Phantom traffic jams: cooperative driving helps

The A270 highway between Helmond and Eindhoven in the south of the Netherlands was the venue in February for a unique experiment involving a hundred cars. In one lane fifty cars equipped with cooperative technology drove along the section of the highway and in the adjacent lane fifty cars drove with no such equipment. Conclusion: technology can reduce the effect of phantom traffic jams by up to 25 per cent.

'Better traffic flow and traffic safety with lower emissions – that's the TNO objective for cooperative driving,' explains Bastiaan Krosse, project leader of the A270 demo, a project involving experts from across the TNO spectrum.

'We started this project to show government and the car manufacturers how much relatively simple technology could achieve in terms of solving traffic jams,' says Krosse. The government or the manufacturers have to take the first step to serious investment in infrastructure and in-car systems respectively in order to enable car-to-car and car-to-infrastructure communication. If one waits for the other to move first, there will be an impasse. So TNO is ready to bridge the gap.

The kind of traffic jam that has a big effect on mobility is the so-called phantom traffic jam. Krosse: 'This is a traffic jam that seems to occur on a busy road for no apparent reason. Cars drive close together and if one brakes, then the car behind brakes even harder and this creates a shockwave effect of increasingly slower traffic. By tempering this shockwave, cooperative driving can have a positive impact.'

In the trial on the A270 half of the cars involved were equipped with a unit that transmitted information (speed, acceleration, position) about the five cars ahead and the drivers were also instructed to 'accelerate' and 'brake'. At the head of the queue of cars was one car that caused the shockwaves. Compared with fifty cars that had no mutual communication (whereby each driver reacted individually to the situation), the phantom traffic jam effect on the cars equipped for cooperative driving was up to 25 per cent less.

Krosse: 'The A270 demo was a world first. The first test of cooperative technology on such a scale. In this situation the drivers received advice but ideally we would like to see the vehicles brake and accelerate themselves through a *Cooperative Advanced Cruise Control* (CACC) system. The benefits would be even greater. Of course, the system would have to be both robust and safe. Not only are sensor reliability and communication scalability crucial but also user acceptance and legal aspects play a role. These experiments show that even this simple technology can have a substantial effect on traffic flow. We still have to translate the significance of these results to a large scale.'

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SPITS

Cooperative driving is a key aspect in the SPITS *(Strategic Platform for Intelligent Traffic Systems)* project under whose auspices the A270 experiment was performed. SPITS is a High Tech Top Project aimed at developing an open platform for intelligent vehicles and road systems. In addition to TNO, the consortium comprises NXP, TomTom, Logica, several smaller companies and universities.

Info: www.spits-project.com

Photos: Jan Dijkshoorn