Volume 20 • Issue 16 • August 15, 2009

THE Intelligent HIGHWAY

GLOBAL ROAD TRANSPORT TECHNOLOGY UPDATE

TELEMATICS

Safety Connect to replace the Lexus Link

Toyota is launching a new telematics system called Safety Connect to replace the Lexus Link, a rebranded version of General Motors' OnStar service. Introduced with the 2010 Toyota and Lexus models, Safety Connect will give subscribers a list of options similar to OnStar's, including emergency crash notification and assistance, stolen vehicle locator, and roadside assistance. Like other telematics systems, Safety Connect utilizes a mixture of cellular telephone, GPS, and computing technology to track vehicle location and communicate with a call center.

In the event of a collision serious enough to deploy air bags, the system automatically notifies the call center and reports the vehicle location. An operator will then call the car to speak with occupants and determine what help is needed. If the operator is unable to speak with anyone, emergency personnel will be dispatched. Subscribers will have the option of calling the center anytime with the push of a button for roadside assistance.

Lexus owners have the option of upgrading to Lexus Enform, which adds services like weather reports and turn-by-turn directions. Users can contact the call center and ask an operator for directions to a specific address, nearby gas station, restaurant, or other location,

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OPTIMIZATION

LIDAR mapping of transportation corridors

LIDAR is a light detecting and ranging system—also known as a laser radar system—that detects and locates objects. LIDAR is now being used as a new transportation corridor mapping technology to support engineering planning and change detection of a road network that may require high spatial resolution and extremely high engineering scale mapping accuracy.

According to Nora Csanyi of the Department of Civil and Environmental Engineering at Ohio State University (www.osu.edu), state-of-the-art LIDAR systems can provide pulse repetition rate of up to 100 kHz, and range measurement accuracy at 2-3 cm level, which in theory, could support engineering scale mapping. However, due to the complexity of LiDAR systems, the various components as well as their spatial relationship can introduce errors that can degrade LiDAR data accuracy, and even after rigorous system calibration, some errors can still be present in the data. These errors are typically dominated by navigation errors and cannot be totally eliminated without introducing absolute control information into the LIDAR data.

LIDAR systems are complex multi-sensor systems, and incorporate at least three main sensors including the GPS and inertial navigation system (INS) sensors, and the laser-scanning device. To help rebuild Highway 1 in Afghanistan, the U.S. Agency for International Development commissioned an innovative ground-based LIDAR mapping solution. Mosaic Mapping Systems of Ottawa, Canada wanted to use LIDAR to create the needed digital elevation models.

With 35% of Afghanistan's population within 50k of Highway 1, this reconstruction will proide better access to markes, healthcare, schools, and jobs. TIH

IN THIS ISSUE

Policy for intelligent cooperative systems

The Netherlands is the first country in Europe to develop a policy towards the use of cooperative systems to address challenges such as congestion, environmental sustainability, and road safety.

Geert Draijer and Martin Van Gelderen, senior policy advisors at the Dutch Ministry of Transport, Public Works, and Water Management, and Gerben Bootsma, Innovation Program Manager (Rijkswaterstaat), discussed the Dutch policy framework and the implementation roadmap for cooperative systems in their country with ERTICO (www.ertico.com).

The Dutch believe that in the future cooperative systems can make a substantial contribution to easing congestion, improving traffic safety, reducing the environmental impact of traffic, and delivering a better service to the road user. Large parts of the Dutch road system are under high stress. The road capacity is insufficient for the demand of traffic, resulting in congestion and unreliable travel times, and economic loss. Over the years, the Netherlands has invested substantially in policy measures aimed at the best possible handling of traffic demand over the road infrastructure network.

About 1100 km of the total of 3500 km of national highways is equipped with roadside systems to support drivers with accident warnings, and to guide traffic flows (on a gantry every 700 meters). There are also hundreds of electronic road message signs to inform drivers, for example about the expected travel time to a next point, or to inform them of alterative routes. This whole dynamic traffic management system is operated by a national traffic control center, and several regional or local centers.

These roadside instruments, however, do have a number of limitations or drawbacks that may not apply for in-car or cooperative systems. Roadside systems, for example, cannot provide personalized information based on a traveller's destination. Furthermore, the annual costs for operating and maintaining roadside systems amount to roughly 10% of the initial investment cost, adding up to hundreds of millions of euros per year. If the policy target of better traffic flow or better safety could be achieved in a more cost effective way, that would be very welcome.

Technologies emerge and in some cases mature enough to offer an alternative to roadside systems. Stimulating the take-up of vehicle-based driver assistance systems, such as advanced adaptive cruise control, could be a cost effective alternative to further development of roadside warning signs. In The Netherlands, the guidance of traffic is already influenced by in-car navigation devices. Travelers may see different advice displayed at the roadside than what appears on their in-car system. But the in-car system will guide the driver during the entire journey from door to door, based on personalized preferences, therefore the effectiveness of the roadside systems is reduced.

This may cause problems when road authorities implement traffic guidance scenarios and the advice from the navigation device is no longer valid. Consistency between public and private information systems is important: e.g. in-vehicle safe-distance keeping advice that was not consistent with the road capacity in case of congestion is a point of discussion between car makers and road authorities. Cooperative systems can help resolve these conflicts. The most vulnerable parts of the network are already equipped with roadside systems. In The Netherlands, where roadside systems are already developed, it is necessary to combine the development of in-car information services with the traffic management demands from road authorities. The Netherlands follows the development of cooperative systems closely and participates in the CVIS, SAFESPOT, and COOPERS European R&D projects.

Underlying this discussion is the question of how to deal with traffic management in the future. Traditionally this area was dominated by road authorities, where traffic is optimized over the network of the road operator (e.g. highways). This is now strongly influenced by the market parties that are able to inform and support a driver with alternatives. This advice also includes guidance for the parts of a trip over local and regional road authorities' networks (e.g. municipalities, provinces etc.). This is where many congestion problems arise in peak hour traffic, with many short distance trips (<15 km). Good cooperation between different road authorities and private parties is essential to prevent undesired side effects on traffic safety or local air quality.

The role for the road authority is still very important, especially in the case of large traffic disturbances (accidents, maintenance, etc.), where its information provision has to be extended to the market parties or service providers that can implement this information in their travel advice and navigation devices. These private parties determine how traffic information is diffused because they provide the information to users. Road authorities would like to play a guiding role within a good working relationship with the industry, in order to serve both the traveler and the community. The multiple parties involved need to be coordinated in the most cost-effective way, working together at strategic level to avoid independent developments in all directions. This is an organizational rather than technological issue. TIH