

CAR ASYST – the Swiss Army Knife of Diagnostics

With CAR ASYST, Softing is presenting an innovative and universal tool for vehicle analysis consisting of a standard smartphone with an analysis app, a WiFi vehicle interface and vehicle data. As it is used on conventional Android smartphones, users can start working with it whenever they want to and wherever they happen to be.



Diagnostic testers in repair shops are essential for efficient vehicle repair and status analysis. Increased safety requirements for networked vehicles and autonomous driving have led to complex vehicle architectures and a rapid increase in the amount of data in automobiles. Modern repair shops have to be able to test vehicles for errors and repair them reliably and quickly using systematic diagnostics. Conventional diagnostic testers are usually too unwieldy and too expensive to equip all service employees for every case of operation. Extending the tool landscape surrounding the large after-sales service tester with a simple and flexible diagnostics tool requires mobile system solutions for fast initial diagnostics and error detection on a smartphone basis.

The complexity in vehicles is constantly on the increase. Nearly one hundred ECUs are now generating almost three gigabytes of data volume with several vehicle buses, over ten thousand bus signals and diagnostifiable symptoms with several thousand diagnostic measured values. And this growing data volume is also relevant for the customer.

Repair shop testers are often occupied with tasks at the lifting platform; stationary testers mean both long waiting and preparation times as well as little flexibility when a car first comes in for diagnostics. Data reading and analysis usually take a long time given the everyday volume of work and frequenting of the repair shop. It is often not possible to directly connect the vehicle data with the driving data or to flexibly transmit analysis results to the repair shop and lab for more in-depth evaluation and processing.

As early as the phase of vehicle and ECU engineering, the CAR ASYST APP helps the engineer in the test shop as well as in road tests in vehicle testing. The acquisition of measured data from the ECUs takes place in combination with route and location information which the development engineer can then assess more precisely on the lab vehicle/breadboard assembly or PC. In the repair shop and in vehicle service companies, the CAR ASYST APP is ideal as a pocket tester the technician always has to hand. In a preliminary fast on-site analysis or when the vehicle first comes into the repair shop,

meaningful conclusions and results can be gleaned fast in the very first conversation with the customer. During short road tests intended to determine the state of the vehicle, CAR ASYST is useful as a simple datalogger for recording measure and video data. During service work in the repair shop, spare parts can be ordered quickly thanks to the immediate transmission of analysis data in the form of simple error reports. In vehicle end control, the mobile analysis tool helps the service technician with the acceptance run and release of tested or repaired vehicles. In breakdown service, CAR ASYST supports the work of automobile association service employees when a vehicle has broken down. In combination with CAR ASYST ANALYTICS, the CAR ASYST APP enables endurance tests with data logging to identify electronic errors of certain results which are otherwise very difficult to detect.

access to the OBD jack is required. In view of the data rates – CAN high-speed buses and a FlexRay bus are incorporated in the vehicle – this ideally takes place via WLAN. Communication is mapped in standardized form via the diagnostic protocol DoIP (Diagnostics over Internet Protocol).

General solution structure

The end-to-end solution CAR ASYST for Audi essentially consists of five parts:

Due to the fact that it is widespread, the obvious mobile

- Mobile end device,
- CAR ASYST APP as a logging and diagnostic application,
- CAR ASYST ADAPTER as the WLAN vehicle access,
- CAR ASYST CARDATA – the package for vehicle data use,
- CAR ASYST ANALYTICS as an optional PC-based data evaluation tool.



Fig. 1: The mobile system solution CAR ASYST with its product components APP and CARDATA, ADAPTER and ANALYTICS. (© Softing)

Systemenvironment

To enable use in the repair shop with customer vehicles, the only standard access to the vehicle still has to be used: the OBD jack. This access generally enables diagnostics with the vehicle. However, the current Audi vehicle platform MLBevo (modular transverse matrix) has a special feature to offer here. In addition to the CAN bus prescribed for Onboard Diagnostics, an Ethernet port is also available at the OBD jack. Instead of 0.5 Mbit/second with CAN, the data rate is thus 100 Mbit/second. The Ethernet port not only allows flash programming with correspondingly higher data rates, but is also available, in a correspondingly secure state, for special applications by transparently switching the gateway (mirror mode). Without any additional cabling, this makes it possible to optionally monitor all internal buses from outside the vehicle. By using functional addressing, i.e. the querying of all error memories in one step, reading the error memory now only takes a few seconds – instead of at least one minute. To deploy the tester in mobile road tests and trails, a wireless mobile

end device is an Android-based smartphone. Any commercially available model, e.g. the repair-shop-tested and sturdy Toughpad by Panasonic, can be used. Of the many interfaces integrated on the end device, WLAN, GPS, the camera and the data connection in particular are used. WLAN enables wireless access to the CAR ASYST ADAPTER which carries out a transformation to Ethernet at the OBD jack, in other words it works like a simple intelligent WLAN router. GPS enables the synchronized assignment of bus events with vehicle position in evaluation. In addition, the camera records the route or the instrument cluster at the same time in order to evaluate this video information later in combination with vehicle and GPS data. The recordings – i.e. bus traces, diagnostic results, GPS and camera data – are then sent for further evaluation via a data connection, e.g. by file transfer. Evaluation takes place offline at the PC using CAR ASYST ANALYTICS.

The core of the app is the vehicle data (as ODX data description) which contains the exact analysis possibilities for every model range and all kinds of variants. Accord-

ingly they must be made available to the app regularly and in the latest version. Additional product features such as, for example, the receiving of prefabricated measure configurations by e-mail, the OBD scan function for older vehicle model ranges, and, in the future, online data streaming, will gradually be integrated into the app.

Solution architecture

In terms of technology, the app solution, as a mobile application, closes the gap to tried-and-tested and established solutions from Softing. There are also other parts that were developed in various projects, particularly the logger for recording bus communication on several buses and the user interface (GUI).

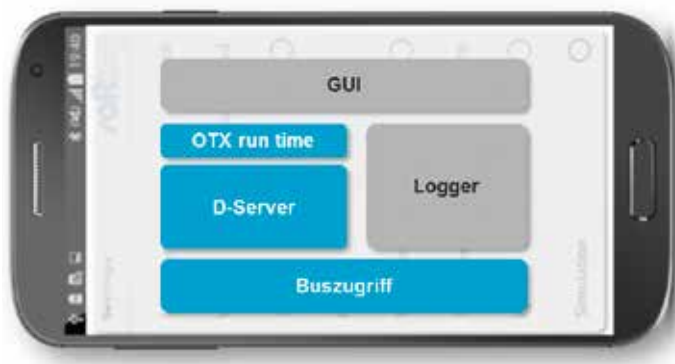


Fig. 2: Schematic of the integrated diagnostic tester system architecture in the app and on the smartphone. (© Softing)

The system solution is initially intended for the target groups Audi Engineering/Development and brand repair shops, as well as importers and service organizations. Independent repair shops are also being given the possibility of using the product in their service operation. The products are available worldwide using the following two distribution channels: The app can be downloaded free of charge from the Google Play Store; the VCI hardware ADAPTER, as well as the CARDATA vehicle data license, which can automatically be lengthened, can be purchased from the new CAR ASYST webshop. Optionally, the PC application ANALYTICS can also be ordered online there. Support (Customer Care) is also managed directly via the website with all important information about the product.

Conclusion


With CAR ASYST, Softing is presenting an innovative and universal tool for vehicle analysis consisting of a standard smartphone with an analysis app, a WLAN vehicle interface and vehicle data. CAR ASYST is a flexible and handy extension in the repair shop as an alternative to the large service tester and can also be used in vehicle engineering: the Swiss army knife that extends the large toolkit. ■ (oe)

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- » www.car-asyst.com


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CAR ASYST for Android smartphones has been available since the end of April. On its launch, the app supports the current Audi models from model year 2016 (Q7 and A4). The tablet variant will be made available at a later date; implementation on further operating systems, such as iOS, is already planned. For additional details take a look at the website www.car-asyst.com. The picture shows the sales model and its distribution to the various target groups.


CAR ASYST System Analysis Plattform




ca/ APP



ca/ CARDATA




ca/ ADAPTER




ca/ ANALYTICS


Zielgruppe:



Automobilhersteller
Entwicklung - Erprobung



Automobilhersteller
Vertragswerkstätten



Freie Werkstätten

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The GUI allows access to vehicle and/or ECU functions as well as the convenient browsing of results. Furthermore, all necessary settings are easy to carry out. These include, for example, the connection configuration as well as the setting of trigger conditions for the logger module. On the diagnostics side, the established components OTX run time and D-Server (MVCI Server) are used. The script engine OTX run time is used in order to be able to integrate ECU-specific sequences directly in the system. The D-Server is responsible for communication and converts the data stream from (and to) the ECU into physical values to then be able to access the vehicle bus.

This system architecture means a complete diagnostic server is integrated on the app and thus on the smartphone. Typical examples of function sequences in the app are "Read entire vehicle error memory", "Read ECU identification" and "Run actuator diagnostics".



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