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A Virtual Set-Up to Evaluate Augmented Reality Effect on Simulated Driving

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Abstract : Augmented reality promises being present in future driving, with its immersive technology let to show directions and maps to identify important places indicating with graphic elements when the car driver requires the information. On the other side, driving is considered a multitasking activity and, for some people, a complex activity where different situations commonly occur that require the immediate attention of the car driver to make decisions that contribute to avoid accidents; therefore, the main aim of the project is the instrumentation of a platform with biometric sensors that allows evaluating the performance in driving vehicles with the influence of augmented reality devices to detect the level of attention in drivers, since it is important to know the effect that it produces. In this study, the physiological sensors EPOC X (EEG), ECG06 PRO and EMG Myoware are joined in the driving test platform with a Logitech G29 steering wheel and the simulation software City Car Driving in which the level of traffic can be controlled, as well as the number of pedestrians that exist within the simulation obtaining a driver interaction in real mode and through a MSP430 microcontroller achieves the acquisition of data for storage. The sensors bring a continuous analog signal in time that needs signal conditioning, at this point, a signal amplifier is incorporated due to the acquired signals having a sensitive range of 1.25 mm/mV, also filtering that consists in eliminating the frequency bands of the signal in order to be interpretative and without noise to convert it from an analog signal into a digital signal to analyze the physiological signals of the drivers, these values are stored in a database. Based on this compilation, we work on the extraction of signal features and implement K-NN (k-nearest neighbor) classification methods and decision trees (unsupervised learning) that enable the study of data for the identification of patterns and determine by classification methods different effects of augmented reality on drivers. The expected results of this project include are a test platform instrumented with biometric sensors for data acquisition during driving and a database with the required variables to determine the effect caused by augmented reality on people in simulated driving.

Keywords : augmented reality, driving, physiological signals, test platform
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