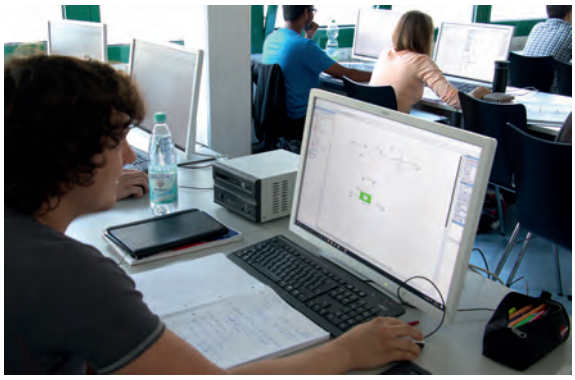
ASCET at the University Lab

Model-based software development at the University of Stuttgart

As part of a close cooperation between ETAS and the University of Stuttgart, ETAS resident engineers Andy Staats and Christoph Schlegel run a seminar titled "Model-based development of automotive software." This hands-on course allows students to learn about the software architectures and procedures used in programming ECUs. The course focuses in particular on model-based development of embedded automotive software – an approach that the automotive industry favors for software-development processes because it offers reusability, quality, and abstraction. Hands-on exercises in the computer lab constitute an essential part of the course, with an emphasis on methods used in developing ECU software. The students model ECU functions in ETAS ASCET before testing them with rapid prototyping systems such as the ETAS ES910 Prototyping and Interface Module. "Students benefit from completing lots of exercises in small groups at our ASCET lab. This means they can apply their recently acquired knowledge and skills to learn from any mistakes they make in the lab," says Andy Staats. He goes on to stress: "The main advantage for our students is that they become acquainted with the procedures, software, and hardware actually used in the industry." The collaboration shows: theory and practice are a profitable combination.



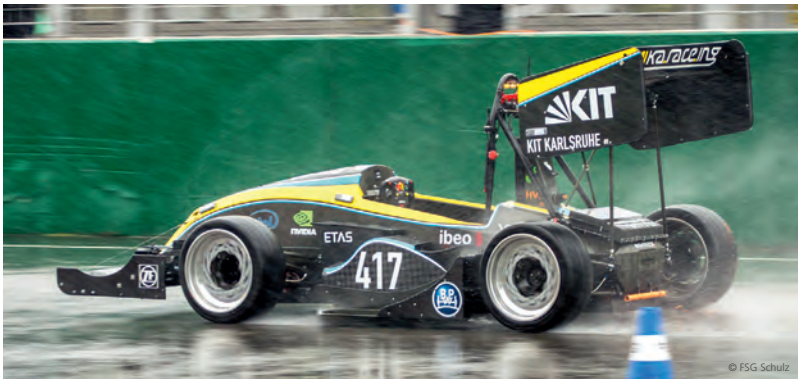
In the ASCET laboratory at the University of Stuttgart, students have the opportunity to gain hands-on experience with software development.

Students Develop Autonomous Race Cars

ETAS helps students gain hands-on experience with future technologies

Formula Student Germany is an opportunity for students to experience a real-world development scenario in the automotive industry. To succeed in the industry, expertise in combustion and electric engine technology is a must. And now in the era of autonomous driving, students need to develop a sound knowledge of this technology as well. For this reason, Formula Student launched Formula Student Driverless (FSD) this year, which focuses heavily on interdisciplinary collaboration. The competition addresses students from the fields of automotive technology and electrical engineering to work side by side with students specializing in computer science, data processing, and sensor technology to develop a race car that meets the requirements stipulated by FSD.

As a long-standing sponsor of Formula Student teams ETAS has also been supporting FSD since 2017. Throughout the year, and especially during the season, the teams benefit greatly from the entire ETAS product portfolio, and from technical support provided by ETAS experts, along with funding. As a result, students not only get to acquire technical expertise but also have the opportunity to gain experience with ETAS products before they enter the working world. This puts them in pole position – both on the track for FSD and in their future careers.



KA-RaceIng Driverless 2017 (Karlsruhe Institute of Technology).

Fascinating ETAS Measurement Technology

Apprentices build test vehicle for students

The ETAS Demo Car is the answer to the fundamental question that Bosch's occupational training department in Schwieberdingen posed to ETAS: How can we help students grasp measurement technology in a vivid, tangible way?

AUTHOR

Klaus Fronius is University Liaison Manager at **ETAS GmbH**.

The ETAS Demo Car turned heads at the 2017 embedded world.

The transformation of the standard plug-in hybrid into an eye-catching vehicle with a high-tech interior took just a few months. The redesigned interior incorporates a broad range of ETAS measurement hardware (ES4xx, ES5xx, ES6xx, ES9xx, and the new ES8xx series).

But what good is all this hardware without the corresponding software? Accordingly, ETAS INCA-TOUCH was integrated into the vehicle in the first phase. Not only can this software be operated via the built-in touch monitor, but the functions can be controlled in INCA using voice command.

What began as a practical training exercise for the technicians and apprentices turned neatly into second phase of the transformation – at trade shows and innovation events throughout Europe, the stylish ETAS Demo Car has attracted lots of attenion over the past few months. Whether in France, Belgium, Italy, or England, or at the 2017 embedded world in Nuremberg, the interest for the Demo Car was great. The converted vehicle makes it possible to experience measurement technology firsthand and vividly demonstrates that the era of tangled cables and laptops propped all over the car is coming to an end.

The foreign tour was really just an extended detour en route to the ETAS Demo Car's ultimate destination – in the future, prospective measurement and calibration engineers will learn their complex trade on the car using state-of-the-art ETAS tools. This is founded on the conviction that optimum training requires secure, modern workplaces. Vibrant collaborations with colleges and universities are, therefore, an integral part of the ETAS business strategy.

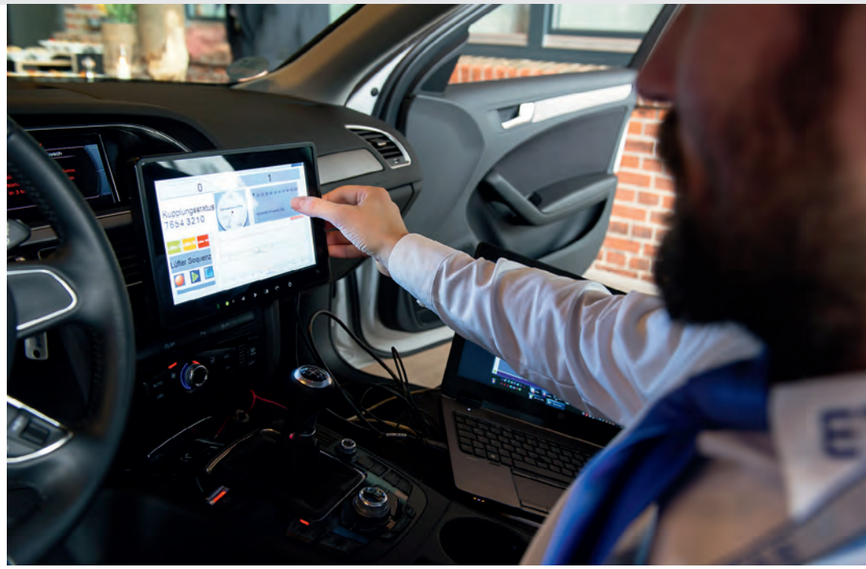
Measuring and Calibrating During Test Drives

ETAS INCA-TOUCH permits the safe and secure display and operation of INCA experiments

Due to the high risk to safety, more and more companies are banning the use of laptops on test drives. However, engineers still need to take measurements to validate and calibrate the behavior of individual vehicle functions. To this end, they can use the INCA-TOUCH interface to operate ETAS INCA via touchscreen or with voice commands.

Touch operation

Users can run the main INCA measurement and calibration functions via INCA-TOUCH. In order to display measurement values and to set characteristic values, the measurement and parameter variables of INCA experiments can be assigned to specific virtual instruments which are specially optimized for touchscreens. If a laptop is used as an INCA computer, the input window can be displayed on an additional touchscreen. When using a Windows tablet computer, the tablet display can be used directly for this purpose.



INCA-TOUCH can be operated using the built-in touch monitor (visible in picture above).

Key features

Secure, safe, and user-friendly:

- Operating functions: e.g., start/stop/pause, recording measurement data, start trigger, hardware initialization
- Measurement values shown in various virtual display instruments: e.g., oscilloscope, bar chart, table, bit view, curves and maps, tacho, and LED
- Onscreen content structured to facilitate switching between different sub-experiments using layers

Automation functions:

- Definition of individual calibration steps; execution by tapping a touch button
- Definition of calibration procedures with modifiable repetition intervals and corresponding dialog windows
- Switching between alternative experimental scenarios

Expansion of INCA functions:

- Voice-command operation for controlling experiments or calibrating variables
- Setting of markers during recording with the option of adding spoken commentary

Learning About Assistance Systems in Bavaria

ETAS supports the "A drive living lab" at Kempten University of Applied Sciences

By establishing the world's only master's degree course in driver assistance systems, Kempten University has pulled off a coup. Students from all over the world are lining up to get involved, as are OEMs and suppliers eager to tap into the research at the new "A drive living lab." In an interview, coordinator Prof. Stefan-Alexander Schneider explains what the lab is all about and which role ETAS and ETAS ISOLAR-EVE play in it.

INTERVIEWEE

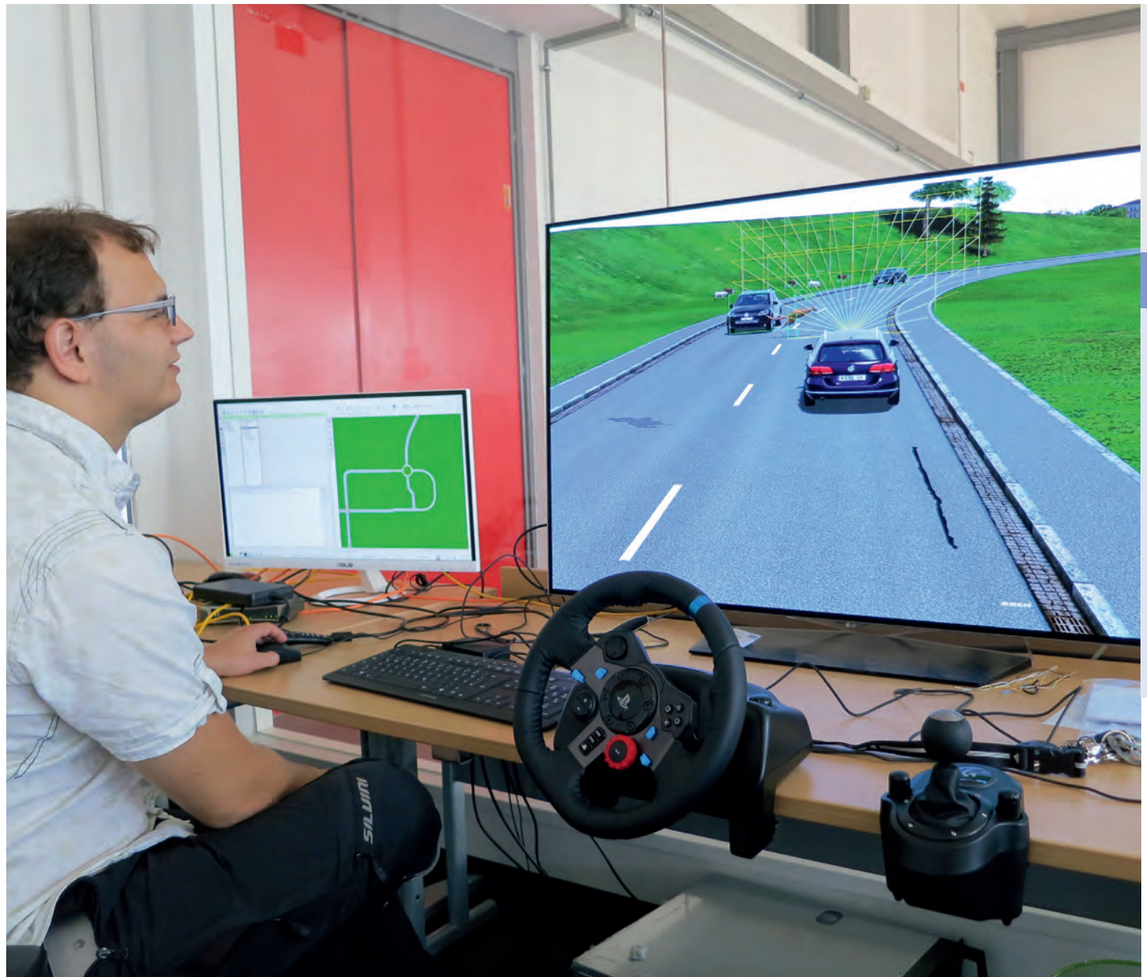
Prof. Dr. Stefan-Alexander Schneider is Head of the master's degree course in driver assistance systems at **University of Applied Sciences** in Kempten, Germany.

RealTimes: Allgäu, autonomous driving, and assistance systems – how do they go together?
Prof. Schneider: Here at Kempten University, we offer the world's only master's degree course in driver assistance systems, which draws on the experience of 15 professors from three faculties. The leading role is played by my Chair of Autonomous Driving and Assistance Systems, which Continental endowed for five years at the end of 2013. In the industry, there is a big demand for system engineers who know how to develop assistance systems. We have been training these engineers since 2014. University applicants from all over the world are knocking down our doors looking for a place. In order to maximize the practical utility of our training, we recently opened our "A drive living lab."

RealTimes: What is the lab for?
Prof. Schneider: Over an area of 500 m², we are recreating the entire value creation chain for assistance system development in order to teach our students the requisite processes, methods, and tools under pre-development conditions. Naturally, it is also about analyzing and optimizing development processes. Electrical engineering, mechanical engineering, and IT are involved, all working closely together and each contributing their specific expertise.

RealTimes: What does the "A" in "A drive living lab" stand for?
Prof. Schneider: Allgäu, assistance systems, and autonomous driving – just like you said at the beginning. But it could just as well have been called the "V Lab," as the design of our laboratory is based on the V-Model used in software and system development. Measuring 50 x 10 meters, the workshop is shaped like an elongated V: from the requirements analysis and the functional and system specification through to the various validation measures, all steps are lined up as stations. This means that, from the outset, the students learn and carry out research in an environment that resembles real industrial conditions – all in one place. ETAS helps here by providing us with professional tools, including ISOLAR-EVE for the generation of virtual ECUs, the Hardware-in-the-Loop system ETAS LABCAR, and the open source software BUSMASTER. In this way, our students familiarize themselves with the tool chains they will later use in their industrial careers.

RealTimes: What applications do you envision for the virtual ECUs?
Prof. Schneider: Well, one thing we want to do is to connect ECUs from different domains. For driver assistance systems, the interplay of powertrain and chassis ECUs with sensor systems for environment recognition and monitoring is important. A key factor is the co-simulation of camera, radar, or lidar systems with virtual ECUs, or in a virtual ECU network. It's about gaining a deeper understanding of the interaction of these systems, about real-time data communication in the vehicle, and ultimately also about the communication between vehicles and infrastructure. Virtualization is very helpful here. And naturally we also have to further advance our current development methods. The trend is to develop agile software that allows additional functions to be installed at a later date. However, for all the flexibility required, these functions still have to be properly validated and verified. These topics are of vital concern for the industry. This is reflected in the fact that several OEMs and Tier 1 and Tier 2 suppliers jumped on board with the "a drive living lab" immediately after it had been founded. In the next few months, the complete infrastructure will be in place. Then we'll be able to really get going.



Hochschule Kempten
University of Applied Sciences

ISOLAR-EVE for the virtualization of ADAS ECUs

The ISOLAR-EVE tool is particularly well-suited for the virtualization of ADAS ECUs, as it takes all components of the ECU architecture into account and is therefore able to simulate the behavior of the real ECU very realistically on the PC. The virtualization incorporates both the application software and the real basic software, including a complete AUTOSAR operating system. It also realistically models multi-core configurations and displays heterogeneous architectures consisting of microcontrollers and microprocessors. In this way, the tool provides optimum support for simulations of multiple connected ECUs and their communication.