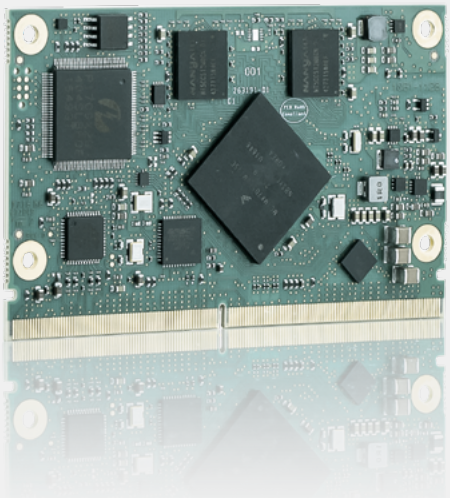
OPEN INTERFACE FOR HIGHLY EFFICIENT VEHICLE DIAGNOSTICS

Kontron helps leading vehicle diagnostics company Hella Gutmann keep pace with the ever-changing communications requirements of major car manufacturers

By identifying the new market requirements, Hella Gutmann seized the opportunity by undertaking a thorough evaluation of potential embedded computer manufacturers and providers. To ensure a rapid and low risk approach to bringing its new product vision to market, Hella Gutmann realised partnering with a trusted long-term supplier of COMs was essential. The chosen supplier would have to already offer an extensive range of leading edge industrial-grade embedded computer products and be highly experienced in the specialized requirements of the sector.

With the above in mind, Kontron was subsequently selected due to the company's proven quality credentials, its comprehensive global support infrastructure including extended five-year product lifetime support, a deep expertise in both embedded hardware and software design, and competitive pricing.



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Hella Gutmann Solutions GmbH is part of the Hella Gutmann Group with around 500 employees and its headquarters in Ihringen. The product portfolio focuses on professional equipment for vehicle workshops, car dealerships and vehicle testing organizations. The core products are data, software and devices for diagnosis, emission tests, light settings, system tests and the corresponding measurement technology.

Around 45,000 automotive companies in 24 countries work every day with devices and know-how from Hella Gutmann Solutions. They benefit from high German quality standards and customer-oriented service such as technical call center, technical training, technical data and sales and marketing support.
In early 2019, the company decided a new product strategy was necessary to offer customers a more flexible and future-proof range of diagnostic devices. Key to this was the development of an 'open' vehicle communication interface that would keep pace with the growing market requirement for diagnostics over IP and CAN-FD (Controller Area Network Flexible Data), while also maintaining compatibility with existing car manufacturer communication protocols.

www.hella-gutmann.de

SYSTEM DESIGN REQUIREMENTS

From the outset, Hella Gutmann realized that if it was to successfully replace its existing portfolio of diagnostic devices - from small entry devices up to high end solutions – a fresh design approach would be necessary and require a space-saving embedded system platform offering flexibility in terms of the core components supported as well as scalability. Moreover, since diagnostic systems are capital goods, Hella Gutmann was used to producing products for five years and then supporting them for a further five years or so. Therefore, the interfaces to core components needed to be considered carefully. It was soon found that the SMARC™ module (Smart Mobility Architecture) industry standard fulfilled these needs. The format was first introduced on the market in 2013 and is now in its third generation with SMARC™ module 2.1, enabling small form factor COMs to leverage the latest functionality, flexibility, and high-speed I/O performance provided by microprocessor manufacturers such as NXP® and Intel®. A further benefit is the ability to maintain ultra-low power consumption for mobile devices.

> Having evaluated and visited several embedded computer companies, we knew Kontron had the hardware and software engineering resources we really needed. These would help us integrate and deliver high quality, scalable vehicle diagnostic solutions quickly and cost-effectively, therefore providing time-to-market and time-to-revenue advantages.
>
> Thorsten Hoes, Head of Diagnostics, Hella Gutmann GmbH

On the software side, as a basis for application development, a Linux based operating system was chosen. A bare metal alternative had been considered but the challenges in interface support and growing complexity meant it was not pursued further. Therefore, the embedded Linux system was designed to use the open source Yocto Project as a foundation, with external components integrated via Yocto recipes.

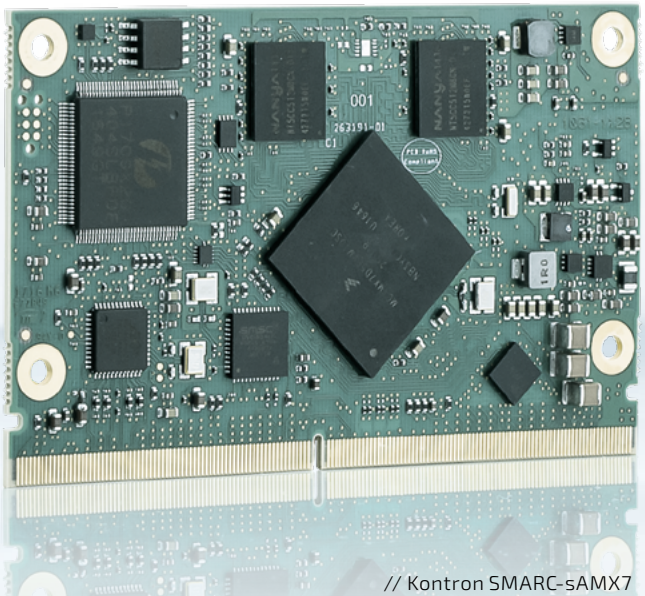
Communication to a vehicle ECU made real-time performance a prerequisite. At the same time, for user interaction, data handling (such as ECU error code interpretation, circuit diagrams and OEM campaigns), plus online license management and software updates four times a year, meant the focus for communication could not simply be on real-time behavior. A secure and extendable solution was also needed for supporting typical embedded interfaces like I^2C, SPI, and SDIO.

// With the diagnostic device mega macs X workshop users can perform diagnostics on different vehicles, even though manufacturers frequently change their communication interfaces.

THE SOLUTION

Mega macs X is essentially a complete computer including vehicle interface, but without a display. With mega macs X workshop users can perform diagnostics on vehicles such as Mercedes S class, VW Golf 8 and Skoda Octavia, all of which frequently change their communication interfaces.

PROCESSOR	Arm® dual processor 1.0 GHz RAM 2 GByte DDR3 EMMC 32 GB yte
INTERFACES	USB-C DC-In Ethernet
SUPPLY VOLTAGE	12 V to 24 V DC
TEMPERATURE OF WORK AREA	0 °C to 45 °C
STORAGE TEMPERATURE	-10 °C to 50 °C
WEIGHT	1420 g
DIMENSIONS	210 x 193 x 80 mm
DEMANDS ON AN EXTERNAL DISPLAYING DEVICE	Screen diagonal 25.4 cm (10") Screen resolution at least 1024x768 Pixel Wi-Fi corresponds to IEEE 802.11n Google Chrome browser at least version 81



// Kontron SMARC-sAMX7

Due to Hella Gutmann's close collaboration with Kontron's engineers the SMARC-sAMX7 family has been thoroughly evaluated and verified. Real-time performance and functionality for ECU data collection is enabled by the integrated M4 processor while at the same time the COM can securely process non time-critical 'big data' such as error codes for archiving and their subsequent analysis as part of vehicle problem solving activities on the Dual Core Cortex®-A7.

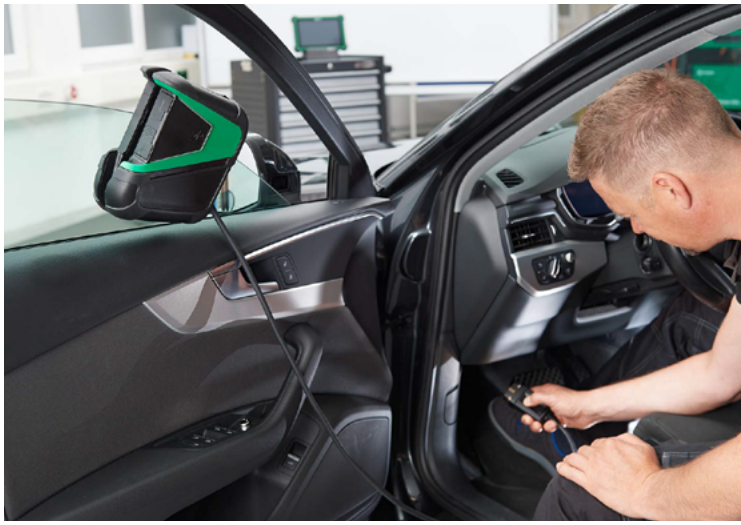
> Our Professional Services have played a key role in contributing to the overall design process together with the managing and coordination of third-party vendors. Kontron's combined embedded hardware and software knowledge ability also ensured we could always assist Hella Gutmann at the critical stages, such as the integration of U-Boot, Linux and the M4 processor.
>
> Hans Ibler, Solution Architect, Kontron

With the various phases involved, a combined hard- and software development project such as this demands flexible support from the embedded solutions supplier. For instance, reliance on NXP® (Freescale) and the Linux community with regards to different LTS strategies had to be taken into account for the BSP. Bootloader, watchdog, interrupt handling and memory management for the different processors were also part of the project phases. Furthermore, power management required deeper consideration since mega macs X is a mobile device.

All of these factors required close collaboration at developer level between supplier and customer. Design reviews of the HGS baseboard development by Kontron were also an asset for the project.

BUSINESS BENEFITS

With the help of Kontron's SMARC™ modules and its embedded computing expertise, Hella Gutmann has been able to build and launch its new family of open interface industrial-grade vehicle diagnostic solutions within a project duration of 36 months - quickly and cost-effectively. By summer 2021, having worked closely with Kontron throughout the new product development phase, Hella Gutmann was able to cover 65 % of its incoming orders with mega macs X, an entirely new generation of highly flexible and scalable open interface vehicle diagnostic solutions. Building on this initial success, Hella Gutmann is already considering future diagnostic device requirements from its customers including the potential for providing graphics functionality. With this, further industry standard COM solutions may also be required, integrated with the support of Kontron.



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> Previously, with the frequent model changes by the major car manufacturers, we were having to update our in-house CAN-based diagnostic devices on a regular basis. For the different diagnostic devices this meant dealing with several different operating systems and hardware, all requiring support on behalf of our customers at the same time, leading to unnecessary complexity and costs. Now our new streamlined open interface approach with mega mac X benefits us as well as our customers who have been very receptive to our flexible and scalable new solutions. Throughout, Kontron has helped us progress and solve the inherent technical challenges.
>
> Thorsten Hoes, Hella Gutmann GmbH

About Kontron – Member of the S&T Group

Kontron is a global leader in IoT/Embedded Computing Technology (ECT). As part of the S&T technology group, Kontron offers individual solutions in the areas of Internet of Things (IoT) and Industry 4.0 through a combined portfolio of hardware, software and services. With its standard and customized products based on highly reliable state-of-the-art technologies, Kontron provides secure and innovative applications for a wide variety of industries. As a result, customers benefit from accelerated time-to-market, lower total cost of ownership, extended product lifecycles and the best fully integrated applications.

For more information, please visit: **www.kontron.com**

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