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# An Adaptive Motorcycle driving Simulator to Enhance Motorcycle Ergonomics

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## Abstract:

The dynamics of single-track vehicles and the special features of the eminently important human-machine interaction pose challenges for the development of motorcycles. Understanding this interaction is the basic requirement for advancements in the field of motorcycle ergonomics and safety. Some of these are motorcycle-specific and do not apply for double-track vehicles. These include, for example, the greater range of movement of the rider and the influence on the center of gravity through different driving postures. Other ergonomic challenges are the wide range of geometries and characteristics of different motorcycle concepts such as super-sport, cruiser and touring motorcycles.

To improve the ergonomic design also the long-term behavior during riding should be considered. For example, changes of the rider's posture over time or due to interaction with the motorcycle are important ergonomic factors which influence safety. Therefore, dynamic driving simulators are optimal suited, due to their potential for evaluating driver performance and human-machine interaction. Based on the significant contact points of the rider-motorcycle system a new motorcycle simulator concept with 14 degrees of freedom was developed. This mock-up will be incorporated into an existing simulator which is described by Werle and Diermeyer (2022) and can recreate a variety of motorcycle ergonomics within a single simulator.

In my workshop presentation I would like to introduce the new concept and discuss its development. Based on this, I will derive possible applications and further adaptations of the mock-up. Furthermore, I would like to discuss the essential factors to validate an ergonomic motorcycle simulator and its advantages and limitations.

## References

Werle, A., & Diermeyer, F. (2022). *An approach for steering advancement in motorcycle riding simulation*. In AHFE International.

## Contributions

As first author, Dorothea Wildner defined the approach and mainly developed the presented workshop. Frank Diermeyer made an essential contribution to the conception of the research project. He revised the paper critically for important intellectual content. Frank Diermeyer gave final approval of the version to be published and agrees to all aspects of the work. As a guarantor, he accepts responsibility for the overall integrity of the paper.