Interview with Martin Sevenich
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„There is nothing in the field of ADAS that is inconceivable in the future“

Martin Sevenich of Continental already knows part of the future. During pre-development, vehicle functions are tested that won’t be ready for series production for several years. We sat down with Mr. Sevenich to talk about different applications, the technical implementation of studies with test participants in the fields of driver assistance and automated driving, as well as the significance of these tests for the future.

I’m responsible for the simulation of active safety systems in the department Advanced Technology of the division Chassis & Safety at Continental. We have set up a driving simulator to test and evaluate advanced driver assistance systems.

For those who are not familiar with driving simulators: How does this work?

Currently, we use a static version, which means that there is no movement at all in the simulator. We try to imitate reality, however. Most of the components in our driving simulator therefore correspond to those of a regular vehicle. For instance, the driver receives feedback on the driving situation via an active steering wheel as well as active accelerator and brake pedals. To enable drivers to feel as though they are in a realistic scene, we have set up a large 120-degree screen in order to create this illusion to a certain extent.

And do you believe that driving feels as realistic as in a real vehicle? Does a test drive primarily work on a visual level or are different senses involved?

The extent of realism becomes obvious, for instance, when test participants who change lanes in the simulation look over their shoulders. This shows us that immersion is able to approximate realism. All sensory channels are important for a test participant to experience a realistic sensation. Not only are a good image or good haptics of the steering wheel required but also the adjustment of the individual components, that is, the latencies are crucial. We have invested considerable energy into a good driving perception in order to continue increasing the realism of the driving experience. Compared to a dynamic simulator, a static simulator lacks the sensation of movement. As a result, not all of a driver’s senses are stimulated in a static simulator.

How did you implement the driving simulator on a technical level?

By means of projectors, we found a way to display a realistic image by merging three images into one visualization on a curved screen. The size of the projection is not necessarily crucial; it is the required seating distance. In order to achieve a realistic sensation of driving, the minimum distance to the screen should be 3.5 meters. Only then can it be acceptable for the test participant since the accommodation of the eye is comparable to a realistic driving situation. An estimation of distance is then possible based on the size of objects.

Is the original solution still in use?

Yes and no. It currently sits in my office, waiting to be deployed again. A possible test scenario would involve initial tests on cooperative driving with two drivers who directly interact with each other.

I assume that test participants need to be familiar with the system to be able to give a good assessment of the driving function.

On the contrary, to evaluate the assessment of new systems, studies with representative test participants (age, gender, etc.) without knowledge of the function are preferable. However, a basic orientation and a training run in the simulator are always completed beforehand.

In addition, we use the simulator for the objective assessment of functions. This differs from one project to the next and these tests are conducted by test engineers. When collaborating with a software developer, the test is focused on the debug function.

Do the tests with test participants run without any problems?

Usually, the tests with participants mostly run without a problem due to the robust setup. A small number of test participants (about 10 %), however, may suffer from the so-called simulator sickness (nausea).
Coupling the simulation software CarMaker with the driving simulator enables realistic test drives with test subjects in reproducible scenarios.

Speaking of simulators, which specific range of functions of the software do you use for this?

In particular, we use the sensor data, the driver, and of course the corresponding vehicle dynamics interface of the closed-loop vehicle dynamics simulation program. Additionally, we use the Test Manager and IPGMovie for the visualization. For tests of automated driving functions, the development of theScenario Editor was especially important for us – it would have been great to have it sooner but I’m glad it’s here now. [laughs]

With regard to automated driving, do you think that a driver model might become obsolete?

Especially for handover scenarios between automation and driver, driver models are of particular interest. Maybe it is important for these precise cases. A driver model is necessary to compare how an ideal driver would drive in comparison to an artificial driver.

What big challenges do you see in terms of test drives for automated driving?

In the case of a feasibility study from a prototype up to a customer project, we’re talking about four to five years. In my opinion, it is impossible for anyone to anticipate a period longer than five years; those are strategies and visions. However, in terms of advanced driver assistance systems, I’d say that there is nothing in this field that is inconceivable in the future.

Much has happened in the development of advanced driver assistance systems in recent years, and the software used must keep up. Which specific features do you consider to be particularly important and which potential do you still see?

New challenges definitely lie ahead for us. It will be exciting to include the entire complexity of natural surrounding traffic into the simulation. Covering only one scenario with three vehicles in all variations is a complex task. One specific issue is this, for instance: What does an emergency braking maneuver of a fully automated vehicle look like? Those are future applications. For now, we must invest considerable energy into finding how such test scenarios can be generalized and simplified.

What challenges do you see in terms of test drives for automated driving?

Essentially, everything has become much more complex. Previously, you had one control unit with one function. Nowadays, there is a large number of control units with different functions that interact with each other as well. For the evaluation of the systems, different, highly detailed and more complex test technology is also required. Due to this, not all tests of automated driving functions can be conducted in vehicle tests any longer.

The challenges arising from this cannot be fully estimated yet. There will be changes to the evaluation methodology toward simulation and possibly sooner than we expect.

Thank you very much for the interview, Mr. Severinich, and good luck with your work.