

HUMAN STRESS DURING DRIVING: CORRELATION WITH ROAD TRAFFIC EXTERNALITIES

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ABSTRACT

The evaluation of vehicle occupants (VO) stress level is a research topic with recent and increasing interest as researchers pursue to understand its correlation with other road traffic-related externalities (RTE), i.e., pollutants and noise emissions, road safety and traffic congestion, and ultimately design a framework able to optimize road networks while considering road stress.

Road singularities (e.g., roundabouts, traffic signal lights, and junctions) and even different road types (e.g., urban, rural, highways) may introduce distinct impacts on vehicle occupants (VO), i.e., regarding their emotional state and stress level. VO heart rate variability (HRV) presents a correlation with human stress and is usually applied to infer stress levels.

It has been demonstrated the connection between driving styles and pollutants emissions as well as the likelihood of road crash occurrence, which in turn are associated with traffic congestion.

The doctoral research main objective is to provide a framework to develop empirical multi-objective optimization and/or analysis of RTE considering stress based on vehicle and engine activity empirical data acquired through real-world driving or simulation.

The main contributions from this research will be: 1) the study of the correlation of human stress with pollutant and noise emissions, road safety and traffic congestion through an integrated approach; 2) deliver an indicator, in the form of an equivalent monetary cost, accounting for human stress, pollutants and noise emissions, road safety and traffic congestion; 3) provide a method to assess human stress during driving without using any physiological equipment or data. These contributions will allow future road infrastructures and networks, and vehicle technology to be planned considering their human stress-related performance and consequently improve VO quality of life.

KEYWORDS: Road stress; traffic externalities; multi-objective optimization

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