

## ICT Results ... Results that lead the way

### Features

#### Transforming buses into mobile sensing platforms

Modern buses could be used as mobile sensing platforms, sending out live information that can be used to control traffic and detect road hazards, according to European researchers.

The research could help improve road safety, allowing traffic controllers, police and other services to access up-to-date information from any number of public buses already on the streets.

In a test, the researchers equipped city buses with environmental sensors and cameras, allowing the vehicles to become transmitters of measurements, warnings and live or recorded videos to anyone allowed to access the data.



#### How's the weather?

Researchers with the MORYNE project perfected a raft of technologies for mobile sensing, data acquisition, analyses and telecommunications that could be placed in public buses as a part of a larger effort to improve road safety and traffic management.

In tests, they embedded humidity and temperature sensors on buses. One pair of sensors checks the road surface while the other pair analyses the air. The sensors were selected and designed to resist to pollution. They were also designed to quickly acclimatise to the environment, as buses may have to go through tunnels, tiny dark roads, bridges and city parks over the course of a few minutes.

The data gathered by the sensors is processed on the bus, using a small but very powerful computer. The computer can then warn the bus driver if for example foggy or icy conditions are imminent.

The computer can also send alerts to a public transport control centre via a variety of wireless connections, including mobile radio systems, wifi or wimax networks, and UMTS (3G). The control centre can in turn warn nearby buses of dangerous conditions through the same wireless channels.

The system can also be set up to warn city traffic-monitoring centres of road conditions, making these mobile environmental sensors another way to collect information on top of an existing network.

#### Bus lane violators, beware!

Another innovation stemming from the project is the bus-mounted road-cam, a powerful video acquisition and processing device that can detect traffic conditions around a bus. They system can be used to spot unauthorised cars in a bus lane and inform the police.

The same video system can also be used to count the number of vehicles in adjoining lanes and measure their speed, helping to alert a city traffic-monitoring centre of road conditions on the

ground, in real time.

"Most large cities, where this type of system would be deployed, already have very extensive camera systems, inductive loops and environmental sensors networks in place to analyse traffic and weather," explains Patrice Simon, the project's co-ordinator. "But city traffic monitoring authorities involved in the project have told us they consider the information provided by buses as a useful supplement."

### The road ahead

The project's achievements are not just about the services and sensing units the researchers have incorporated into the system, but could also be realised in potential future applications of the technology.

"Our project worked on a large number of allied technologies, and perfected them to the point where they could be economically incorporated into bus design, but that is just the beginning of what these systems could do," explains Simon.

For example, MORYNE's work on video capture, transmission in real-time and simultaneous recording could help improve security for bus drivers and passengers.

"The devices are quite small but very powerful, and we could develop software that could analyse images to detect if a fight breaks out on the bus, for example, and automatically alert the police" Simon notes.

Work on that particular technology remains to be done, but the EU-funded MORYNE project has demonstrated that it is feasible.

"All the public transport authorities we spoke to over the project showed a great and increasing interest for on-board security applications, but it was beyond the scope of the project," says Simon. "Still, we have made significant progress in realising this type of system, and the image and sound analysis software to detect aggression is the only major element currently missing."

Simon notes that partners will apply for funding to perfect the on-bus security applications, the sensors and the telecommunication network that bus services are clamouring for, in the autumn call for the next round of EU research funding, known as FP7.

Moryne received funding from the EU's Sixth Framework Programme for research.

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