Interaction between man & car

Preventing traffic congestion by modifying driver behaviour: that was what CEG researchers working with Technolution and TomTom came up with. Together they designed a system that advises people how fast they should be driving and in which lane they can do that best. ‘The direction I want to move in is that of allowing the car to do more for you.’

Traffic jams. There are more and more of them, and they are getting longer, in spite of all the measures we have devised to alleviate them, from toll booths to rush-hour surcharges, from building new roads and 80 km/h zones, and from promoting public transport to increasing fuel duty. As a driver you have little choice but to travel to the office later in the day, work from home, carshare with someone or just accept that you are going to spend part of your day sitting in a jam.

The Faculty of Civil Engineering and Geosciences is taking it in another direction by developing a system that can change your driving style. The new system has the working title of Dynamic Lane Guidance and it advises drivers at which speed to drive and in which lane they can do so most effectively. It was initially intended to combat traffic congestion on the A67, the motorway between Venlo and Eindhoven. Funding for its development came from the Eindhoven Region, the province of North Brabant and the Ministry of Infrastructure and Environment. Ultimately, of course, the idea is that everyone will be able to use the system. In-car systems are nothing new.

`Take the second exit to the right’ or ‘Turn around, if possible’ are familiar phrases for many drivers. They are spoken by computerized gadgets which, thanks to GPS, know exactly where you are located and will tirelessly advise you which route you should take. More recent are the systems designed to make sure that drivers stay in a certain lane of the road. They warn drivers who are straying from their own half of the road by means of vibrations in the seat or corrective steering. There are also systems that ensure that drivers keep their distance from other cars. Dynamic Lane Guidance is somewhere between all these systems.

**DETECTORS**

How does it work? ‘We use loops along the road to measure how many cars are using each lane and the average speed at that point on the road,’ says Wouter Schakel, who is dedicating his doctoral research to this anti-congestion system. ‘The principle is that information is collected from the road and transmitted to a system. That is not new in itself, because detectors are already installed at traffic lights, for example. Based of the information gathered, an advisory speed limit is displayed on matrix boards above the road. What is new is that we now gather this information on a lane-by-lane basis rather than for the whole road, increasing the accuracy significantly.’

However, the real challenge lies not in gathering the information from the road, but analysing it. ‘We get our information from the National Data Warehouse, where the data from all roads in the Netherlands is collected. They provide us with the required data three minutes after it has been measured. That data delay is much greater than we had anticipated. This makes it difficult to estimate the cur-
rent traffic situation accurately: where exactly is it busy and how busy is it? In the second module of the system, we pass the anticipated volume of traffic on to an advisor, who in turn gives advice to the drivers. For example, at the end of a traffic jam we invariably advise keeping a short but safe distance from the vehicle in front. The idea behind that is that cars that don’t drive in this way will end up stopping and starting, making them react slowly, leaving more time between the the car in front. That is not efficient. It’s by keeping such a short but safe distance with the car in front that you will drive through the traffic jam the quickest.  

But ultimately it is road users who determine whether a traffic jam occurs. ‘Motorists have to trust the system,’ says Bart van Arem, professor of transport models. ‘It helps if you motivate people by explaining to them why they should do something. For example, people like to know that the end of the traffic jam is one kilometre away. But the information has to be accurate, because if they are still sitting there after two kilometres, they will stop following the advice you give them. Neither do you want to overload drivers with information all the time, only at very specific moments. The most important thing is that people just keep driving. We have carried out simulations and if everyone follows the advice, the delay can be reduced by forty to fifty percent.’  

Van Arem’s ideal is for cars start to understand us more. ‘Just as a horse can feel that his rider is giving him the space to run free, a car should also be able to do more for itself. And I don’t just mean accelerating and braking, but also changing lanes. That should feel good for the driver too, because ultimately he or she remains in control. The car can gather information and communicate with the driver, so that there is interplay between people and technology. It would be really wonderful if the car knew what it should do automatically in and around traffic jams.’