System detects driver's symptoms of fatigue and prevents traffic accidents

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The new system helps prevent possible traffic accidents. Credit: University of Granada

Researchers from the University of Granada (UGR) and the Polytechnic University of Valencia (UPV) have designed a new low-cost system that detects the drivers' symptoms of fatigue and distraction and helps

prevent possible traffic accidents.

The system consists of four sensors that monitor different physical parameters of the driver and their position at the wheel. From these values, the system is able to generate a series of acoustic signals if it detects some risk, thus alerting the driver and avoiding a possible accident.

As the researchers explain, fatigue has a wide range of symptoms: blurred vision and increased blink rate; anxiety and changes in the driver's behavior; increase in the number of movements needed to be comfortable on the seat; and, more importantly, an increase in the driver's reaction time to a certain dangerous situation on the road.

"For this reason, it is important to have some system capable of detecting those symptoms to help increase the driver's safety. Now, most of the current solutions focus on eye movement and face detection, and our system goes further," says Jaime Lloret, researcher at the Polytechnic University of Valencia.

The system devised by the researchers consists of an electronic board that acts as a central processing unit, two pressure sensors and another two that measure the driver's temperature, all of them located on the steering wheel, and by duplicate for monitoring both hands; a light sensor on the headrest that would detect possible snoozes when driving; and the buzzer that generates the acoustic alarm in case of detecting fatigue or distraction.

All of this is complete with a collision sensor that detects collisions or sudden braking and a button to reset the system located on the steering wheel. "After triggering an alarm, the driver has to disable it by pressing the button," says Sandra Sendra, researcher from the University of Granada.

The sensors are connected to the central electronic board, which receives data from the sensors every second, and it processes and analyzes them by an algorithm, to check if the collected values remain within the thresholds considered normal or safe. When any of these sensors exceeds said threshold values, the algorithm tries to define if it is a false alarm or if the sensors have registered a possible fatigue or distraction situation. In an affirmative case, the acoustic signal that alerts the driver is activated.

Additionally, all data are stored on a micro-SD card for a possible post-processing task, in case of accidents or future studies.

The system was presented at the 1st EAI International Conference on Future Intelligent Vehicular Technologies, held last September in Portugal. The work was also awarded as the best paper of the conference.

Looking ahead, the researchers plan to incorporate a small GPS receiver to collect the position of the vehicle and a wireless module that allows to connect the system with the drivers' smartphones, so that, as a last resort, the system is able to make an emergency call.

More information: Low-Cost Vehicle Driver Assistance System for Fatigue and Distraction Detection. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, (2017), Vol.185, Pp. 69-79. DOI: 10.1007/978-3-319-51207-5_7

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