

An innovative system anticipates driver fatigue in the vehicle to prevent accidents

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Harken IBV

The Instituto de Biomecánica de Valencia (Biomechanics Institute - IBV) has worked on the development of a device integrated in smart

materials capable of monitoring cardiac and respiratory rhythms in order to prevent drivers from falling asleep, in the framework of the European project HARKEN.

This nonintrusive sensor system measures heartbeat and respiratory rate embedded into the seat cover and the safety belt of the car. According to the IBV Director of Innovation in Automobile Markets and Mass Transportation, José Solaz, "the variation in heart and respiratory rate are good indicators of the state of the driver as they are related to fatigue. So when people go into a state of fatigue or drowsiness, modifications appear in their breathing and heart rate; HARKEN can monitor those variables and therefore warn the driver before the symptoms appear."

Up to now, no system was capable of measuring those vital constants in a car in a non-invasive way.

The Harken device, developed by companies, universities and technology centres of the consortium, "is an innovative solution because it measures both variables on a scenario affected by vibrations and user movements, by means of intelligent materials embedded into the seat cover and the seat belt. The system detects the mechanical effect of the heart beat and the respiratory activity, filtering and cancelling the noise caused by the moving vehicle elements (vibrations and body movements), calculating the relevant parameters that will be integrated into future fatigue or somnolence detectors," explains José Solaz.

The outcome of this project is a fully functional prototype that allows anticipating the symptoms of fatigue associated with cardiac and respiratory rhythms, and monitors this physiological activity, with the aim of reducing the number of accidents.

The system is based on three main components: the seat sensor, the seat belt sensor and the signal-processing unit (SPU), which processes the

sensor data in real time. Besides, thanks to its integration possibilities, they are invisible to the user.



Harken infography

Closed track tests

José Solaz explained that "the device has been tested by users in closed track tests, in order to prove its effectiveness under real-life conditions."

Thanks to its short time-to-market scope, Project Harken will shortly

allow to have vehicles in the streets in order to run tests in real traffic scenarios. Preliminary tests "have led to positive and reliable results, thus, Harken will help in the near future to reduce accidents," added Solaz.

A serious road safety problem

Road accidents and casualties caused by fatigue are an important societal and economical problem for the EU. In 2008 there were 1.2 million [road accidents](#) in the EU, which resulted in 1.5 million casualties and 38,000 fatalities. This kind of accident will be the third most common cause of death and disability worldwide, by 2020.

According to the figures of the eSafety Forum, the proportion of fatigue-related crashes is about 8.3% of all vehicle crashes. This implies nearly 100,000 crashes and about 125,000 injured people in the EU every year. But that proportion rises when fatal accidents are considered: driver fatigue accounts for 20-35% of serious accidents. The projection of these figures means that there may be over 7,000 annual fatalities due to fatigue-related accidents in the EU.

The measures to avoid fatigue may be directed to drivers, enterprises, infrastructures, and vehicles. Advertising campaigns, infrastructure improvements, law enforcement, and in-vehicle systems that alert fatigued drivers, are some of the measures that have been developed during the past years.

Fatigue in-vehicle detectors may reduce such a problem and may save thousands of lives per year, as well as many millions of Euros in health costs. "Therefore component suppliers in the automobile industry are working together in order to solve the fatigue detection problem, although they couldn't measure the useful physiological driver's information, which is a crucial factor to evaluate them. This is why this

research is so important," explains José Solaz.

Provided by Asociacion RUVID

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