ZF's New Interaction Concept Paves the Way for Autonomous Driving

- **ZF's "Concept 2020" can relieve stress and build confidence in the face of increasing automation levels**
- **360-degree overview combined with central and intuitive setting options for all assistance functions**
- **In combination with latest safety systems enables haptic feedback**

Friedrichshafen/Las Vegas. At CES this year, ZF is presenting a new interaction concept which can help to relieve driver stress and prevent accidents. Drivers often find it difficult to activate, set and monitor the multitude of assistance functions in today's vehicles. ZF's new "Concept 2020", addresses this challenge by showing the status of all assistance systems in one overview. Furthermore, with this concept, ZF's latest integrated safety systems can prompt the driver to act when necessary. A scientific study determined that "Concept 2020" can also boost confidence in automated systems.

Those who frequently rent vehicles often face a common problem, namely that the sheer amount of functions and settings relating to assistance systems in modern passenger cars are generally not designed to be understood intuitively. Comfort and safety functions tend to work separately , and control elements and indicators are located in different places, such as the warning signal on the exterior rear-view mirror, the switches on the indicator lever, icons in the cockpit or the LED display on the central console.

Simplified control

With the support of the fka Forschungsgesellschaft Kraftfahrtwesen mbH (a research company for automotive engineering) in Aachen, ZF has developed "Concept 2020", a vehicle cockpit with simplified controls. Here, the team is working on providing an overview of all assistance and control functions in terms of their operation and

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displays. The driver has a bird's eye view of their vehicle on the Head Up Display Instrument Cluster (HUDIC), a centrally-installed monitor. A 360-degree view informs the driver why and to what extent the assistance system is intervening.

Uwe Class, project manager for "Concept 2020" at ZF, commented: "Airplane pilots have had image displays such as artificial horizons for almost 100 years and still use them today. This helps them to capture a huge amount of information efficiently, and this technology will also be used to help car drivers in the future. The steering wheel, for instance, is designed without a lower and upper rim, so that it looks more like an airplane yoke."

Active, virtual vehicle auras

The main feature of the display is its ability to visualize safety-related functions for all assistance systems. It shows an oval with up to three grey lines around the vehicle – ZF calls this an "Active Vehicle Aura" (AVA). The number of lines represents the level of sensitivity of the control system and can be set from the steering wheel. Three lines mean that the system will intervene quickly and with a more gentle reaction. One line means that intervention will occur later and be more forceful. Uwe Class said: "By regulating the sensitivity, we can ensure that all of the assistance systems in a vehicle follow the same philosophy."

For example, if the driver initiates a maneuver into a neighboring lane while another vehicle is diagonally behind them in the blind spot, the lines in the AVA change shape and color. The assistance system then can react instantly, triggering the individual wheel brake control and preventing the maneuver from taking place. Various applications such as a Blind Spot Assist, Adaptive Cruise Control or Lane Keeping Assist can be detected and controlled centrally. "Concept 2020" is designed for semi-automated driving at Level 2 - meaning that the driver's hands should always stay on the wheel. This system is also designed for future applications as it can also be used for higher levels of

autonomous driving. Today it can help to build confidence in current automated functions.

Seat belt assistance

A combination seat belt system consisting of an Active Buckle Lifter (ABL) and a pretensioner, the Active Control Retractor (ACR), has also been integrated into the "Concept 2020". ZF's ACR8 has also been integrated with electronic assistance systems so that some seat belt slack can be removed if a collision appears to be unavoidable. It also offers a further feature for automated driving - the belt generates high-frequency, vigorous pulsations to help alert the driver in the event that action is required.

Study confirms acceptance of "Concept 2020"

A scientific study that was carried out on a simulator during the development of "Concept 2020" has confirmed the basic approach of the concept and produced positive results. Test subjects were able to understand the functions intuitively without explanation needed. Furthermore, in comparison to assistance systems with a conventional layout (which were also used during the study), the test subjects felt safest with the maximum level of AVA sensitivity. The congruence between the display screen and the actual events taking place in the vehicle's surroundings played a crucial role in the trust that the subject had in the automated driving functions.

The conclusion was that "Concept 2020" can contribute to making driving simpler and safer. It also helps to build confidence in automated systems which is an essential factor on the road to autonomous driving.

Captions:

1.) Other road users, buildings and street signs are shown on the display and are positioned to represent how the driver would see them in real life. Important traffic information, such as the

current speed limit or the remaining time that a stop light will stay red, completes the presentation.

2.) The display zooms in or out from the view of the vehicle in the traffic flow when necessary, e.g. during navigation for selection of a route or when parking, to show the distance from an obstacle. All of the information that the driver needs is shown in the central display.

Images: ZF

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ZF allows vehicles to see, think and act. With its technologies, the company is striving for Vision Zero – a world of mobility without accidents and emissions. With its broad portfolio, ZF is advancing mobility and services in the automobile, truck and industrial technology sectors.

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