DRIVING EMBEDDED EXCELLENCE

Translated article "Erprobung auf hohem Niveau: ETAS ES830 erweitert Werkzeugkette für Rapid Control Prototyping," Elektronik automotive 2/3.2019

High-level checkout

ETAS ES830 expands toolchain for Rapid Control Prototyping

Rapid Control Prototyping (RCP) makes life easier for function developers. It allows them to develop even the most complex systems quickly and securely by providing a simple means of testing and comparing new functions. To implement RCP, ETAS has developed a robust, high-performance real-time target that enables simultaneous execution of computationally intensive bypass applications on up to four ECUs. Seamlessly integrated in the ETAS toolchain, it offers developers a wealth of new opportunities.

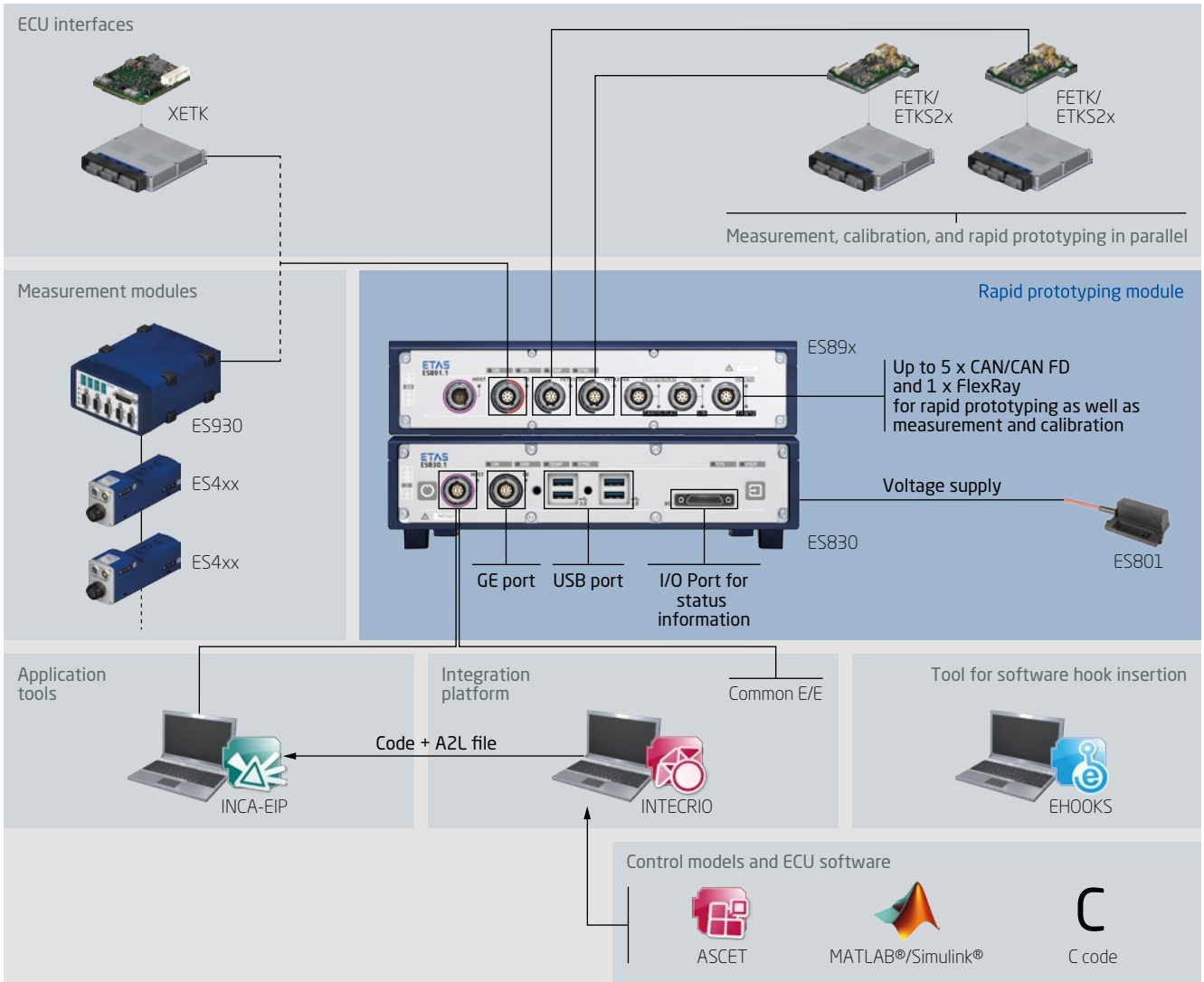
Engineers need flexible and versatile tools to develop software functions, especially in the light of recent developments such as increasingly connected E/E architectures with multi-controller applications, complex hybrid drives, and sophisticated control tasks in autonomous driving. As the complexity of their tasks increases, developers are unlikely to see proportional gains in budgets and timeframes, so better tools are essential.

One solution is rapid control prototyping. RCP lets developers test specific new functions and compare them in the vehicle or on the test bench. However, current RCP hardware products soon reach their limits when it comes to new software architectures and functions that involve more than one ECU. Yet this enhanced level of complexity is exactly where real-world testing and validation become even more important.

New fields of application

ETAS prototyping solutions introduce a reliable way of meeting these new requirements while significantly expanding the areas in which bypass experiments can be performed. Firstly, though, what do bypasses actually do? Essentially, they replace existing functions in an ECU, or add new ones. That allows developers to validate these functions in real time – either directly in the vehicle itself or in the lab – without having to modify the ECU software beforehand or run through the time-consuming process of consulting the ECU manufacturer. The new ES830 high-performance Rapid Prototyping Module puts developers in the driving seat, allowing them to carry out bypass experiments with two – and soon even four – ECUs at the same time.

Not only does the ES830 let developers test and validate



The centerpiece of the ETAS prototyping environment is the new ES830 simulation target

complex functions at an early stage of the process, it also allows them to replace real components with virtual hardware from simulation models. What's more, developers can choose to inject erroneous signals and readings whenever they like to test and validate how the system behaves when things go wrong.

Robust, reliable, and versatile

At the heart of the ETAS solution is the ES830 rapid prototyping target, which expands the successful ES800 series into a high-performance prototyping system. Up to five modules can be stacked on top of each other using a connector that provides both power and fast and secure module communication via Gigabit Ethernet and PCI Express. This robust stack configuration eliminates problems such as users plugging cables into the wrong ports or tests being aborted due to loose cables. The module stack is also protected against vibration and shock and is designed for use at temperatures between -40 °C and +70 °C. To ensure seamless integration in the automotive environment, the ES800 product family provides interfaces to all standard buses. The ES830 target itself comes with two Gigabit Ethernet ports, an I/O connector for querying status information in real-time operation, two USB 2.0 ports, and two USB 3.0 ports. Additionally ES800 interface modules are available to provide the required number of CAN (Controller Area Network), CAN FD, FlexRay, LIN, FETK/XETK, and Gigabit Ethernet interfaces. This modular set-up offers a level of flexibility that makes life considerably easier for researchers, pre-developers, and production developers. The ES800 range of products supports function prototyping at an early stage of the process as well as validation in the vehicle or on the test bench.

Embedded in the toolchain

As well as a flexible bus interface, this solution also offers seamless integration in established ETAS toolchains (see Figure). The ETAS INTECRIO integration and configuration platform can integrate function models from ETAS ASCET, MATLAB®/Simulink®, and C code, allowing engineers to validate and test open- and closed-loop control and diagnostic functions under extremely realistic conditions. The powerful ES830 module computes the bypass applications in real time and ensures a reliable exchange of data with the connected ECUs via either the FETK/XETK or XCP interface. ETAS also offers its ETAS EHOOKS tool to prepare ECUs and facilitate the integration of bypass hooks into ECU software. Finally, ETAS INCA can be used to validate the new open- and closed-loop control and diagnostic functions.

Conclusion

The robust, highly flexible, and high-performance RCP toolchain from ETAS provides exactly what developers need to verify and validate innovative ECU functions in future vehicle architectures. By opting for this solution, function developers will soon be able to integrate up to four bypasses in parallel. This will give them greater flexibility and more room for maneuver when it comes to developing complex electronic vehicle systems, including those designed for hybrids and autonomous driving.

Authors

Irene Pulido-Ames is ES830 Product Manager at ETAS GmbH.
Axel Zimmer is Solution Manager for Function Prototyping at ETAS GmbH.