A life-saving black box for cars

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A car that can automatically alert emergency services in the event of an accident, giving its precise location and the health status of occupants would save thousands of lives each year. Thanks to the work of AIDER such a vehicle is a step closer to becoming reality.

Developed over three years by 10 partners under the European Commission's IST programme, the AIDER system has been completely tested in the field and, from the car maker's perspective, contributes towards meeting the requirements for introducing enhanced an in-vehicle emergency call service (eCall), according to AIDER coordinator Silvia Zangherati at the FIAT Research Centre (CRF).

The system developed and validated by the project is one of the most comprehensive created to date. "Essentially it is a black box for cars, which not only records different parameters inside and outside the vehicle but also automatically alerts emergency services in the event of an accident, providing information about the severity of the crash, the number of occupants and their health status," Zangherati says.

By using mechanical and biomedical sensors as well as cameras to monitor the on-board pre- and post-crash environment and transmit the information wirelessly to a control centre, the system dramatically accelerates and enhances the response of emergency services.

"During trials we found that the system reduces the response time of emergency services by approximately 30 per cent and also increases the effectiveness of their response," the coordinator notes.

Location information obtained via GPS satellite tracking allows call centre operators to pinpoint the exact location of the vehicle, while biomedical data allows them to determine the severity of occupants' injuries, helping them decide whether to send a helicopter or an ambulance, and what equipment might be needed. Information about the number of occupants and video footage of their locations inside or outside the vehicle assists paramedics in locating patients who need priority attention.

"The system provides emergency services with all the information they need to respond as effectively as possible, compared to the current situation in which an occupant or a passerby has to make an emergency call and may not be able to give the precise location of the accident or determine the injuries the people involved have sustained," Zangherati says.

At the heart of the AIDER platform is the impact-resistant black box containing a processing unit, flash memory and a mobile communications system that incorporates GPS tracking. Data is obtained from an exterior front-mounted camera, a 360º degree camera inside the vehicle, mechanical sensors on the front, sides and back to register impact, and biomedical sensors connected to the occupants. "The biomedical sensors could be something the driver or passengers put on when they get into the car or they could be incorporated into a permanently wearable device such as a wristwatch," Zangherati says.

The data is processed and cyclically stored in the flash memory. If an accident is detected a signal containing all the necessary information and low-resolution video footage is automatically sent via GPRS to a control centre. Operators can also remotely obtain additional information such as higher resolution video images of the exact moment that the accident occurred. A back-up communications system using the COSPAS-SARSAT international search and rescue satellite network can also be

employed if GPRS fails, with the project partners having developed an integrated antenna for the black box that is able to transmit and receive over the different communications technologies.

By alerting emergency services immediately after an accident occurs, crash victims will have a better chance of receiving medical attention within the "golden hour," the hour after a serious injury in which effective treatment can be crucial to patients' survival.

With more than 1.3 million traffic accidents causing 1.7 million injuries and 40,000 deaths each year in Western Europe, enhancing the response of emergency services would save thousands of lives and would in turn reduce the social and economic impact of road deaths.

In addition, Zangherati notes that the system could be used to reconstruct accidents, helping the police determine who or what was to blame. "Besides the social benefits, there are also commercial ones. Insurance companies, for example, are very interested in seeing systems such as this incorporated into vehicles," she says.

Source: IST Results

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