Future Occupant Safety for Crashes in Cars

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The upcoming, interconnected generation of Highly Automated Vehicles (HAVs) has much to offer: New sitting postures through reclining and even rotating seats promise to convert HAVs into a place of relaxation and comfort. New seat positions though implicate challenges for the occupant safety and therefore call for new concepts of improved safety systems, such as "intelligent" seat belts and airbags. For the safety assessment of these new systems, the traditional crash test dummy also needs help from more biofidelic Human Body Models (HBMs).

Figure 1: OSCCAR's strong international consortium, coordinated by VIRTUAL VEHICLE

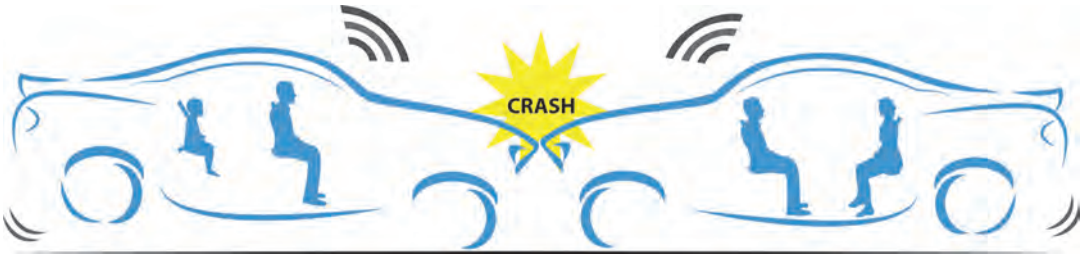

Figure 2: Future accident scearios will be characterised by mixed traffic between automated and traditional vehicles. Automated vehicle will additionally allow more relaxing and comfort sitting positions.

Leading European OEMs like Daimler, Toyota Motors Europe, VolvoCars and Volkswagen and Tier1 suppliers Autoliv, Bosch and ZF join forces with the European and International research community in the EU H2020 project OSCCAR. Its goal is to pave the way for future safe and comfortable vehicle development using virtual development and assessment methods - making EU "Vision Zero" come a step closer!

OSCCAR, coordinated by VIRTUAL VEHICLE, unites more than 20 international partners and runs for 3 years since June 2018. The experts develop a novel simulation-based approach to safeguard occupants involved in future vehicle accidents. Future accident scenarios, new advanced occupant protection and the improvement of diverse, omnidirectional, biofidelic and robust Human Body Models (HBMs) are the cornerstones of the project. Its ambition is to pave the way for future virtual testing-based homologation, especially needed for the complexity of HAV capabilities.

Researching on advanced occupant protection

In order to provide a safe and comfortable vehicle interior for HAVs, new seat configurations need to be equipped with appropriate safety systems to maintain optimal passive safety for all occupants. OSCCAR will therefor develop and demonstrate advanced occupant protection principles. These need to be assessed with improved HBMs, considering gender and demographic factors as well as enhanced biofidelity. Furthermore, fully integrated assessment methods for complex test scenarios of the complete crash phase will be devised and applied.
OSCCAR will also contribute to the harmonization of HBMs and injury criteria as well as the improvement and development of virtual testing standards. Eventually OSCCAR will develop a clear roadmap towards large scale implementation of virtual testing methods for advanced safety solutions, not only relevant in the automotive domain but also for two-wheelers, vulnerable road users (VRUs), or even in sports.

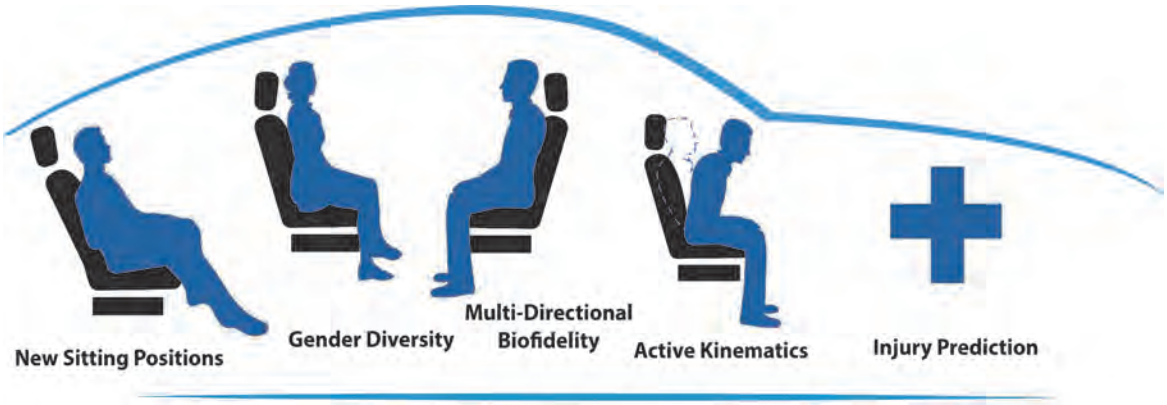

Figure 3: Advanced Human Body Models will allow to address specific safety requirements of the diverse occupant population

Figure 4: Future virtual homologation procedures require harmonization of virtual testing and fully integrated safety assessment of complex accident scenarios

In a first step OSCCAR project analyses the limits of current occupant vehicle safety systems for HAVs. Deficits will be identified, and appropriate improvements of current systems will be suggested. For this application it is especially necessary to provide virtual tools and harmonized methods for the development and assessment of those advanced automated vehicle safety systems.

Current hardware-based testing methods and tools will no longer neither be sufficient to handle the high complexity of future accident scenarios, nor will it be possible to conduct the necessary number of tests in reality. Thus, improved virtual testing methods are necessary.

For where conventional physical crash test dummies cannot reliably be used, harmonized, enhanced HBMs suitable for complex testing will be developed. These models usually depict internal organs, bones and individual muscles and are able to represent the heterogeneity of the population also taking into consideration characteristics like gender, age and other demographic factors. Some even have an active and reactive muscle functionality for assessing the pre-crash phase. All that at feasible cost and hugely increased capability compared to crash test dummies, for a dedicated increase in safety for the individual.

An integrated toolchain will be developed that allows a continuous assessment and novel interior concepts in future accident scenarios using advanced HBM evaluation tools. This enables the development of advanced and adaptable protection for the diverse occupant population.

The OSCCAR project foresees to achieve advancements in the following important areas:

1. OSCCAR will provide simulation tools including advanced HBMs for the development and assessment of advanced automated vehicle safety systems

2. OSCCAR will lay the foundation for future harmonized virtual testing of advanced protection systems and the homologation of future sitting positions in the context of automatic driving

3. OSCCAR will generate an in-depth knowledge about future accident scenarios incl. a publicly available database

4. OSCCAR will develop advanced protection principles for new - automated vehicle enabled - innovative seating concepts

Due to its excellent partner consortium and collaboration with key players from industry and research from Europe, North America and Asia, OSCCAR is in the position to ensure global application of its results and achievements. ■

More Information:
www.osccarproject.eu

The OSCCAR project and consortium partners has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768947.