Taking the Right Turn with Safe and Modular Solutions for the Automotive Industry
The Austrian high-tech company TTTech Computertechnik AG is technology leader in robust networked safety controls. TTTech products are applied in various safety-relevant areas in the space and aerospace domains, energy production, railway systems, industrial process automation as well as automotive where highest reliability and safety of networked electronic systems is demanded.

The subsidiary TTTech Automotive GmbH provides solutions for the challenges of future vehicle generations. Those challenges include the increasing connectivity inside and outside of automobiles as well as the growing safety and robustness demands regarding electronics. This especially includes safety-relevant areas of vehicle dynamics as well as advanced driver assistance systems.

TTTech Automotive brings networking scalability and flexibility to customers and enables safe communication and networking – up to SIL 3/ASIL D – for systems with different safety requirements according to IEC 61508 and ISO 26262. The product range includes modular hardware and software solutions based on certified safety modules as well as effective system solutions for electric and other niche vehicles. TTTech Automotive also develops reliable testing devices for bus systems such as FlexRay, Deterministic Ethernet (TSN, TTEthernet), MOST and CAN.
Key Customer Projects

Customized Solutions for Audi, VW, Mercedes Benz, Volvo and Others

**Audi / VW**

TTTech and Audi have been collaborating closely since 2001. In the current generation of the Audi A8 TTTech introduced FlexRay for the optimization of the data communication. Additionally, development tools for FlexRay, CAN, LIN and MOST were provided. TTTech’s software has also been applied in the A7 and A6 as well as various VW models, such as the Golf.

**Volvo C30 Electric**

This entirely electrically powered vehicle is already being produced in its second generation. For both of them TTTech Automotive developed the electronic control unit for monitoring the electric inverter – a central element for the safety of the overall system of electric vehicles.

**Mercedes-Benz Vito E-CELL**

Available since 2012, the Mercedes-Benz Vito E-CELL uses a safety solution from TTTech Automotive for its electric drive (lithium ions transactions battery). Specifically a safety ECU (HY-TTC 94) is applied for controlling the torque vectoring.

**Audi zFAS**

As a platform control unit for various assistance functions, such as piloted parking or driving, the driver assistance system zFAS uses numerous technology components from TTTech. For example, the individual CPU cores are connected based on the reliable time-triggered Ethernet communication. Its unique design allows the combination of data traffic of different criticalities at simultaneously high data transfer.

**OVALO**

Within a development partnership with OVALO GmbH, a specialist for mechatronic propulsions, TTTech developed electronic control units according to ISO 26262 ASIL D in various application areas such as vehicle dynamic regulations and dynamic steering systems.

**e-AAM™**

TTTech Automotive developed a safety control unit for the control of the electric powertrain for e-AAM™ in Sweden, a subsidiary of American Axle & Manufacturing Holdings Inc. (AAM) specialized in electric engines. Aside from the control function the platform also houses the control software for the axle drive, including innovative torque vectoring.
General Purpose ECUs
Powerful and Robust Control Units

TTTech Automotive offers a range of general purpose electronic control units: from powerful high-end controllers to cost-effective ECUs. The portfolio also includes ECUs for safety-relevant applications, certified according to the DIRECTIVE 2006/42/EC. The electronic control units of this product family are IEC 61508 SIL 2 or SIL 3 certifiable, depending on the model. They fulfill requirements according to EN ISO 13849 PL d (Performance Level). For a number of these products certification according to ISO 26262 ASIL C is possible as well.

To guarantee utmost reliability only qualified components are used and all ECUs are tested under extremely harsh conditions. The electric circuits are protected by a compact aluminum die-cast housing.

All products fulfill automotive requirements regarding temperature, NVH and EMV and can be used in a broad range of applications.

Deterministic Ethernet

TTTech has developed an IEEE standards-based Automotive Ethernet IP solution. This solution is based on TTTech’s long-term real-time Ethernet experience in several vertical markets with high electronic robustness requirements, including aerospace, space and energy segments. TTTech’s automotive Ethernet solutions enable unified Ethernet networks and the convergence of critical and non-critical application data streams on one single network. The products cover today’s automotive network requirements for flashing, diagnostics, camera applications, infotainment and driver assistance systems (DAS). In addition, it shows its full potential for the next generation of automotive architectures such as Ethernet-based backbone domain architectures including fail operational network configurations.

www.tttech.com/automotive-ethernet/

General Purpose and Customized ECUs

HY-TTC 500   HY-TTC 200   HY-TTC 50 Familie   HY-TTC 30X Familie
Development and series supply of safety-relevant ECUs in the areas of electric propulsion, driving dynamics and driver assistance are part of TTTech Automotive’s core business. A revolutionary system of modular building blocks based on hardware and software modules offers the unique option to build qualified prototypes according to customer-specific requirement specifications within a short period of time. For manufacturing, as well as series production, TTTech Automotive has long-standing partners with deep knowledge of their respective industries.

Regarding hardware the building block consists of various CPU cores and monitoring modules, readily configurable as specific modules according to customer requirements. In-depth expertise regarding the calculation of safety metrics guarantees that even requirements according to ISO 26262 ASIL D are fulfilled reliably.

Thanks to strict partitioning a corresponding middleware allows the running of application software of different criticalities in parallel on the same CPU core, the networking of complex multi-core architectures and the parallel integration of different software levels up to co-simulation on the developer’s computer. The use of MICROSAR Safe or other AUTOSAR basic software guarantees compatibility with network requirements of all relevant OEMs.

The sole use of qualified building blocks and the close cooperation with production already at the beginning stage of the ECU development guarantee highest quality, cost-efficient production and lowest complaint quota in the field.

www.tttech.com/products/automotive/electronic-control-units/
TTTech Automotive has developed an advanced platform control unit for current and future driver assistance systems (ADAS). This allows, for the first time, the integration of all assistance systems of a vehicle and its functions on a single ECU.

With TTA Drive it is possible to run dozens of applications simultaneously. Depending on the topology, the platform ECU can be mounted with various multi-core high-speed processors. The fusion of all arriving sensor data is integrated as well.

The TTTech middleware TTIntegration ensures the abstraction of hardware towards applications and sophisticated participation. This way different ASIL safety levels can be allowed simultaneously. Additionally, there is a co-simulation on a standard PC.

The real-time capable Deterministic Ethernet backbone solution ensures data exchange between processors and communication to the simulation environment. The integrated Ethernet switch supports data traffic between functions with different safety and real-time requirements.

Aside from the usage as a domain control unit the ADAS concept is also interesting for vehicle development. TTA Drive is designed for the special requirements and allows fast integration and evaluation of new applications.

**Important Features**

- Highly scalable
- Extremely high processor capacities
- Safety levels up to ASIL D according to ISO 26262
- Processing of signals with different criticalities
- Safe and real-time capable Deterministic Ethernet
- PC co-simulation
- Future-proof for ADAS functionalities up to fully automated driving
- Notably less ECUs in one vehicle
- Simplification of the on-board power supply

“With our high performance ADAS platform we are already set today for all future driver assistance systems.”

Marc Lang, Director Business Development & Sales

More about TTA Drive [www.tttech.com/ADAS/](http://www.tttech.com/ADAS/)
The TTX DataLogger sets new standards for safeguarding of communication and troubleshooting in automobile networks. It enables the recording of data of all current bus systems (such as CAN, FlexRay, LIN, MOST25, MOST150 and Ethernet) that can be synchronized by a central time stamp. Additional internal ECU signals can be recorded via CCP/XCP and GNLog.

The TTX DataLogger has been developed together with leading OEMs who utilize the tool for data recording as well as fault analysis during function testing, fleet tests and acceptance runs. Logging periods may vary from a few hours to several days in a row. In addition, TTTech Automotive offers further customized products for testing and validation, especially for FlexRay networks.

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The TTX DataLogger sets the benchmark for recording and analysis of all vehicle bus data, for on-board recording as well as for the subsequent evaluation. I am pleased that this ambitious tool for quality assurance has been implemented successfully.

Ricky Hudi, Head of Electrical Engineering, AUDI AG

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TTX DataLogger Features
• Simultaneous, extensive recording of all networking data with one common time stamp (1 μs accuracy)
• Configurable power management
• Trigger, filter, pre-evaluation
• Open data format
• Integrated CCP/XCP master
• Freely programmable
• Recording of wake-up-frame
• On-air live data visualization (WiFi)

Testing Tools
www.tttech.com/products/automotive/testing-tools/
Taking the Right Turn with Safe and Modular Solutions from TTTech

Vienna, Austria – Headquarters
Phone: +43 1 585 65 38-5000
office@tttech-automotive.com

Germany
Phone: +49 841 88 56 47-0
office@tttech-automotive.com

USA
Phone: +1 978 933 7979
usa@tttech.com

Japan
Phone: + 81 52 485-5898
office@tttech.jp

China
Phone: +86 21 5015 2925-0
china@tttech.com

www.tttech.com/automotive