A cooperative road towards automatic driving

Innovative driver support systems can enhance traffic safety and make driving more convenient by alerting drivers to dangers on the roads, through both visual and audible signals. Such systems will soon start appearing in new car models.

These novel warning systems can tell drivers about hazards like broken down vehicles, road works and motorway jams. They can also let road-users know about emergency vehicles approaching from behind them, bad weather conditions, and upcoming traffic signs that may require them to stop or slow down to protect children or pedestrians. In Lapland professional drivers can even be warned when reindeer stray onto the roads.

– The impacts of smart traffic systems have now been assessed through several extensive trials around Europe, says **Pirkko Rämä**, Principal Scientist at VTT Technical Research Centre of Finland. – The DRIVE C2X project has particularly focused on cooperative systems, with Europe's car-makers extensively involved.

Automatic driving will make cooperative systems even more necessary

The main aims of these road trials were to get ordinary drivers to try out such systems, to test their technical functioning in wider deployment, to observe how they change road-users' behaviour, to assess how these changes meet the transport systems' goals, and to examine drivers' opinions and observations on the systems.

– It turned out that the systems particularly improved road safety. It has been estimated that they have the potential to reduce traffic fatalities by 30% where several systems can be used together, says Rämä. – There are also indications of positive environmental impacts, and improvements in travel comfort.

Benefits must justify investments

Data on the benefits and impacts of systems is vital for everyone involved – and especially for the authorities, who must be able to justify any necessary investments. The project examined various cooperative warning systems. Results widely showed that drivers reacted as intended, by noticing the warnings and accordingly adjusting their behaviour.

Cooperative systems will form a springboard for a future shift to automatic driving. Such systems will still be needed even when driving is automated. For automatic driving to function optimally, individual vehicles must be networked with each other.

Cooperative systems explained

Smart solutions for road traffic are rapidly developing. Support systems inside vehicles and roadside systems can now be combined to create cooperative systems. A major report on automatic driving defines cooperative services as services that involve the electronic exchange of information between road-users and other road-users or elements of the road infrastructure.

Cooperative systems involve networking between vehicles as well as technical collaboration between organisations involved in the running of road traffic systems.

– Far from making cooperative systems redundant, automatic driving will make them even more necessary, says Rämä.

Car-makers and research institutes in collaboration

Car-makers have announced that they will start to integrate the first functions based on communications between cars into new car models in the next few years. The first firms to adopt such systems are likely to be Mercedes, GM and Volvo. Drivers of such cars will receive warnings of problems ahead through audible alerts or visual signals. Warnings of potential collisions will also be very useful, for instance for tired drivers on long journeys.

The effectiveness of various warning systems has been examined in seven European countries through extensive road trials coordinated by the DRIVE C2X project's partners. The trials involved 750 car-drivers, including 80 Finnish motorists. Trials conducted in Tampere tested systems warning drivers of road works, broken down vehicles and violations of speed limits. The trials also examined the impacts on drivers' behaviour of displaying traffic signs on vehicles' displays.

Smart driving

European car-makers, their subcontractors and several research institutes have combined their expertise on smart road traffic solutions through the DRIVE C2X project. The project's total budget amounted to 18.6 million euros. VTT has been the biggest contributor to the project in terms of workload and a budget of 2.2 million euros.

The project was coordinated by the German vehicle manufacturer Daimler, and also involved the car-makers Audi, Fiat, Ford, Opel, PSA Peugeot Citroën, Renault and Volvo. Motorcycle producers Honda and Yamaha also participated in trials.

Systems informing drivers of weather and road conditions were also tested in VTT's Tampere trials during challenging weather. In these tests drivers received warnings of hazards such as upcoming warning signs and slippery stretches of road.

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