

Visio.M Automotive Service Bus goes open source

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A central screen provides driving information. With simple swiping gestures the driver can enter commands on a touch pad (right). Credit: Florian Lehmann / TUM

Up to 80 different systems putter around in many cars. The complexity has come to a limit. Within the "Visio.M" research project, funded by the German Federal Ministry for Education and Research with a total of

7.1 million euro, scientists at the Technische Universität München have developed a two-tier IT system that reduces this complexity drastically. Now the researchers put their 'Automotive Service Bus' under an open-source license.

Cars are starting to resemble computers more and more. However, the information architectures they use build on principles that were developed over the last one hundred years. Increasingly, breakdowns result from the electronics. And in the near future, cars will also communicate via the internet and drive via remote control or even autonomously.

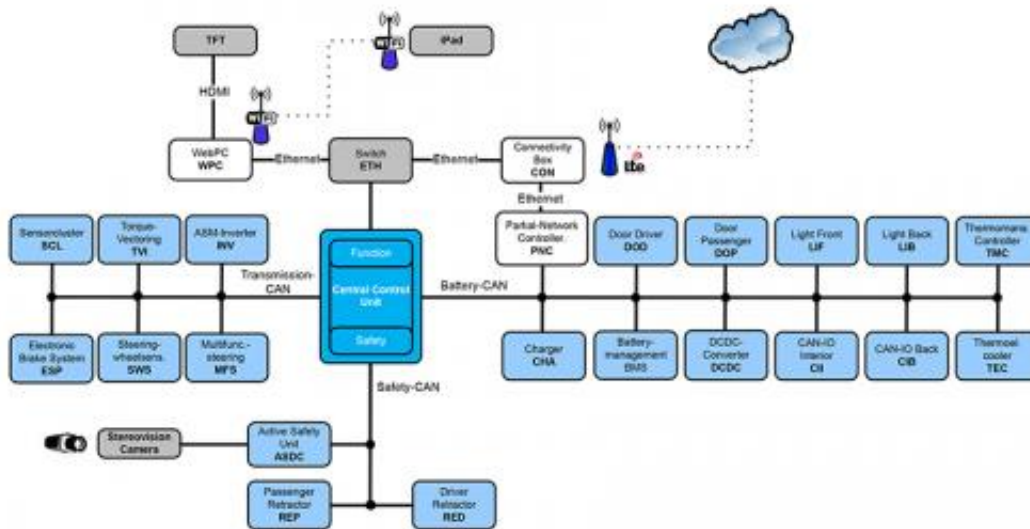
For Visio.M scientists at the TU München have now developed a completely new IT architecture. Akin to smart phones, it is structured in two layers: All driving and safety relevant functions run in one layer, while comfort functions, as well as communications between system, driver and internet are located in the other.

The system is protected from external attacks by running the two subsystems on different platforms. All vital functions are managed by a central electronic control unit (ECU) with a controller area network (CAN) bus. A web-enabled computer is responsible for driver and internet communication. Its basic architecture principle builds on the "Automotive Service Bus" developed by the researchers.

News exchange on the Automotive Service Bus

The Automotive Service Bus functions as a message channel. All components can send and receive messages via this channel. Essential for security is that the components have only read access to vehicle data. Only in clearly defined situations for predefined functions the central ECU grants write access. This allows, for example, the implementation of a [remote control](#) for a car as demonstrated at the CeBIT stand (C79 in

Hall 12) of the German federal government.



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In principle, there are three different kinds of messages: Events provide information like the current speed or position. Commands allow interactions between individual components, like setting a new target temperature for the air conditioning system. Preferences are messages with driver-specific information like music preferences or a home

address.

"All components must adhere to the grammar of the Automotive Service Bus, that's all," says Michael Schermann, director of the Automotive Service Lab at the Chair for Computer Science in Economics at the TU München. "Just like apps on a smart phone, components can be updated, appended or deleted without having to visit a service station."

Uniform user interface

A graphical user interface (GUI) facilitates communication with the driver. All essential driving information is displayed on a central dashboard screen. "The display on this screen can be designed as needed," says Michael Schermann. "In Visio.M we chose a rather classical display design with round instruments."

A center mounted touchscreen accepts driver input. To minimize distractions while driving, the unit accepts simple swipe gestures. In contrast to smart phones, there are no elements that must be accurately "hit" with the finger.

If components are added or altered, the GUI remains largely unchanged. New or different functions simply become available. On the other hand, users can adapt the GUI to their personal preferences without without any work on individual components.

While cars of the past could hardly be altered over their entire lifespan, the separation of the two layers allows updates and adaptations to be made at any point in time. "The Automotive Service Bus also forms an ideal basis for 'premium services.' For example, for a small additional fee personal music collections stored in a cloud can be made available to rental car drivers," says Michael Schermann. "And if I prefer the navigation program of a specific provider, the system can make this

service available - without changes to the vehicle."

Automotive Service Bus becomes open source software

Last October, Visio.M received road-use certification using this system. Following the end of the Visio.M research project, the developers at the TU München are now making the Automotive Service Bus available under an open source license. "This will provide developers around the world the opportunity to use this platform for their own research," says Michael Schermann.

The OSGi software platform (Open Service Gateway Initiative) forms the basis of the Automotive Service Bus. It is Java-based and, as such, runs on all standard operating systems like Windows, Linux or Mac OS. The hardware platform is a PandaBoard, a single board computer based on a chipset of the partner company Texas Instruments, running a Linux operating system. An Apple iPad serves as a touch screen. The central control unit is a an ECU of the partner company IAV.

Participants in the Visio.M consortium were, in addition to the automotive companies BMW AG (lead manager) and Daimler AG, the Technische Universitaet Muenchen as a scientific partner, and Autoliv BV & Co. KG, the Federal Highway Research Institute (BAST), Continental Automotive GmbH, Finepower GmbH, Hyve AG, IAV GmbH, InnoZ GmbH, Intermap Technologies GmbH, LION Smart GmbH, Amtek Tekfor Holding GmbH, Siemens AG, Texas Instruments Germany GmbH and TÜV SÜD AG as industrial partners. The project was funded under the priority program "Key Technologies for Electric Mobility - STROM" of the Federal Ministry for Education and Research (BMBF) for a term of 2.5 years with a total budget of 10.8 million euro.

More information: www.cebit.de/exhibitor/die-bundesregierung/V669901

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