SAFETY AND EMISSIONS ALGORITHMS FOR THE INTERACTION BETWEEN MOTOR VEHICLES AND VULNERABLE ROAD USERS

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ABSTRACT
Road traffic has been responsible for high levels of pollutant emissions, several injuries and deaths. Many studies have been focused on safety or emissions issues, but an integrated approach considering safety-emission hotspots is rather rare, particularly, with respect to impacts involving Vulnerable Road Users (VRU), such as pedestrians and cyclists. The recent advancements in technology and in vehicle automated functions will reshape the road traffic environment, and soon, there will be a transition phase where Conventional Vehicles (CVs) and Connected and Autonomous Vehicles (CAVs) will coexist and share the road infrastructure. Therefore, this Ph.D. research seeks to develop an integrated approach focused on advanced algorithms to reduce driving behavior volatility through safety and emissions warnings in an urban environment focusing on the transition phase. Real data will be used to evaluate driving volatility and pollutant emissions. Safety and emissions will be combined through an integrated methodology under a statistics-optimization-data mining framework. The expected contributions of this Ph.D. research will be: 1) a thorough and microscopic characterization of individual driver decision mechanisms focused on safety and emissions hotspots in urban areas, with a major concern on VRU exposure; 2) a tool of driver warning and control assistance mechanism to be applied in both CVs and CAVs.

KEYWORDS: Driving volatility; Safety Warnings; Emissions Hotspots; Vulnerable Road Users; Markov Decision Process.

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