ZF Develops Advanced Steering Wheel Concept for Automated and HMI Solutions

- New concept features advanced gesture control and hands on detection to support Level 3 automation and higher driver interaction
- Drivers receive feedback through graphic displays and dynamic illumination
- Features capacitive touch for horn operation and a driver airbag concept allowing deployment around the screen interface

Friedrichshafen. ZF has today unveiled a new steering wheel concept aimed at supporting Level 3 and above autonomous driving functionality. The system incorporates gesture control via graphic displays to enhance communication between driver and vehicle, and advanced hands-on detection technology.

According to Juergen Krebs, vice president of engineering for steering wheel systems and driver airbags, “As ZF pursues its goal of “Vision Zero”, a critical enabler will be vehicle and driver interface. As new automated functions become more commonplace, advanced technologies employed in the steering wheel are important and can help improve driver safety and awareness of the current vehicle control mode.”

ZF’s new concept is designed to utilize gesture control to trigger various vehicle functions as chosen by the vehicle manufacturer. It works intuitively through gestures commonly used on phones or other smart devices. For example, a single tap on the cover could activate the horn, and a double tap or tap and swipe at the rim can activate indicated functions associated with that portion of the wheel rim such as changing the climate control. These gestures are supported and confirmed by the center display and accompanying graphic and light displays.
The wheel uses multiple interfaces to indicate the vehicle control mode. A seven-inch LCD display in the center of the steering wheel rim indicates if the driver or the car is in control. Additionally, an LED light strip is integrated into the steering wheel rim with blue lights indicating autonomous mode, white lights for manual driving mode and red lights for driver warning. Other uses for the light strip include yellow lights indicating left or right-hand turn signals – and glowing or flashing lights to indicate various scenarios chosen by the vehicle manufacturer.

The system also features a wide range of functions cleverly integrated into the wheel including 10 capacitive sensors in the outside rim detecting where the driver is gripping the wheel, and one additional on the inside of the rim detecting if an advisable grip is being employed. This enables accurate hands on/off detection – helping to make clear whether the driver or the vehicle is in control. This will be critical for Level 3 and above autonomous operation.

The wheel’s unique configuration presented new challenges as the driver side airbag could not be located in its traditional area due to the centrally located LCD screen. ZF engineers designed a new airbag concept which can deploy from the back side of the wheel through the rim and covers the display, thus helping to protect the driver in case of a crash.

“ZF’s advanced steering wheel concept represents an important step in the evolution of automated driving while helping to enhance safety and driver awareness,” Krebs emphasizes. “As we prepare for Level 3 automated functions the hand-over of control between vehicle and driver using highly accurate feedback will be critical. We believe our new concept is the most intuitive and provides the clearest feedback to the driver.”

Press contact
Thomas Wenzel, Director External Communications ZF,
Telephone: +49 (0)7541 77-2543, e-mail: thomas.wenzel@zf.com
John Wilkerson, Technology and Product Communications,  
phone: +1 734 582-1312, email: john.wilkerson@zf.com

ZF Friedrichshafen AG
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safety technology. The company has a global workforce of around 137,000 with  
approximately 230 locations in some 40 countries. In 2016, ZF achieved sales of  
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