Psychophysiology on the road towards enhanced traffic safety

DriveLab – a new system for measuring driver behavior and physiology

Andrew Spink[1], Tobias Heffelaar[1], Lucas Noldus[1], Lisanne Teekens[1,2] & Matthijs Noordzij[2]

[1]Noldus Information Technology
[2]Cognitive Psychology & Ergonomics, University of Twente

Abstract

DriveLab is a solution which integrates a number of different techniques that can be used to measure the behavior and mental states of people in either a driving simulator or in an actual car. The system is designed to both integrate and synchronize data about the driver from a number of different sources including eye tracking, facially-expressed emotions (FaceReader), car/simulator data, annotated video and physiological data. Calculations can be carried out on the data (for example steering reversal rate as a measure of performance). All the data streams are brought together in one overview.

One component of the system is integrated physiological data measured using data acquisition hardware and electrodes, for example for skin conductivity, heart rate and heart rate variability. Although that setup gives very high accuracy, some participants regard the electrode placement as intrusive and the subjects' mobility is restricted. In this context we investigated the validity of wrist-worn wearables for measuring heart rate data to determine its suitability for this purpose. Our conclusion was that none of the devices currently on the market are yet of good enough quality but that the developments look promising and we expect that in the short term new devices will offer significant improvements. However factors such as access to raw data from many subjects simultaneously will remain an issue, so it is necessary to create a new software platform to make physiological data from wearables suitable for research purposes, including measuring driver behavior.