

## Safety Tolerance Zone for Driver-Vehicle-Environment Interactions under Challenging Conditions

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**Abstract :** Road safety is a worldwide issue with numerous and heterogeneous factors influencing it. On the side, driver state – comprising distraction/inattention, fatigue, drowsiness, extreme emotions, and socio-cultural factors highly affect road safety. On the other side, the vehicle state has an important role in mitigating (or not) the road risk. Finally, the road environment is still one of the main determinants of road safety, defining driving task complexity. At the same time, thanks to technological development, a lot of detailed data is easily available, creating opportunities for the detection of driver state, vehicle characteristics and road conditions and, consequently, for the design of ad hoc interventions aimed at improving driver performance, increase awareness and mitigate road risks. This is the challenge faced by the i-DREAMS project. i-DREAMS, which stands for a smart Driver and Road Environment Assessment and Monitoring System, is a 3-year project funded by the European Union's Horizon 2020 research and innovation program. It aims to set up a platform to define, develop, test and validate a 'Safety Tolerance Zone' to prevent drivers from getting too close to the boundaries of unsafe operation by mitigating risks in real-time and after the trip. After the definition and development of the Safety Tolerance Zone concept and the concretization of the same in an Advanced driver-assistance system (ADAS) platform, the system was tested firstly for 2 months in a driving simulator environment in 5 different countries. After that, naturalistic driving studies started for a 10-month period (comprising a 1-month pilot study, 3-month baseline study and 6 months study implementing interventions). Currently, the project team has approved a common evaluation approach, and it is developing the assessment of the usage and outcomes of the i-DREAMS system, which is turning positive insights. The i-DREAMS consortium consists of 13 partners, 7 engineering universities and research groups, 4 industry partners and 2 partners (European Transport Safety Council - ETSC - and POLIS cities and regions for transport innovation) closely linked to transport safety stakeholders, covering 8 different countries altogether.

**Keywords :** advanced driver assistant systems, driving simulator, safety tolerance zone, traffic safety

**Conference Title :** ICTTE 2023 : International Conference on Traffic and Transportation Engineering

**Conference Location :** Houston, United States

**Conference Dates :** October 23-24, 2023