
Experiences with Training and Study Design Mechanisms Utilizing the DLR Bike Simulator

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Abstract:

In the workshop, we plan to present our bicycle simulator which is part of the MoSAIC VRU-Lab. The dynamic simulator consists of a moving platform, actuators for variable steering and pedaling resistance. The virtual environment can be presented via HMD or via monitor. Three studies were conducted with the simulator. Two of them were consecutive validation studies that served to determine initial assessments and validations. Based on the results of the first study, the functions of the simulator were revised and re-evaluated in the second study, e.g. steering force calculation, lean angle algorithms, headwind simulation and speed measurement. A third study was conducted to answer research questions on the development of an external HMI system for autonomous vehicles. For the first time, the simulator was used as a tool to improve a system to avoid critical situations in road traffic. We would like to share and discuss the experiences gained in these studies in the workshop, especially regarding simulator sickness and training routines. Furthermore, we plan to give an outlook on our unresolved questions, e.g. the difficulties with the simulator's movement system in terms of realism and simulator sickness. In particular, we want to focus on the aspect of whether a simulator should mainly resemble realistic physics or rather should create a feeling as realistic as possible.



Figure 1: The DLR Bike Simulator