CUSTOMIZED EMBEDDED VISION
DEFENCE SOLUTIONS

DRIVER VISION ENHANCER &
SITUATIONAL AWARENESS SYSTEMS
AUTONOMOUS & TELEOPERATED DRIVING
OBSERVATION & BORDER SURVEILLANCE
TRAINING & SIMULATION

hema
electronic

Eyes on the field!

Mission-proven Electronics for Driver Vision and Sensor-Fusion

Driver Vision Enhancer and Situational Awareness Systems are crucial for safety in military and defence operations. Special electronics for these systems combine data from multiple cameras and other sensors. They ensure, that the right images and data are available to every user at all times. Real-time data processing and ultra-low latency requirements, sensor fusion for 360° all-round view and superimposed on-screen graphics and information have in the past made the development of such electronics time-consuming and expensive. However, this does not have to be the case, say hema electronics. The German vision electronics developer and manufacturer with 45+ years of experience offers a modular embedded vision platform, that shortens development times, reduces costs and minimizes design risks. It is battle-tank approved with over tens of thousands assemblies in the field and features scalability for upgrades and product variants.

Qualified according to MIL standards

The company recently developed a video distribution unit for a German OEM providers' Driver Vision System, that is being implemented in tracked and wheeled armed vehicles. The development from order placement to the first delivered unit took just 24 months, significantly shortening the time to volume production of the overall solution. The Driver Vision System integrates numerous cameras and sensors and can be used as a standalone Vision System or as an upgrade to existing DVS. It enables secure operation of the Defence Ground Vehicles under the hatch and can thus substitute standard angle mirrors. There are four different standard versions of the OEM's system available, all based on the same electronics, with different computing units for scalable performance and features. Thanks to the rugged design of the electronics and overall system, it withstands shock and vibration as well as harsh environmental conditions. The system passed all certifications according to MIL standards and have now started to be deployed in several international armed vehicles.

Design library for costum vision systems

The development of the electronics is based on the hema embedded vision platform, that has been especially designed for embedded vision electronics and applications such as surveillance solutions, situational awareness systems and other stationary or mobile image processing applications. It has been deployed for other military, defence and security applications before, with over 150,000 units already in the field, numerous of them implemented into latest generation battle-tanks.

The design platform is based on over 45 building blocks for interfaces and functionalities, from which the hardware can be freely configured. Developers therefore select the required interfaces from the hema design library. Standard interfaces such as Ethernet, USB, CAN and Wifi / Bluetooth are available, as are common video interfaces. The board format can be freely selected so that the electronics can be adapted to existing housings. On request, hema can also supply complete solutions including customer-specific housings.

In hardware design, there are corresponding templates for the circuit diagram and layout for each of the building blocks. The advantage for the customer: They receive their individual electronics within a very short time and at manageable development costs. In contrast to a completely new development, the electronics are based on tried and tested circuits, perfectly suitable for defence solutions. Customer-specific circuits or functions not yet available in the hema design library can be easily integrated. Longevity and long-term availability is ensured for all components of the system, with proactive lifecycle and obsolescence management and obsolescence management. These services, as well as development and onsite-production, are all provided directly from hema electronic in Aalen, Germany.

FPGA-based Modules for scalable performance

The computing power of the electronics is provided by System on Modules (SoM) with powerful ARM processors and FPGAs. All EMC-critical components around the processor are already integrated on the modules, which simplifies the development of the mainboard and in turn contributes to lower costs and shorter development times. The modules are available with different performance classes, processors and memory expansions. A standardized interface ensures compatibility and enables product variants, without the costly redevelopment of the entire electronics and thus perfect for mid-lifecycle upgrades.

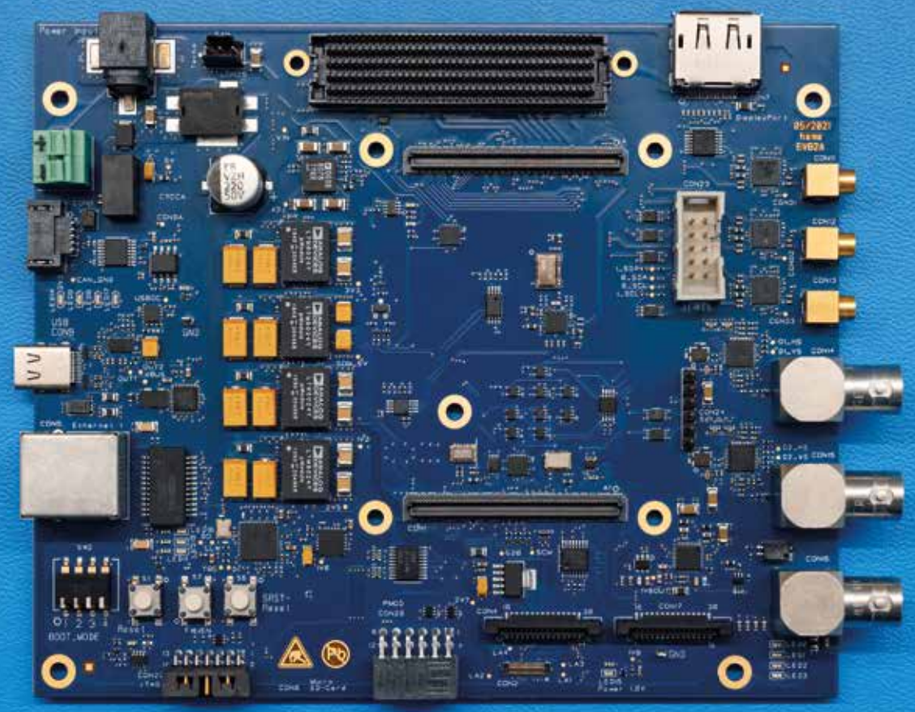
The FPGAs on the modules manage the video data: they process the data of the multiple inputs and distribute it to the outputs. All functions are implemented with extremely low latency times of 30ms – 40ms, depending on additional image processing tasks. The processors and FPGAs can also be used to combine video streams into dual and quad view or picture-in-picture data, or to play out graphic overlays via the video outputs. If required, the electronics can also supply finished video data, e.g. for 360° views, which can be stitched together and rectified, or for fusion of day- and night-vision camera data. For this image processing, the electronics include comprehensive software libraries and sample applications, that customers can use as a basis for their own application development.

Modular software design and extensive tools

The software for the FPGA electronics is programmed in parallel to the development of the hardware and is also based on modular building blocks, which are customized and individually adapted to the hardware. hema electronic provides code blocks for certain image processing functionalities such as split screen, picture-in-picture, scaling, mirroring, rotating and graphic overlays. This speeds up development and reduces the risk of programming errors. Code blocks for the latest AI chips such as the NVIDIA Jetson series, the Hailo Edge AI processors and the SimAI deep learning tools from Ansys are also integrated into the software library.

Fast implementation of versatile optronic systems

The modular software development process is fully integrated into the digital production workflow of the hema electronics platform. As a result, customers receive within weeks customized prototypes that allow to develop, implement and test their own applications quickly and easily. Thanks to tried-and-tested, industrial-grade circuits and components, hema's prototypes are already very close to the subsequent series hardware. Series optimization, certifications and the start of production can take place in just a few weeks. The hema embedded vision platform is thus the ideal basis for the fast and cost-efficient development of video processing units and other electronics for sensor data processing in numerous military and defence applications, as well as civil use-cases for surveillance and other embedded vision tasks.



Hardware-, Software- and FPGA-Development for high end customer specific vision applications and systems

Interfaces for:
- Analog video (PAL, NTSC)
- Digital video (HDMI, SDI, MIPI, Display Port, Camera Link, CoaxPress, ...)
- CMOS sensor technology with HDR imaging up to 170 dB dynamic range
- VIS, IR, Thermal camera

Applications and Services:
- Intelligent video management unit
- Image acquisition, processing and transmission
- Rugged designs for mobile applications
- Hardware and software testing
- Long-term availability by system design
- In-house prototype manufacturing
- Obsolescence management

Video Processing:
- Video multiplexing up to 4K
- Format scaling, color conversion, flipping, rotating, warping, lens correction
- Sensor data fusion
- Image fusion
- Realtime graphic overlay
- Split screen
- Digital video recording
- Video + audio multiplexer
- Video streaming h.264 and h.265
- Low latency video transmission/TSN

OBSOLESCENCE MANAGEMENT

30+ years of product availability:

Obsolescence management for the entire product life cycle

Ever faster technological developments are resulting in shorter innovation and life cycles for products and components. This does not stop at industry and is becoming a real challenge for sectors such as medical technology and the defense industry, where systems are expected to be available for 30 years or more. hema electronic has tailored its obsolescence management specifically to the requirements of such applications. It ranges from the design phase and product development to series qualification and extensive measures throughout the entire life cycle of a product. The result is long-term and reliable availability of assemblies and products. The risk of expensive and time-consuming emergency measures is reduced, meaning that obsolescence management also increases profitability. Each customer can individually define their specific needs and the structure of the service.

Reactive OM	**Proactive OM**	**Strategic OM**
Action after an end-of-life message has been received. (increased risk)	Action before an end-of-life message is received. (early warning, long scope for action)	Long-term strategy: Regular forecasting and cost analyses over the entire product life cycle; as early as the development phase. (anticipatory action)
Measures Identify in which assemblies the component is present and contact the customer with the following suggestions: • Last time buy • Long-term storage • Form Fit Function (an alternative for a component part) • Redesign	**Measures** • Availability check of all components incl. risk assessment of the components • Lifecycle analysis of parts lists as early as the development phase • Electronic monitoring of key components **+ Reactive OM**	**Measures** • Checking the current replenishment times • Second source strategy (multiple suppliers from the same manufacturer and/or alternative components from other manufacturers) • Inventory management (active monitoring of key components at the suppliers) **+ Reactive OM** **+ Proactive OM**

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