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APPLICATION OF INFORMATICS IN ROAD SAFETY

Transmitted by Netherlands

Introduction

Intelligent Speed Adaptation (ISA) is gaining more and more attention. It is one of the promising new developments in the world of intelligent transport systems (ISA) which has the potential to enhance traffic safety and driver comfort considerably. Car manufacturers already offer (simple) ISA systems as an option and several countries are seriously studying the possibility of the introduction of such systems as part of their traffic safety policy. Currently it is being discussed in different European forums and several pilot and research projects are being carried out which will deliver more insight into its prospects and technical requirements. Due to the globalization of industry, the harmonization of vehicle requirements and cross-border traffic, implementation clearly has an international dimension.

It is useful for WP.1 to follow developments in this area closely. First, because it is a development that has implications for the 1968 Vienna Convention on Road Traffic. Second, the potential effects of ISA systems in general on road safety should have the attention of this group. Third, there is the need to focus attention on longer term strategic issues in the framework of the ECE Inland Transport Committee. Such a discussion should not only be limited to the ITC itself but should also be discussed within the relevant Working Parties.

Typology

Many different ISA systems are possible. They are summarised in the figure below. Here the realm of ISA is taken in a rather broad sense: from the very basic speed delimiter to very sophisticated equipment. The two main dimensions are the nature of the speed limit (vertical) and the degree of intervention of the system (horizontal). The simplest systems have only one, fixed speed limit, like the speed delimiter for trucks. On some new passenger cars a user-set ISA is available as an option. For ISA systems with place-dependent speed advice a database with speeds is required. This could be integrated in the future with the digital map of the navigation system or transmitted by, for example, active road signs. In the most advanced form of ISA the speed advice is transmitted to the car by road side infrastructure. This avoids the requirement of an up-to-date data base in the car and makes dynamic speed advice possible, e.g. related to congestion, weather conditions or accidents.

Feed back ?

| | | informative | advisory | control |
|--------------------|-----------|-------------|--------------------|---------|
| ? Speed dependency | Static | | | lorries |
| | | | speed assistant | |
| ? Speed dependency | Location | | navigation systems | |
| | | | | |
| ? Speed dependency | Loc.+time | | | |
| | | | | |

The second dimension is the degree of intervention or the feed-back to the driver (from speed information to speed delimiter). Usually three levels are defined: 'informative' (maximum speed or speed violation is only reported to user), 'advisory' (the system helps the driver to keep to the speed limit by means of, for example, a haptic feed back) and 'control' (no speeding possible). As a third dimension the voluntary or mandatory nature of the system could be added (either in use or fitment). This is more a political rather than a technical question but it can have important implications for liability, for example.

ISA potential

Speeding is widespread in Europe and is one of the major causes of traffic accidents and is strongly related to accident severity. It is estimated that speed plays a role in about a third of the fatal accidents.¹ The safety of drivers and passengers of motor vehicles has been greatly enhanced in the last decade by the progress in passive safety and much is expected from the upcoming active safety systems. But every year about 10,000 vulnerable road users (pedestrians, cyclists and mopeds) are killed in the EU who do not have the benefits of such systems. The reduction of

¹ 3rd Road Safety Action Plan 2002-2010, DG-TREN; ECMT studies 'Safety in road traffic for vulnerable users' (2000) and 'Speed moderation' (1996).

the speed of motor vehicles in urban areas could reduce that toll significantly: the risk of fatal injuries for a pedestrian hit by a car is virtually zero at 30 km/h, about 50% at 50km/h and almost 100% at 70 km/h.²

The observation of maximum speeds can be achieved by means of police or electronic surveillance, education and road design. ISA adds to this spectrum a vehicle-based technology. The advantage of ISA is that it is always available, can be made flexible to reflect local road conditions (weather, congestion, curves) and is very cost effective; virtually no additional infrastructure has to be installed by public authorities, depending on the type of vehicle-road communication used. In contrast to that, surveillance can only be limited in time and location and infrastructural measures are very costly and have undesirable side effects. On the other hand, ISA might be perceived as too intrusive on the liberty of the driver if the maximum speed can not be exceeded anywhere.

Apart from traffic safety, ISA offers enhanced driving comfort by alleviating the driver from the task of continuously monitoring his/her speed. This makes driving more relaxed, more attention can be paid to the road and other road users and speeding tickets are avoided. In the case of dynamic ISA, road congestion can be reduced by speed optimising and intelligent speed limits can be implemented, tailored to actual local road and traffic conditions.

In several studies³ it is estimated that full use of ISA would reduce the traffic death toll by 10-50%, depending on the type of ISA. This is due to the lower average speed and the reduction in speed distribution. Generally speaking, the systems in the upper left of the figure above are the least effective, those in the lower right the most. The exact figures are still a topic of debate and more research is needed to get a more accurate picture. However, a reduction by only 10% would mean a significant contribution to the enhancement of traffic safety relative to other possible measures. Therefore the discussion about the exact figures should not stop us from taking the first steps towards introduction of ISA.

Discussion

Apart from the effectiveness of ISA, a list of open questions has to be addressed. Two of the most compelling are:

- ?? Collection, maintenance, status and transmission of the speeds limits
- ?? Liability

For liability, an important aspect is whether or not the system is mandatory. As long as the system is voluntary the liability for public authorities is limited; the manufacturer of the ISA equipment will be mainly accountable for its correct performance. If the system is mandatory road administrators and public authorities will also become involved.

For the first point, the road administrator will have to play a role. Either indirect, via a service provider, or direct. This raises again the liability question. We think the situation is comparable with the current obligation of posting the correct classical speed signs.

² MASTER Final Report (1998).

³ E.g. 'External Vehicle Speed Control', University of Leeds and the Motor Industry Research Organisation (2000).

In the paper submitted by Germany (TRANS/WP.1/2001/15) the *admissibility* of compulsory, control-type ISA is disputed. In Germany's view, the impossibility of exceeding the speed limit violates the Vienna Convention articles 8 and 13. We do not share this point of view. The driver remains in full control of the vehicle with all types of ISA; the system only prohibits speeding, which is against the law anyway. Furthermore, the influence the ISA system has on the driver and vehicle is much more limited than with, for example, automatic cruise control (ACC) or an electronic stability package (ESP). In our opinion the true nature of the problems sketched in the German document is more in the field of liability and effectiveness rather than admissibility. We think it is very useful for further discussion that the German paper has stressed the importance of this issue

As stated before, more research is needed to study the effectiveness, implementation, liability etc. of ISA. Many initiatives have been taken already. Pilots have been, or are, being carried out in the United Kingdom, Sweden, the Netherlands, Finland, Denmark, France and Belgium. In the European research programmes DUMAS and MASTER knowledge has been compiled about road safety and speed. The forthcoming programme PROSPER (2002-2004) will be entirely focused on ISA; from technical aspects to implementation strategies.

Also in other forums ISA is being discussed. In the WP.29 (GRRF supplement to regulation 89) the technical specification for an adjustable speed limiting device is described. ERTICO recently launched the SpeedAlert initiative. Here public authorities and automotive industry will work together to study several aspects of (voluntary) ISA. The EU High Level Group on Road Safety has a dedicated ISA subgroup which will be continued in the coming years. Furthermore, both in the Europe 2002 Action Plan and in the Third Road Safety Action Plan, Intelligent Transport Systems (ITS), of which ISA is part, are mentioned for their potential for the improvement of road safety.
