SMART HELMET AND GARMENT TO HELP SAVE MOTORCYCLE RIDERS IN THE EVENT OF A CRASH

Motorcycles are the only transport mode for which accidents have been on the rise over the past 10 years. While e-call systems have already cut response time, real-time vital signs monitoring could be used to prepare for an appropriate emergency response. The EU-funded I-VITAL project has created such a system that can be seamlessly integrated into helmets and garments.

The I-VITAL (Smart Vital Signs and Accident Monitoring System for Motorcyclists Embedded in Helmets and Garments for eCall Adaptive Emergency Assistance and Health Analysis Monitoring) system is made of two main parts or, as we call them, kits, along with a smartphone application,” says project coordinator Rafael Maestre Ferriz, Director of the Electronics Department at CETEM, Spain. “It is the I-VITAL system for the helmet, whereas Kit II is the I-VITAL system for the garment.”

Both kits can be used independently or in combination. They share similar sensors for vital signs monitoring and accident detection, a circuitry for data acquisition and processing, as well as Bluetooth low energy (BLE) technology to provide a wireless connection to the user’s smartphone.

The smartphone runs a dedicated application. It gathers information from the kits about the health status of the user and detects crash events. When an accident occurs, the smartphone app automatically triggers an eCall. The user can communicate his situation without any need for further action. But more importantly, the system automatically sends out the basic required accident-related information along with additional health information which is I-VITAL-specific,” Maestre explains.

Even though they share the same technology, all elements have been customised for their specific kit — bearing in mind physical constraints and limitations. Information collected includes ‘Heart rate monitoring’ (HRM) and ‘Heart rate variability’ (HRV), temperature and humidity. On top of that, the garment can sense respiration rates, while the helmet includes electronics for consciousness detection in the case of an accident.

As all these sensors need continuous energy supply, the consortium chose to move away from standard battery technology and to develop energy-harvesting capabilities specific to each kit. The helmet includes a wind power generator, while the garment integrates solar cells.

A technical breakthrough

Unlike car accidents, which have benefited from a long history of R&D and safety measures, motorcycle crashes are very unpredictable. “In many accidents, there is no consistent correlation between the damage done to the motorcycle and the injuries of the rider: in some instances, the rider even separates from the bike and the detection of an impact on the motorbike has nothing to do with what happens to the rider,” Maestre says.

These facts contrast with the specs of state-of-the-art eCall systems. The latter usually rely on sensors placed on the motorbike only, whereas another system called Schuberth RiderEcall combines this mode of detection with another one placed in the helmet.

‘The problem is that a severe impact to the body of the rider may not be
New funding, new opportunities

The project may have been completed in October, but the consortium still has many plans in the pipeline. ‘We are looking for new funding sources to take I-VITAL from prototypes to real final products,’ says Maestre. ‘European projects are one of the first options that we will explore, but the most desirable one would be to get a big name in the industry to support this effort.’

He also points out that there remains work to be done and that the technology still has room for improvement. ‘For example, some additional processing can be done over the vital signs, in order to find secondary parameters that can be used to determine the level of stress and attention of the driver. These algorithms are proprietary and cannot be yet disclosed.’

‘We also identified smarter ways of doing things while achieving even more benefits. However, this will imply more efforts and investment, and we have to admit that some extra work has to be done before reaching the market. Fortunately, most of the project partners believe it is worth the effort.’

Two of the project partners, helmet and garment manufacturers NZI and Lookwell, have been exploring the different exploitation routes and commercialisation alternatives. ‘They have already approached major manufacturers and brands, but this is something that has yet to become a reality and cannot be disclosed at this time. All in all it will all depend on the funds available and the interest of potential customers, but a realistic date for commercialisation could be around early 2018,’ Maestre concludes.

I-VITAL
* Coordinated by CETEM in Spain.
* Funded under FP7-SME.
* [http://cordis.europa.eu/project/rcn/109489](http://cordis.europa.eu/project/rcn/109489)
* Project website: [http://www.i-vital.eu](http://www.i-vital.eu)