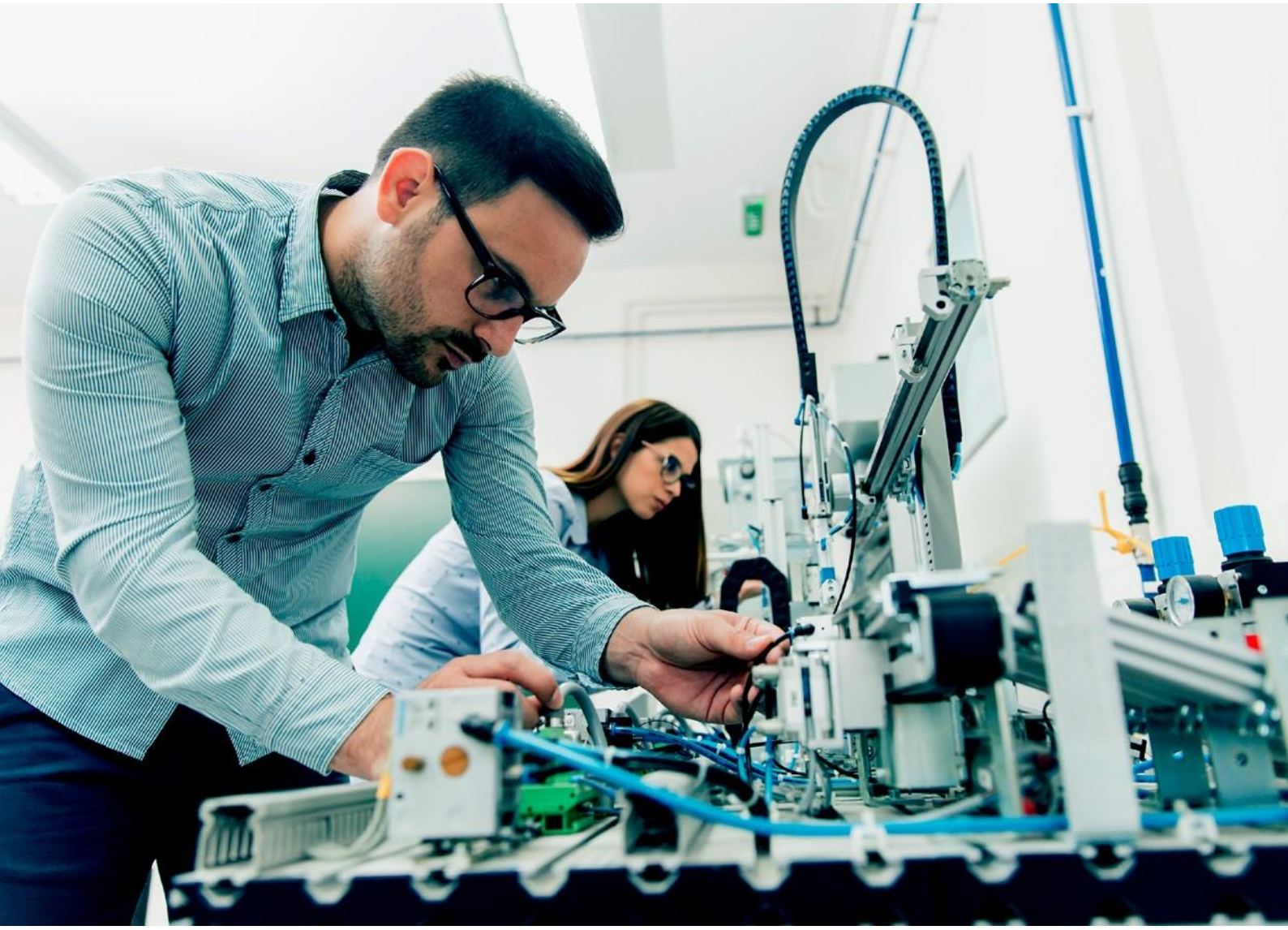
Test bench trials still play an important role in engine development: In mappings, basic maps are run in and calibrations are verified. Endurance test programmes serve to secure and approve components, and consumption and emissions are measured in standard cycles.

The greatest challenge for test stand operators is the interconnection of a large number of complex systems. Only smooth communication between all systems allows efficient operation.
The focus in such applications is primarily on monitoring the operating time of all functions.

Systems currently available on the market offer an extremely high range of functions that are often too complex for daily work. OCT offers you the possibility to effectively and economically map tasks that arise on the test bench.

- Remote access to basic functions and processes
- Programming possible with Simulink/Stateflow
- PDCom Interface for EtherCAT-Systems
- Alternative solution zu ASAM2-Links

OCT integrates seamlessly into existing systems and links them into a single unit. This reduces the administrative effort while increasing the productive test stand times.



2.3 Universities and other Institutions

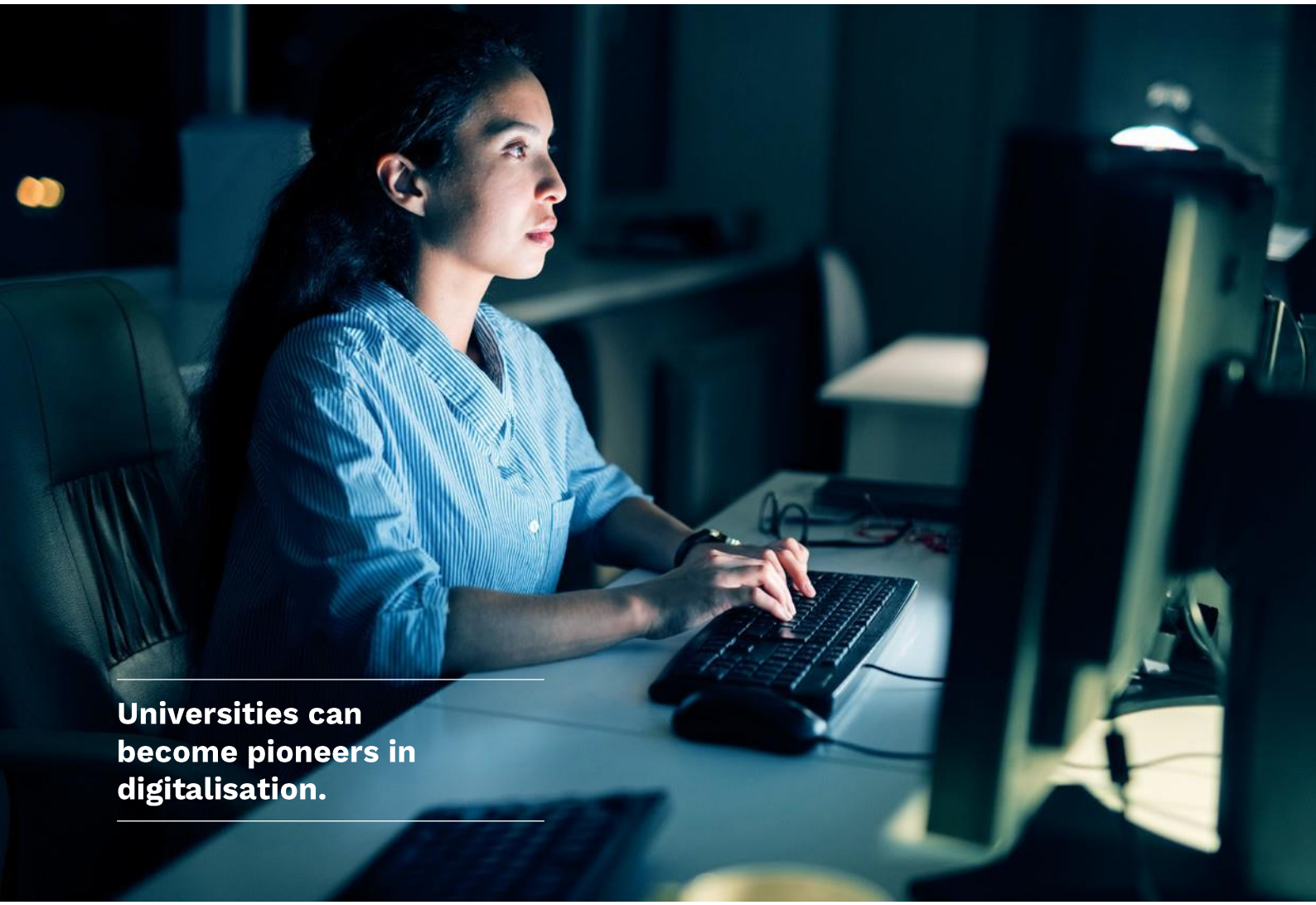
For efficient and up-to-date knowledge transfer, theoretical phases alternate with practical work in everyday university life. In this way, students mature into scientists who put what they have learned into practice and advance research with inventiveness and creativity. The prerequisite for this is appropriate technical equipment at the universities: The tools used in teaching should correspond to those used in research and industry. On this basis, new teaching, working and research formats can be developed, which often leads to universities becoming pioneers in digitalisation.

In this context, the OCT makes it possible to provide each student with an internship in which they can also learn the practical work of an engineer from home. This creates new perspectives for interactive learning.

Advantages of OCT at universities and other institutions:

- Fully equipped internship workplace with browser-based access
- Restriction of user rights to learning scopes possible
- Manage current internship topics via network
- Open interfaces for app-development by students and teaching-staff
- Versatile use in student projects thanks to cloud connection (e.g. HERE geodata), Car2X technology, GPS and acceleration sensor

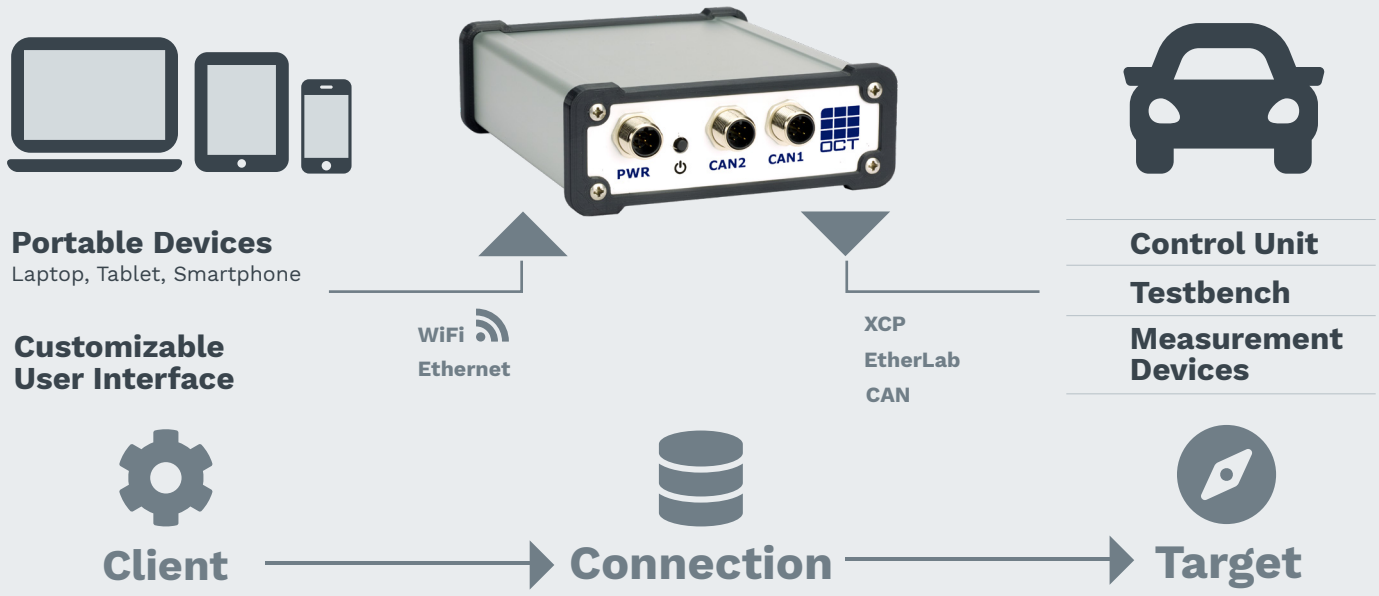
In research- and educational institutions, OCT offers a flexible response to the ever-increasing technological requirements and enables you to teach the latest content simply, comprehensively and individually adapted in the course of digital teaching.



Universities can become pioneers in digitalisation.

3. Technical Design

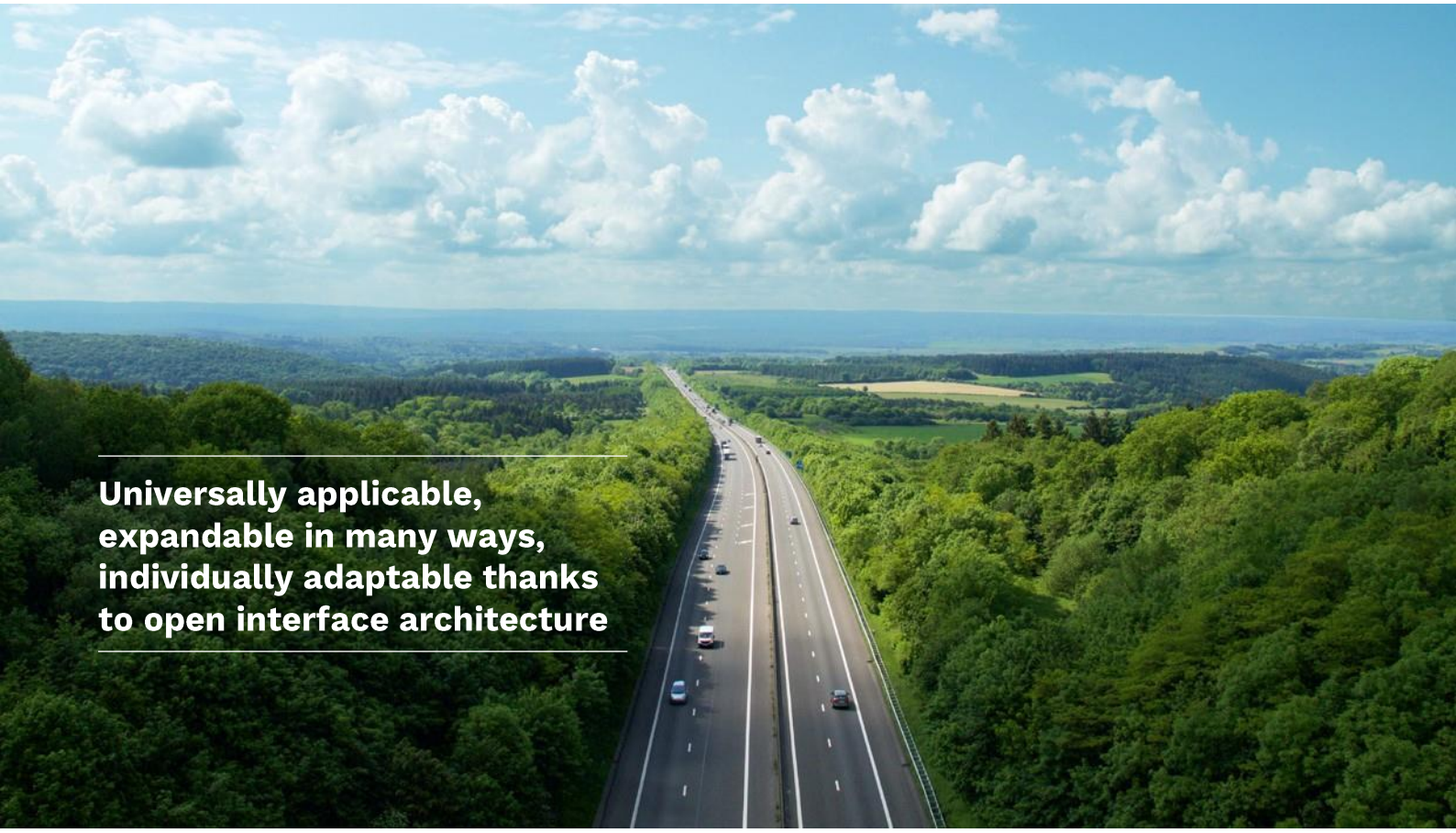
In comparison to classic measurement and calibration systems, OCT combines the functionality of the interface adapter with data communication, processing and storage in one compact module. Data visualisation and operation of the device are carried out via a web interface. PCs/laptops or mobile devices such as smartphones and tablets can be used for this purpose. No additional software needs to be installed on the device used. Both WiFi and wired Ethernet are available for the connection to the end device. Integration into the company network is just as possible as a direct connection. For the latter, the OCT provides a DHCP server.



The OCT is equipped with two CAN interfaces that support the XCP and CCP protocols for calibrating automotive ECUs. Of course, CANraw and CANdbc are also supported. This means that sensors and external measurement technology can also be directly integrated. EtherCAT is available as a further interface. This is used in particular test bench environment.

In addition to the external interfaces, further modules are available for the acquisition and processing of data. The OCT receives position data worldwide via an integrated GNSS chip. The GPS, Glonass, Galileo and Beidou systems are supported. Furthermore, a 6-axis acceleration sensor is built in. Two USB ports and an SDHC card slot, additional functions such as data logging and mobile radio connection can be realised.

A Simulink interface enables the execution of models that can access all available signals and parameters of the internal and external interfaces. This makes it possible to evaluate and adjust calibration values depending on any Simulink algorithms.



4. Ready for the Future

With OCT, we pave the way for a universally applicable and almost unlimitedly expandable system. In the future, new functions demanded by the market will be made available promptly or developed by the community itself. Our goal is to provide all employees, teams and companies with a platform that is oriented towards increasing requirements and grows with them.

The OCT is designed in such a way that it can be expanded as required for future applications. Through the open interface architecture, we would like to encourage you to develop special solutions adapted to your requirements yourself or with our help.
In addition to the freely customisable user interfaces, including various widgets for data visualisation, OCT offers developers additional application interfaces. Thus, OCT can be adapted even better to the individual needs of internal development tasks.
You too can play an active role in shaping the digital transformation. Networking and integration are the building blocks for a successful future.

Benefit from over 20 years VEMAC know-how and learn more about our products and development services. Get in touch with us!

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