The 1st International Conference on Cognitive Aircraft Systems – ICCAS

March 18-19, 2020

https://events.isae-supaero.fr/event/2

Scientific Committee

- Mickaël Causse, ISAE-SUPAERO
- Caroline Chanel, ISAE-SUPAERO
- Jean-Charles Chaudemar, ISAE-SUPAERO
- Stéphane Durand, Dassault Aviation
- Bruno Patin, Dassault Aviation
- Nicolas Devaux, Dassault Aviation
- Jean-Louis Gueneau, Dassault Aviation
- Claudine Mélan, Université Toulouse Jean-Jaurès
- Jean-Paul Imbert, ENAC

Permanent link : https://doi.org/10.34849/cfsb-t270

Driver stress detection : identification of the physiological parameters depending on stress exposure

Ms KERAUTRET, Laora (University of Lyon - Valeo), Dr NAVARRO, Jordan (University of Lyon); Dr DABIC, Stephanie (Valeo)

Content

Driving is a complex activity taking place in a dynamic environment integrating risks and fatal situations. Many stressors (e.g, complexity of the situation, imminent danger, short or long exposure) may lead to stress states (e.g, anxiety, distress, fatigue). Stress states represent also a threat for drivers as they may affect emotions and cognitive abilities. It results in inappropriate driving behaviors, sometimes dangerous for the safety of the driver. This is precisely the close link between driver stress and substantial risk of accidents that has pushed the players of road safety and the automotive company to highlight the problem of driver stress. The challenge consists to improve the detection, evaluation, and understanding of the driver stress to design new technologies informing the driver of his stress condition or offering stress-reducing solutions adapted to the driving situation.

In this context, the current study has been led to improve the detection, evaluation and understanding of the driver stress. A stress induction has been conducted in driving simulator where stress measures and evaluations were performed. The stress induction was carried out by different driving scenarios integrating various levels of stressful situations (i.e, quiet driving in a country, driving with traffic in a city, and driving with traffic and loss of control in highway) and one-off stressful events (e.g, animal or pedestrian crossing the road, car driving in the opposite direction). The stress response resulting from stressful situations and one-off stressful events were measured by sensors of cardiac and respiratory activities. Although the physiological sensors were the same between stressful situations and one-off stressful events, different physiological parameters were calculated for each one. The objective was to find physiological parameters adapted to the type of exposure to the stressors, whether long-term and permanent (such as stressful situations) or short-term and one-off (such as one-off stressful events), in order to detect as many stress states as possible. Finally, to go further in the understanding of driver stress, self-reports were completed to bring a different level of stress response understanding, more subjective than physiological measures, but not less informative. In addition, self-reports were used to highlight potential individual factors influencing the stress response.

The main results will be reported on the poster and could constitute useful information to design stress detection technologies in driving and in flight.

Keywords : Mental workload, Acute stress, Emotion, Fatigue