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Acoustic measures to increase immersion in static driving simulators

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Abstract:

Static driving simulators are essential tools for conducting driving research in controlled environments. However, the lack of motion feedback can limit the realism of the simulated experience and, consequently, the validity of research findings. This study investigates the potential of acoustic measures to enhance driver immersion in static simulators. By integrating haptic and auditory cues, such as engine vibrations and realistic sounds, the research aims to improve drivers' perception of speed, driving status, and overall environmental awareness. A modal exciter and vibration transducer were installed to simulate vibrations through the seat and steering wheel, while a high-fidelity 5.1 surround sound system was implemented to provide a comprehensive auditory experience. Preliminary results indicate that the integration of these acoustic enhancements significantly improves driver immersion and perception compared to standard simulator setups. Drivers reported feeling more connected to the simulated environment, suggesting that acoustic feedback can play a crucial role in enhancing the realism and effectiveness of static driving simulators for research and training purposes. Further research is planned to fully assess the impact of these acoustic improvements on specific driver behaviors and simulator performance.

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