PRESS RELEASE

Just in time for the summer holidays: ZF researches to counteract motion sickness

- **Prevention and reaction: in cooperation with neuro-technologists, ZF works toward pre-empting and counteracting motion sickness**
- **Artificial intelligence applies driving dynamics and the physiological markers of motion sickness to develop driving features that can help prevent**

Friedrichshafen, Germany. Summer not only brings the hottest time of year but also the start of the vacation season. For families with young children, this often means long road trips. However, these car journeys can be synonymous with dizziness, headaches, and nausea. Children are especially prone to motion sickness. ZF is working together with neuro-technologists from Germany's Saarland region to investigate how to detect motion sickness at an early stage. This may aid in developing smart driving features to detect symptoms early. Thereby, ZF focuses on the comfort of occupants as a decisive factor for next generation mobility.

On long car journeys, few people are immune from motion sickness when seated in the back or in the front passenger seat. About a third of passengers suffer a sense of dizziness and motion sickness which makes any attempt to enjoy the ride, or to work while on the road, difficult or near to impossible. At the start of the summer holiday season, this becomes painfully obvious to families with small children. To help solve this problem, ZF is looking beyond a purely vehicle-based approach: "We are among the very first companies in this sector to place the occupants and their individual driving experience center stage", states Florian Dauth, responsible for activities in the field of Human Centered Vehicle Motion Control in ZF's Advanced Technology Development. "Our goal is to identify individual instances of motion sickness and to devise measures that relate to the prevailing condition of the passenger."

ZF Friedrichshafen AG
Global Corporate &
Marketing Communications
88038 Friedrichshafen
Deutschland · Germany
press.zf.com

The scientific basis for this concept is derived from test candidate studies that were conducted jointly by the Systems Neuroscience & Neurotechnology Unit (SNNU) at the Saarland University and htw saar. In these studies, the physiological reactions of test candidates were examined in a variety of driving situations. “Our pioneering research incorporates the fields of neuro-technology, psycho-physiology, artificial intelligence and driving dynamics”, said Prof. Dr. Dr. Daniel J. Strauss, Director of the SNNU. “The respective skill sets of the partners complement one another perfectly in the context of this collaborative project. The scientific results obtained to date have been very well received by the international specialist community.”

Scientific data provides an insight into physiological processes

Motion sickness is caused by a discrepancy in perception: The balance organ in the inner ear senses a movement that is not confirmed by other sense organs such as the eyes. This is most likely to happen when a passenger is concentrating on a screen or a book. In this situation, the human body responds with a reaction that is in many ways similar to the response to poisoning. The symptoms range from a slight sense of unease to acute motion sickness.

In several studies, the researchers at ZF and SNNU analyzed the physiological markers that show the highest correlation with the subjective perception of motion sickness by individuals. They also examined how this correlates to the driving dynamics of a vehicle. Physiological indicators are among other changes in the body such as temperature and galvanic skin response. “Our Motion Sickness Research Vehicle enables us, with the help of a high performance computing platform, to record the large number of physiological and camera data, and measurements relating to driving dynamics. At the same time, the vehicle serves as a platform for the development and validation of algorithms”, explains Dauth.

Over more than ten thousand kilometers, the team of researchers gathered more than fifty thousand gigabytes of physiological markers in the central and autonomous nervous system in the form of

thermographics, imagery, and driving dynamic data. In this sector, this is a unique and multi-modal data resource on the subject of motion sickness. “It helps us to apply a scientific procedure to the task of gaining an understanding of the phenomenon of motion sickness, and is at the same time a basis for depicting AI-based algorithms”, states Dauth as he explains the development process.

People as the focal point

The research currently employs a set of sensors inside the vehicle along wearables for non-invasive measurement. “The challenge is to develop an automotive-compatible system that, over a number of evolutionary steps, enables motion sickness to be detected without physical contact. We view this as crucial information to gain a firm grasp of the very individual phenomenon that is known as motion sickness”, states Dauth. With this, the driver – or at some future point, the control system running an automated vehicle – can identify at an early stage if, by way of example, a child on the back seat is starting to feel ill and can adapt driving characteristics accordingly.

The vehicle learns a preventive driving style

Everyone reacts differently to vehicle movements, and possesses an individual sense of ride comfort. At ZF, this fact is depicted in an algorithm based on Artificial Intelligence methods that acquire knowledge of the physical reactions of each passenger, enabling a personalized profile to be created. As a consequence of this, individual data is obtained for every passenger in a vehicle, meaning that automated vehicles would actually be able to store the preferred driving style of each passenger.

Caption

Human centered development: ZF and neuro-technologists from Germany’s Saarland region use artificial intelligence to develop driving styles that can help to prevent motion sickness.

Image: ZF

ZF Friedrichshafen AG
Global Corporate &
Marketing Communications
88038 Friedrichshafen
Deutschland · Germany
press.zf.com

Press contact:
Jennifer Kallweit, Technology and Product Communications,
phone: +49 7541 77-969441, e-mail: jennifer.kallweit@zf.com

Robert Buchmeier, Head of Technology and
Product Communications, Heritage Communications,
phone: +49 7541 77-2488, e-mail: robert.buchmeier@zf.com

#MobilityLifeBalance
For most of us, mobility originally meant personal, self-determined freedom. More recently, due to congestion, emissions, accidents, and a lack of availability, it can now be an ever more present cause of stress. It is becoming more and more challenging to determine the best solution for each individual among the range of mobility solutions currently available. ZF is highlighting this challenge with its **#MobilityLifeBalance** campaign and featuring its range of solutions that contribute to a better and more sustainable mobility offering. The objective is to enable clean, safe mobility that is automated, comfortable, and affordable. For virtually everyone, everywhere.

Find out more about the topic through the **#MobilityLifeBalance** hashtag in social media, or online at http://www.mobilitylifebalance.com.

ZF Friedrichshafen AG
ZF is a global technology company and supplies systems for passenger cars, commercial vehicles and industrial technology, enabling the next generation of mobility. With its comprehensive technology portfolio, the company offers integrated solutions for established vehicle manufacturers, mobility providers and start-up companies in the fields of transportation and mobility. ZF continually enhances its systems in the areas of digital connectivity and automation in order to allow vehicles to see, think and act.

In 2018, ZF achieved sales of €36.9 billion. The company has a global workforce of 149,000 with approximately 230 locations in 40 countries. ZF invests over six percent of its sales in research and development annually.

For further press information and photos please visit: www.zf.com