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Artificial Intelligence as a Catalyst for Next-Generation Emergency Call Systems

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Timely emergency response is crucial after serious crashes. Traditional protocols depend on individuals contacting emergency services, which can be delayed by victim incapacity, remote locations, poor wireless coverage, or incomplete information .

Key objectives include:

- Identifying serious injuries (such as head trauma or thoracic impact)
- Minimizing both over-triage and under-triage by emergency medical services
- Enhancing survival rates through the prioritization of critical cases

Modern vehicles feature advanced technology, and connectivity is opening new opportunities for better post-crash care. Our event focuses on crash notification and telematics. NHTSA's Office of Emergency Medical Services and National 911 Program are working to enhance how telematics alerts 911 and first responders after crashes. Besides accelerating response times, some systems can predict injury severity and help EMS decide if trauma center transport is needed or if prehospital blood should be sent to the crash site.

Advanced emergency call systems currently transmit basic vehicle data during accidents. To enhance passenger safety, new features focus on improved data collection aligned with NENA2 and NG-AACN standards, considering in-vehicle architecture and communication protocols. The goal is to provide precise information about occupants and surroundings for better rescue operations. AI integration boosts efficiency and effectiveness, optimizing eCall systems through rapid data analysis and prioritizing calls by severity. AI enhances design and operational capabilities, enabling automated data processing and swift emergency assessment. Predictive analytics foresee potential emergencies, supporting proactive measures and strategic resource allocation for high-risk scenarios.

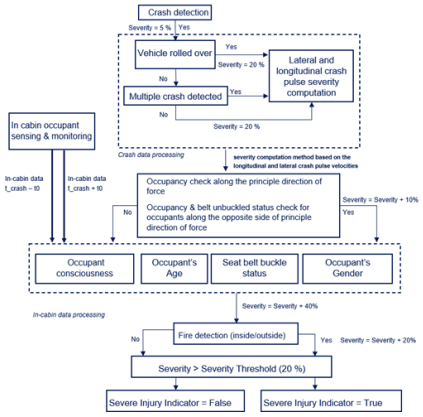

Fig.1 Overview of the proposed solution

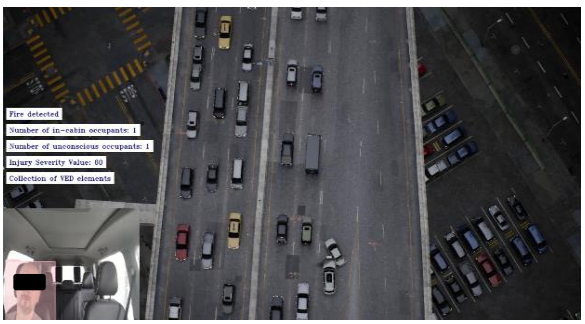

Fig.2 Overview of the proposed solution

Our approach emphasises the necessity of a comprehensive evaluation following an accident or collision. This involves systematically assessing the condition of each vehicle occupant—including details such as the number of individuals, injury severity, exact location, age, sex, weight, extraction feasibility, and any present hazards. Concurrently, it is imperative to collect thorough information regarding the external environment, including road obstructions, debris, potential hazards like fire or flammable materials, and specifics of other vehicles involved (notably electric vehicles). Such meticulous data collection is crucial for optimising rescue efforts and delivering valuable information to emergency responders. The proposed solution integrates multi-source occupancy estimation with a multifactor injury severity model to yield a detailed AI-based assessment of in-vehicle risk. By synthesising environmental sensing, incabin sensors, wearable devices, vehicle dynamics, and occupant-related metrics, this approach establishes a robust framework suitable for advanced safety applications and scalable deployment (see figure 1).