Smart Road Restraint Systems (Smart RRS): Integrating Sensing Technology into Crash Barriers

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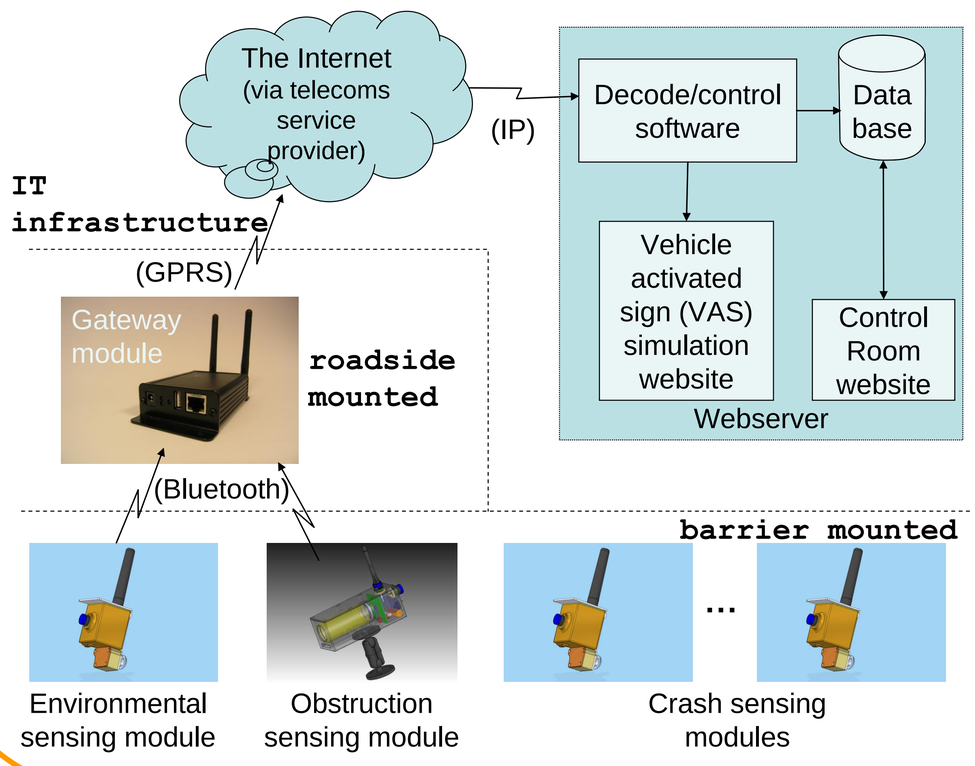
Introduction

- Project motivated by a perception within the EU of the particular hazard presented to vulnerable road users by crash barriers.
- Crash barrier collisions are a factor in 8-16 per cent of all powered two-wheeler deaths
- The Smart RRS project sought to improve barrier safety by
  - –Making the barrier more collision-friendly (mechanical energy absorption elements) – *Secondary safety*.
  - –Detecting roadway hazards from the barrier and warning oncoming drivers – *Primary safety.*
  - –Detecting vehicle collisions with the barrier and alerting the the emergency services – *Tertiary safety.*
- This paper focuses on the primary and tertiary safety aspects of the project



The system

- Environmental sensing module: inferring simple road condition hazards (wet, icy roads).
- Obstruction sensing module: inferring the presence of a stationary obstruction.
- Crash sensing module: detecting barrier collisions.
- Gateway module: Laird Technologies RF gateway – connecting the local Bluetooth network and the GPRS link to the back office/webserver.
- Webserver: Receiving roadside data and using it to drive two websites – one simulating control room data screens, the other simulating roadside vehicle activated signage.

Key requirements

- The system should be able to communicate the sensed events to other road users, to some form of remote control centre and (in the case of the tertiary system) to the emergency services.
- The communicated data should be traceable to specific location and time.
- The system be capable of being integrated into a crash barrier without increasing its potential to cause harm or degrading the performance of the barrier.
- The system should make minimal demands for additional infrastructure, for either power or communications.

Results

- The primary system was tested at a UK road junction. End to end functionality was verified against meteorological data and traffic camera data.
- The tertiary system was successfully tested under controlled crash conditions ranging from motorcylist dummies to a 13 tonne coach.