### February/March 2011

### Happy Anniversary 25 things about Traffex's silver jubiled that you won't read anywhere else How at TECHNOLOGY INTERNATIONAL

۲

Secure network

How privacy by design will avert privacy by disaster

### Surface treatment

Why road markings offer an unbeatable bang for your buck

WWW.TRAFFICTECHNOLOGYTODAY.COM

# The road aheac

**Design Challenge**: Experts in the field rewrite the rulebook on the traffic intersection



۲

 Brian Negus, RACV
 "The government's fuel excise is ripping off motorists to the tune of AU26¢ a liter" ➡ | Sit back and relax
SARTRE's project team
reveals its hopes for the future
of autonomous road trains

 $( \bullet )$ 

Simulation modeling Software users tell us why they love it when a plan comes together

# CONDECTOR Measure it. Manage it. Improve it.

### EdgeConnect<sup>™</sup>

### Manage your video detection system remotely

Iteris' Edge*Connect* quad-view remote communications module provides both local and remote management of data and video over Ethernet – allowing traffic managers to view real-time video for up to four Vantage<sup>®</sup> video detection cameras at the cabinet, in the TMC, or wherever an internet connection is available.

- Review the operation of an entire intersection on one screen
- MPEG4/H.264 video compression scalable to fit the bandwidth available
- Simple to use interface reduces training time
- Simplicity, ease-of-use, and reduced life-cycle cost



۲

### Innovation for better mobility





### **Cover story**

### 46 A new order

Rewriting the rulebook on the traffic intersection A team of industry thought-leaders devise new ideas and concepts to revolutionize this

problem area of the traffic network

### **News features**

### 4 Follow the leader

Exclusive report on the SARTRE autonomous road trains project

### 10 Project focus: In-Time

The latest on the EU's innovative multimodal information service scheme

### **Features**

### 12 Number crunchers

Louise Smyth presents case studies from the leading lights in traffic modeling

### 18 Road angels

The latest innovations in road markings and their future potential. By Nick Bradley

### 31 Artistic license

Assessing the role of ALPR in advancing the business case for video tolling

### 34 Private party

Bern Grush interviews Dr Ann Cavoukian to explore the need for 'Privacy by Design' in road charging

### 44 Panoramic view

A look at a vision-based traffic monitoring system

### 56 Silver jubilee

25 things to see at the 25th edition of Traffex











### Interviews

### 27 Brian Negus

Nick Bradley speaks with the general manager of public policy at Australia's RACV

### 41 Robert Bain Traffic Technology International meets the author, researcher and all-round expert on traffic forecasting

54 Sing Mong Kee The man behind ST Electronics' huge success in ITS

### Regulars

- 75 Eric Sampson The good professor ponders the Abilene Paradox
- 79 Smart Cars 'What's in a name?', asks Jim Misener
- 81 Adrian Walsh The new momentum gripping the road safety sector
- 85 Grush Hour Why services must form the heart of RUC
- 91 Bulletin Board
- 92 The Burning Question What advances do you predict in the road markings sector to improve traffic safety?

### In This Issue | 🤤



level, by **HiTech Solutions** 



**TSS** on the role of modeling for ICM projects



The latest advances in ALPR from **ARVOO** Imaging Products

( )

### **Technology Profiles**

- 71 Smart sensor solutions Stijn Vandebuerie, **Traficon**, Belgium
- 74 New vehicle identity recognition suite Meta Rotenberg, **HiTech Solutions**, Israel
- 77 Russia's revolution in speed management Frederik Alberts, **Olvia**, Russia
- 78 Video's role in data collection Shane Walker, Miovision Technologies, Canada
- 80 Virtual loop technology for traffic management Silvia Vilanova, **Quercus Technologies**, Spain
- 82 Modeling for ICM strategy Nadia Feddo, TSS-Transport Simulation Systems, Spain
- 84 Embedded ALPR solutions René Voorwinden, ARVOO Imaging Products, the Netherlands
- 86 Assessment of dynamic tolling John Swanson, Steer Davies Gleave, UK

71 Sophisticated sensors from **Traficon** 



### Foreword



Considering I was involved in, shall we say, a number of altercations behind the wheel in my younger days, I never actually crashed at an intersection. Into a horsebox, yes (minus the horse). I also reversed into a neighbor's car, regrettably. And allegedly

into a new, shiny S Člass in the car park of the Blue Anchor pub in Walton Heath. But I've never crashed at an intersection.

I should count myself lucky – all of the above were just minor shunts at very low speed. The majority of accidents at intersections occur at much higher speeds. According to research from NHTSA, 40% of all traffic accidents and 20% of crash-related fatalities occur at these undisputed problem areas on our networks. And despite more sensible intersection designs and advances in traffic engineering control, they're likely to be the stage for further carnage in the future, particularly with two-thirds of the world's population predicted to be living in cities by 2015.

NHTSA data extrapolated between 1997-2004 reveals that 84% of fatalities occur at intersections, with 37% of fatalities occurring at stop signs in urban areas. Appreciating these two facts, it's easy to see why intersection safety is the focus of so much R&D attention – Ford, Daimler, and Audi are the car makers that immediately spring to mind. And on the infrastructure side, it's probably why the roundabout is an increasingly visible feature on US roads, since they wipe out treacherous left-hand turns across opposing traffic, in doing so virtually eliminating highspeed right-angle and head-on crashes.

Intersections don't fare particularly well in the green stakes either. How much time do you spend stopped in front of a red light, waiting for the light to change – more often than not when there's no traffic passing on the cross-street? Vehicles stand idling, pumping out harmful emissions, and wasting fuel. Millions and millions of gallons of the stuff, costing economies billions of dollars.

So if we started from scratch, would intersections even make an appearance? That's the question we posed for a new feature in *Traffic Technology International* called 'Design Challenge' (page 46), in which we challenged people to think outside of the box and draw up a concept or strategy to revolutionize the intersection as we know it. It could have been an idea to improve flow, enhance safety or lessen the environmental impact of the vehicles stuck in front of them. It could even have been a pie-in-the-sky idea not feasible with today's available technology.

It's patently a facet of traffic management some of you feel needed some due care and attention, as I was inundated with forward-thinkers rising to the challenge. Certainly, we'll be setting you another challenge at some point down the line. Suggestions are duly welcome!

#### Nick Bradley

Editor, Traffic Technology International



Nick Bradley nickbradley@ukipme.com Deputy editor Louise Smyth I.smyth@ukipme.com

Aubrey Jacobs-Tyson, Frank Millard

Art director James Sutcliffe Art editor Ben White Design team Louise Adams, Andy Bass, Anna Davie, Andrew Locke, Craig Marshall, Nicola Turner, Julie Welby

#### Production manage

lan Donovan Production team Carole Doran, Lewis Hopkins, Cassie Inns, Robyn Skalsky

### Adam Frost

Publication director

Mike Robinson m.robinson@ukipme.com Publication manager

Franco Crismann f.crismann@ukipme.com Australasia business manager

Chris Richardson c.richardson@ukipme.com +61 4207 64110

#### CEO

Tony Robinson Managing director Graham Johnson Editorial director Anthony James Finance director

Rob Kirke

Traffic Technology International UKIP Media & Events Ltd, Abinger House, Church Street, Dorking, Surrey RH4 1DF, UK Tel: +44 1306 743744 Main fax: +44 1306 742525 Email: traffic@ukintpress.com www.ukipme.com

The views expressed in the articles and technical papers are those of the authors and are not necessarily endorsed by the publisher. While every care has been taken during production, the publisher does not accept any liability for errors that may have occurred. Traffic Technology International, ISSN

Traftic Technology International, ISSN 1356–9252. Published eight times per year by UKIP Media & Events Ltd, and distributed by US Mail Agent, Clevett Worldwide Mailers LLC, 7 Sherwood Ct., Randolph, NJ 07869. Periodicals Postage Paid at Dover NJ, 07801. Postmaster. Please send address changes to Traffic Technology International, 19 Route 10 East, Bidg 2 Unit 24, Succasunna, NJ 07876

published by UKIP

#### ABC Member of the Audit Bureau of Circulations

Average net circulation per issue for the period January 1-December 31, 2010 was 17,423 Annual subscription US\$153/£73

USPS Periodicals Registered Number 012-893

#### ISSN 1356-9252 Traffic Technology International

This publication is protected by copyright ©2011 Printed by William Gibbons, Willenhall, West Midlands, WV13 3X, UK

002 Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com



### Stop Traffic.

۲

### Sony Cameras for ITS

Freeze a speeder at 85 mph. Capture their license plate at 200 paces. Reduce traffic congestion. Identify a car's color at midnight with Sodium Vapor Auto Tracking White Balance. Whatever your intelligent traffic application, Sony has your image capture camera, with over 30 models from which to choose. In applications where replacing cameras is a major headache, Sony reliability is a major relief. Sony ITS cameras: anything less just wouldn't be intelligent.

Visit sony.com/its for a free 30-day evaluation or contact sony.cameras@am.sony.com.

H

6553M13

© 2010 Sony Electronics Inc. All rights reserved. Reproduction in whole or in part without written permission is prohibited. Features and specifications are subject to change without notice. Sony, the Sony logo and "make.believe" are trademarks of Sony. GigE Vision and the GigE Vision logo are trademarks of the Automation Imaging Association. Images simulated.

Smart Cameras GigE Vision Cameras Block Cameras

WMR \$673

۲

### Autonomous Driving | 🕞



Such vehicle platoons function much like an improved version of adaptive cruise control, matching a car's movements to the distance, speed and the direction of the vehicle in front. Once in a platoon, this allows drivers to relax and do other things, such as reading or even taking a nap while the platoon drives toward its long-distance destination



۲

The trials held on Volvo's test track in Sweden slaved a single car to a lorry to test the platooning system. Trains of cars under the control of a lead driver should cut fuel use, boost safety and may even cut congestion



"I do appreciate that many people feel this sounds like Utopia," says Volvo Car's Erik Coelingh. "But this type of autonomous driving actually doesn't require any hocus-pocus technology, and no investment in infrastructure. Instead, the emphasis is on development and on adapting technology that is already in existence"

eller hopp

# Follow the leader

To a fanfare of global publicity, the SARTRE autonomous road trains project took to the highways for the first time in January. **Nick Bradley** is the first to speak with the team behind the program about the results – and expectations for the future

Photography courtesy of Volvo Cars & Ricardo

004 **Traffic Technology International** February/March 2011 www.TrafficTechnologyToday.com

### Autonomous Driving



utonomous driving has seemingly been a few decades away since the dawn of the modern automobile. It therefore comes as no surprise to hear that is what the brains behind SARTRE are predicting if the 'Safe Road Trains for the Environment' vehicle platooning project yields the kind of results its research team anticipates.

With similar intentions to initiatives such as Prometheus, PATH, Promote-Chauffeur and KONVOI, SARTRE does however boast some notable distinctions. "We don't have any dedicated lanes, such as PATH," says Dr Erik Coelingh, technical leader, Active Safety Systems at Volvo Cars - one of the seven partners in the consortium. "We don't need to make any alterations to the existing infrastructure either. We're also mixing the autonomous road train with other traffic on public roads, and vitally we're doing this using sensors such as cameras, radars and LIDAR, etc. What's central for us is to take a production-ready vehicle and adapt it as little as possible. That's what makes it unique."

#### Small steps to a giant leap...

SARTRE is thought to be the ideal way to take Volvo's safety technologies such as ACC and emergency braking to the next level. "It is our belief that autonomous driving is on the horizon," Coelingh continues. "We're not there yet – and I don't know when we will be – but it's clear that's where we're all heading.

"What's also clear is that Volvo is not looking at concepts that are three, four or five years down the line, but those that are 10 or 20 years ahead. Our core vision is for an accidentfree future. So during internal discussions at Volvo, we asked ourselves, 'Where do we now require knowledge?' We agreed on platooning - but not platooning that necessitates an overhaul at the roadside, or where all vehicles drive autonomously. We instead thought about a scenario in which a lead vehicle is driven by a professional driver, similar to a bus – you get on, pay for your journey, the driver takes responsibility for you, and you just hop on and off when and where you want."

While these discussions were taking place in Sweden, UK engineering consultancy Ricardo was drawing up its own ideas for platooning, so when both parties became aware of each other's ambitions, a meeting of minds was inevitable. "We got together in Cambridge, compiled a list of suitable and competent partners, and that's basically how it all came together," Coelingh states. That list included Spain's Fundacion Robotiker -Tecnalia and IDIADA Automotive Technology, Germany's IKA (Institut für Kraftfahrzeuge, RWTH Aachen University), and the SP Technical Research Institute of Sweden.

The SARTRE proposal was submitted to the EU in May 2008 and funding was subsequently secured under the EU's Seventh Framework Programme. Officially starting on September 1, 2009, it will all come to an end on August 31, 2012. "We're coordinating and managing the overall program," reveals Ricardo's Tom Robinson, SARTRE project coordinator. "We're also leading the safety analysis, the development of the autonomous control systems as well as the platoon management systems, all drawing upon our experience in developing high-integrity

### ITS according to Ricardo...

"ITS is the next evolutionary step in transportation, the next hierarchy of integration between transport systems and modes that currently work with reduced cooperation - the key word is 'intelligent'," says Ricardo's Tom Robinson, when asked if the company's recent appointment of David Rollafson as ITS director means we might be reading more about the company in these pages. "The key future challenges are for vehicle transportation to be sustainable, safe and efficient in the use of energy, minimizing journey times while maximizing the utilization of infrastructure, as well as being cost-effective. We believe that 'intelligence' and 'smart systems' will play a critial part in meeting these challenges. The more difficult prediction is to define when these technologies will become mainstream and develop into new profitable industries. However, our longer-term vision is that vehicles will operate in an intelligent control and communications environment."

### Accenture

research conducted with 2,000 consumers revealed 49% of people would want driverless cars, even saying they'd pay more for the privilege

> 66 What's clear is that Volvo is not looking at concepts that are three, four or five years down the line, but those that are 10 or 20 years ahead

### Autonomous Driving | 🗲



Drivers who want to join the roadtrain state their destination and are guided by their satnay to the nearest available convoy

**( ( ( )** 

automotive systems, rapid prototyping and intelligent transportation systems."

### Off the ground

Research throughout 2010 was confined mostly to the virtual world, though, as Coelingh explains further. "We conducted different simulations for a variety of scenarios, for instance to understand how much time was required to join a platoon, what impact the platoon length would have on traffic flow, and so on. We also conducted HMI simulations to analyze user reactions to driving in autonomous

mode, as well as simulating emergency situations just in case anything drastic occurred."

"There are a number of different driverless car has been and sometimes conflicting factors voted one of TIME's '50 that need to be undertaken before Best Inventions of 2010' It drove accident-free for strategic program decisions are finalized," Robinson adds. "Activities such as traffic modeling, use-case analysis, human factors analysis, technology assessment, safety case,

business case, etc, are all being completed by the different program partners to ensure we have a good understanding of such factors."

SARTRE took a major step forward from the simulator to the road in January 2011 when all of the systems were brought together for the very first real-world test near Gothenberg in Sweden. "Our main goal was to make sure that everything mirrored the simulations," Coelingh says. "We've all developed different parts of the system so this was the first time we connected everything up to see if the car, in this case a Volvo S60, could operate entirely autonomously. We wanted to see if it would steer, brake and accelerate in the way we wanted and we're pleased to say the test was highly successful."

#### Mass appeal?

The announcement of this first milestone was greeted with global press coverage, in doing so reigniting a topic that's been burning away for over 80 years (see The 80-year wait for Futurama sidebar). "Reaction was varied but mostly positive," Robinson reports. "The concept seems to have captured the imagination. One of our major goals is to provide further choices to road (motorway) users without compromising safety. I think as long as we address these basic points, then drivers will be supportive."

Coelingh was one of the first in the queue to get behind the wheel and agrees that customer acceptance could be a hurdle, although he was surprised as to how quickly he and others became accustomed to hands-free driving, enjoying a cup of coffee and even reading a newspaper just a meter or so from the Volvo truck in front - and all at highway speed! "It's somewhat unusual at first, but you get used to

### The 80-year wait for Futurama

here's nothing new about the GM, have been boldly predicting their rise since the late 1930s, claiming back then that by 1960 we'd all be traveling from A to B courtesy of our very own robotic chauffeurs. And although we're still waiting for that Futurama to come been any progress at all

Google's

230,000km with just

occasional human

<u>assistance</u>

GM picked up the gauntlet in the early 1950s, collaborating with the Radio Corporation of America to develop scale models to investigate facets such as electronic steering and distance-keeping. Soon after, codenamed 'Firebird' would whet the appetite further, keeping the Futurama followed throughout the 1960s,



World's Fair in New York. In the early 1980s, GM revisited the topic of automated highways once more, with a few determined engineers pursuing the AHS vision by writing a paper for the FHWA. communications were proposed to superseded magnetic propulsion concepts of the 1950s and 1960s

Arguably GM's biggest autonomous success story came in the form of the Chevy Tahoe, 'Boss', which claimed DARPA's 2007 Urban Challenge. Led by Carnegie Mellon University, the Tartan Racing team's machine vision-based robotic car used perception, planning and behavioral software to reason about traffic and take appropriate actions while proceeding safely to a destination.

Traffic Technology International February/March 2011

The General

**Motors** Pavilion

in the 1939 New

York World's Fair

006www.TrafficTechnologyToday.com

### || SAFEWALK

۲

Sensing people, protecting lives

### <u>main goals</u>

- Better protection of all vulnerable road users.
- Reducing the number of pedestrian injuries and fatalities.
- Avoiding unnecessary delays to both pedestrians and motorists.

### <u>MAIN APPLICATIONS</u>

- Detection of pedestrians waiting to cross the road.
- Detection of approaching pedestrians intending to cross the road.
- Suitable for use at crossings or signal controlled junctions.

100

### <u>MAIN TECHNOLOGIES</u>

- Video Image Processing Technology
- 3D Stereovision Technology
- CMOS Sensor Technology

#### MAIN BENEFITS

in the

• High detection reliability

0

۲

21

- High immunity to false calls
- Quick and easy installation
- Direct visual verification
- Field-proven Traficon algorithms
- Unique design

### Interested in how this intelligent sensor can ensure better safety for pedestrians in your city?

۲

REQUEST A SAFEWALK

Send an email to <u>safewalk@traficon.com</u> and receive a free gift!



۲

WWW.TRAFICON.COM

### Autonomous Driving | 💽

### Ready to roll

According to Erik Coelingh, there is nothing magical about the technology being employed in the SARTRE platoon vehicles - a mixture of standard radar, camera and LIDAR sensors, as well as 5.9GHz 802.11p DSRC communications - althoughthat does perhaps oversimplify what's being achieved. "We want to make the platooning a kind of extension of ACC. he says. The main challenge technologically is that the vehicles are traveling so close to one another that the sensors cannot see the lane markers. So instead of using the lane as a reference, we're using the lateral position to the vehicle in front as the reference.

"Communications between all vehicles also presents a challenge," Coelingh adds. "We're continuously transferring information about accelerations, velocities, data relating to longitudinal and lateral motion, curvature, and so on.' The V2V communication module, currently an ALIX 3D3 embedded PC, connects to the vehicle CAN interface, although a backup communication channel may also be needed.





(Above) Systems will be developed to facilitate the safe adoption of road trains on unmodified public highways with interaction with other traffic (Right) Platooning may be the new way of traveling on motorways in as little as 10 years

it," he says of the experience. "It's reminiscent of the first time you drive with ACC. Once you realize it works perfectly, you end up adjusting your driving style to one that embraces ACC. It's the same with autonomous driving."

Both Robinson and Coelingh agree the Vienna Convention potentially also presents a stumbling block. "We're considering these issues as we progress through the program and it is too early to say if it [the legislation] will need to be modified – though it is likely," the Ricardo man feels. "One of the things we need to consider concerns driver overrides," Coelingh adds. "Do we allow that override at any point in time, or just at certain points? And does that mean you're still in control of the vehicle, as the Vienna Convention stipulates? You'll need some smart lawyers to dissect what is written there."

#### **Benefits**

The business case is also key. The benefits for drivers in the platoon are clear, yet incentives need to be provided for the lead driver, who aside from a little lower aerodynamic drag benefits from little else. Coelingh suggests it's feasible that those who join the platoon could therefore pay a fee to the lead vehicle for the privilege. "It's something we're investigating," he says. "All of the players in the platoon should have incentives, otherwise why would people even bother – and in particular why would the lead driver take on all of the added pressure of being responsible for the platoon vehicles?"

The environmental benefits of platooning have been proved in previous projects, such as PATH, which demonstrated an average reduction in fuel consumption of 20%, varying according to the number of platoon vehicles, the vehicle spacing and the aerodynamic geometry of the vehicles within the platoon – i.e. car, truck, bus. With SARTRE, though, the lead vehicle is always intended to be a commercial vehicle, so being higher and wider than a car, theoretically this could reduce fuel consumption even more.



The potential in terms of improving congestion will benefit all road users however. According to Robinson, the speed variability of the SARTRE vehicles will be reduced, leading to an overall improvement in traffic flow. He does stress that it is necessary to discriminate between different traffic conditions - i.e. free traffic, collapsing traffic, synchronic inhomogeneous traffic, and stop-and-go traffic with potential benefits for all but free traffic. For collapsing traffic, it's expected that the biggest pay-offs will be reached with platoons in which vehicle gaps are reduced to a minimum. For synchronic inhomogeneous traffic (characterized by both varying traffic flow and average velocity), a significant improvement can be expected through autonomous guidance, which would help to reduce these fluctuations. For stop-and-go traffic, platoon vehicles will leave traffic jams more quickly than a human driver, leading to a more rapid reduction in congestion.

For Coelingh and Robinson, though, the biggest factor that will drive uptake among the public is that those who opt into a platoon will be able to do something else with their time. "Look at how people are driving today," Coelingh concludes. "They're sending text messages, talking on phones, eating and drinking, and reading maps – all when they should be concentrating on the road and the task of driving. Driver distraction is really a big issue and there's currently a huge debate about solving this major problem. In a way, we're turning the debate on its head by acknowledging that drivers maybe just want to do something else with their time when they're in-vehicle. Autonomous platoons will allow them to do what they want to when going from A to B. Ultimately, that's why we believe the concept will be successful in the future." O





۲



### ITS for Access. ITS for Parking. ITS from Kapsch.

Hassle-free. Cash-free. Hands-free. E-parking & access solutions. Kapsch TrafficCom Ltd., Sharon Kindleysides, Phone +44 (0)1 35 36 44 010. www.kapsch.net

always one step ahead

#### Project **Focus** $\mathbf{\mathbf{ }}$



### Custom-built

The In-Time service launch event, held in Vienna on January 25, 2011, showed that intermodal end-user services are delivered to mobile devices and provide intermodal traveler information services by using real-time information coming directly from the single transport operators. Rather than supporting just one single mobile platform, In-Time demonstrates that different end-user solutions can be provided by different end-user service providers, meaning the In-Time solution can be customized to a user's needs. In this respect, customized means both that different mobile platforms (iPhone, Smart Phone, Android) are supported and that customized services are delivered to the individual traveler as different travelers have different traveler needs.

( )

In-Time is a pilot project evaluating the acceptance, utility and impact of its services. The consortium is inviting residents and visitors to its six pilot cities to use and evaluate the In-Time service and traffic in Europe's cities become a test-user has resulted in chronic by downloading congestion – every year, the In-Time application (www. in-time-project. eu/en/test\_users/).

## n rea

If successful, the EU-funded In-Time project could yield a number of benefits for society, the environment and the individual. AustriaTech's Martin Böhm reveals more about this multimodal information service

he In-Time pilot project aims at drastic reductions in energy consumption in urban transport through the change of the single traveler's mobility behavior. The key is the provision of multimodal real-time traffic and travel information, allowing the traveler to make fully informed choices. The In-Time system will be piloted in six European cities with the goal of having a shift of individual travelers from road to public transport systems.

Traveling in foreign cities more often than not results in using road transport options (e.g. taxi or private car) – especially for business travelers. And even in well-known cities, the

use of motorized individual travel options seems to enjoy a big advantage against public transport - the traveler knows the departure time and all details for the journey for his/her car, whereas this same information for public transport is difficult to access. Even gaining access to timetable information relies on a walk to a station/stop or searching for a web address. And to get access to real-time public transport information is even

more difficult or indeed impossible.

But what if real-time public transport information is accessible for the single traveler in different European locations on his/her mobile device or sat-nav? In-Time partners expect that providing multimodal real-time traveler information services to mobile devices will enlarge the acceptance of public transport by

providing high-quality navigational services. The traveler can then receive travel options for all modes and - even in the case of traffic jams - alternative routes can be calculated for other modes, including reservations for car parks. This would allow travelers to switch to a more efficient mode according to real-time conditions. ۲

#### Transport policy

To ensure a broad acceptance by all stakeholders as well as high quality, In-Time has defined an interface for information exchange between infrastructure operators and traffic information service providers (serving the end user). In such a scenario, the single infrastructure operator is responsible for providing information about the current traffic status of the corresponding transport network, while the traffic information service provider is responsible for the traveler service provision to his customer group. This interface is defined in a way that no changes in running systems - with the infrastructure operators nor with the traffic information service providers – need be done. The interface definition consists of a definition and description of adapters that ensure that traffic information service providers have access to information located within regional sites (cities) or operators. To know which data and information is available at which site, a registry and catalog provides detailed information about accessible information including quality indication.

Road operators within the In-Time cities are committed to delivering road-related traffic

Increased

nearly €100 billion

are lost, representing

1% of the EU's

GDP

### Project Focus





information covering static road network data, dynamic traffic flow data, and dynamic traffic messages. This information includes travelrelevant roadwork information about accidents, incidents and congestion. Additionally, information about parking lots and park-andride facilities is provided, while dynamic parking information (capacity used of car parks) can optionally be provided.

Public transport operators provide public transport information covering all public transport modes (bus, train, subway, tram, and aircraft). The information provided to the traffic information service providers covers static public transport information as well as dynamic information on the real-timetable deviations.

Location-based information is provided by event operators and weather data service providers. In most cases, private operators will also have the possibility of providing information that might have an impact on traveler behavior and trip planning.

### Bringing about change

( )

By providing a broad set of travel-relevant data via the traffic information service providers to the single traveler, a change in travel behavior is expected. The modal shift toward public transport will reduce the use of passenger cars, which have a considerable environmental impact in urban areas. Therefore, the possible effect of real-time traveler information on mode choice is of particular importance. The expected modal shift depends on many factors – e.g. content, quality and reliability of information. As provision of information is one of the core objectives of the In-Time project, establishing a relation between information provision and mode choice is particularly relevant for quantifying the environmental impact.

The whole of 2011 will be used for pilottesting and validating the system in the cities of Bucharest (Romania), Brno (Czech Republic), Florence (Italy), Munich (Germany), Oslo (Norway), and Vienna (Austria). In the first stage, potentially more than eight million inhabitants will have the chance to benefit from interoperable and multimodal real-time traveler information services. Additionally, these pilot tests will show if, besides the technical achievements of In-Time, the expected change in traveler behavior resulting in a reduction of energy consumption can also be reached.

How and if these services will help city authorities to reduce energy consumption and make urban transport systems more sustainable will be validated in the pilot phase, taking the different environments of the six cities into account. As the whole specification is publicly available, subsequent cities and service providers will also be invited to install the solution by following guidelines on the website (in-time-project.eu) and thereby enlarging the In-Time community. O

Email martin.boehm@austriatech.org for more info

66 The modal shift toward public transport will reduce the use of passenger cars, which have a considerable environmental impact in urban areas

According to European figures, urban traffic is responsible for 40% of CO, emissions and 70% of emissions of other pollutants from road transport



$\cap 1 \cap$	Traffic Technology International Eebruary/March 2011
UΙΖ	www.TrafficTechnologyToday.com



s in almost every walk of life, if somebody comes up with a new idea for a traffic management project, one of the first questions asked is always 'How much is it going to cost?', usually followed shortly after by 'What are the benefits?' It's exactly these questions that traffic modeling can answer.

#### Value chain

The use of traffic simulation both helps to avoid costly mistakes on our road networks and provides a quantitative value – with regard to all measurable parameters – when it comes to assessing how a proposed scheme will impact on real-world conditions. Traffic engineers across the world depend on high-quality modeling. Particularly in today's budget conscious environment, using traffic models to conduct cost-benefit analysis (CBA) work is extremely useful. When consultants are drafted in to perform such tasks, they want to create simulations that use good quality data to produce detailed, informative scenarios. Any model is only as good as the data that's fed into it, so these kind of projects rely heavily on cooperation and collaboration between all parties involved. This requires software vendors, modeling experts, consultants and authorities (whether a DOT, toll road authority or other) to work together for the same overall aim. And the results that can be achieved when this all comes together are very impressive indeed.

We asked a few of the most highly regarded experts in this field to share details of some recent projects from around the world that showcase the importance of traffic modeling. The case studies on the following pages are testament to just how far simulation software has come. A million vehicles in one model? No problem. The biggest study of its kind ever conducted? No dramas. Read on to discover how the virtual world is ultimately impacting reality... O

# Number Crunchers

Today's computer processing power coupled with ever more sophisticated software means that traffic engineers are reaping the benefits of accurate and immensely valuable modeling. **Louise Smyth** speaks with three happy users counting themselves lucky

**Illustration courtesy of Magictorch** 



### Traffic Software | 🕒

### V for victory

In Melbourne, Australia there is currently a huge project being undertaken called the Hoddle Street Study. "Hoddle Street is critical to Melbourne's transport network, providing public transport connectivity to bus, train and tram services, access to the city center and an important north-south connection, explains David Sutanto, a traffic and transport engineer with Aurecon. "This important link in Melbourne's inner-east carries up to 90,000 vehicles per day. The aim of the overall Hoddle Street Study, managed by VicRoads, is to develop integrated transport options for consideration as part of future transport planning.

"The study began in late 2009 and is proposed to be completed by mid-2011. The Hoddle Vision consortium was engaged by VicRoads to develop and evaluate a range of integrated options to achieve the above objective. As part of this consortium, Aurecon developed a number of TRANSYT 13 models to assist with options development and understanding transport network implications."

۲

Aurecon built several models using TRL's TRANSYT, covering the study area, which consists of a 3.5km-long section of Hoddle Street with 18 sets of traffic signals. Sutanto reveals that Aurecon's modeling team faced three main challenges: "The first was the unprecedented size of the models. To include the entire study area within one TRANSYT file, each model contained over 80 nodes and 400 links. To enable TRANSYT to successfully process such large models, TRL made modifications to the software specifically for this project. The size of the models also meant there was an enormous amount of input and output data. To manage all of this information, Excel spreadsheets and macros were extensively used.

"The second challenge was the widespread congestion along Hoddle Street, which results in queues that cascade back from intersection to intersection. This meant that accurately modeling blocking back was a key consideration – the Cell Transmission Model (CTM) in TRANSYT 13 therefore came in





(Above and below) Melbourne's congested Hoddle Street area (Left) TRANYST screenshots of the modeling work

۲

useful. By using the CTM model, we built base models that were successfully validated against observed travel time data."

The complex traffic signal phasing that operates at many of the intersections along Hoddle Street was the third challenge. "As buses and trams run along and across Hoddle Street, there are special bus and tram priority phases operating at many of the intersections," Sutanto continues. "At one intersection, for example, there are special phases to allow buses to perform hook-turns (where they turn right from the left-hand side of the carriageway). However, the capabilities of TRANSYT enabled existing traffic signal phasing at all intersections to be appropriately modeled."

The models were used to investigate and understand both existing conditions and potential





operational impacts of each option being considered. Outputs from the models also enabled the performance change between each option and the existing situation to be quantified.

Sutanto describes TRANSYT's creator, TRL, as an "invaluable resource" during a project that pushed the software to its limits. "They were very responsive to any queries that we had, as well as making modifications to meet our needs."

However, when asked for his wish list for future offerings from software vendors such as TRL, he has a ready answer. "A software tool (possibly linked to a GIS) that could facilitate management and storage of data, interface automatically with a variety of modeling packages and convert this data to a format suitable for reports and presentations would be a dream come true!"



Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com



۲

uses StrongPoint technology to keep the traffic network safe!

۲

the brains (and logic processor) of Mobilityville's intersections!

Captain Centracs keeps traffic moving safely and efficiently!

information crucial to the city's ITS operations!

to quickly and accurately report on the city's traffic patterns!

Alone, they are powerful ...together, they are unstoppable! Stay tuned throughout 2011 as the Mobility League fights their greatest battle yet, against the villainous Von Gridlock! Visit www.econolite.com to learn more!



### Traffic Software

### California goals

Widely regarded as one of the most tech-savvy early adopters of ITS, Caltrans has long embraced traffic modeling. One of its recent projects involved Caltrans District 12 working with a team of industry experts to model a network of three heavily congested urban corridors. The State Route 22/I-405/I-605 Corridor System Management Plan (CSMP) is an ambitious scheme that will ultimately be a step on the path to true integrated corridor management.

On the planning side, the prime consultant, System Metric Group, brought in Braidwood Associates to conduct the modeling work that formed the heart of the cost-benefit analysis associated with all of the scenarios that were modeled. Richard Braidwood outlines this work: "Base models were calibrated in accordance with Caltrans' Guidelines for Applying Traffic Microsimulation Modeling Software. A 37-mile corridor was modeled, including both freeways and open-road sections. Fourhour time periods (both am and pm) were modeled.

"More than 200 zones were included, encompassing everything from HOV lanes to 75 ramp metering sites to 37 interchanges (including eight freeway-to-freeway interchanges). Turn and link counts, bottleneck locations and travel times were also features."

Braidwood is an independent specialist and for this project it was software from Quadstone Paramics that stepped up to the mark. What sort of challenges did the software have to deal with? "It's no exaggeration to describe this as a very large model," Braidwood says. "Couple that with the four-hour time period that we were simulating and it's clear that this was a complex undertaking. In this environment, data management is everything. If you don't understand, manage

(Above) The I-405 (Right) The complex nature of the corridors in this project (Far Right) Eight freeway to freeway interchanges were modeled



and interrogate the available traffic data at a very basic level, it can have long-term implications."

Another challenge common to all modeling projects is that of calibration: "You have to use your data to ensure that the model is representative of existing conditions. Good data is critical but what you do with it is just as important," he stresses. "This means continually evaluating the output statistics and visualization to ensure the model is representative of current traffic conditions. Successful modeling is not 'plug and play' – it requires ongoing analysis and modification to work out the potential benefits of each scenario and to achieve relevant, accurate results."

Although the modeling technology played its role efficiently here, Braidwood attributes a significant amount of the high-quality results provided due to simple teamwork: "The success of large-scale models such as this is about the team involved. There has to be a continuous flow of information between the agency and consultants as well as a willingness to collaborate. Experience and expertise is everything," he concludes.





( 🏟

### At a junction

In the UK, Transport for London (TfL) has recently developed an £8 million (US\$12.9 million) junction improvement scheme at Henlys Corner in the London Borough of Barnet, which will look to increasing traffic flow through the busy, congested junction while improving pedestrian and cycling facilities throughout the area. Work on the scheme is expected to be completed by the end of the year.

"Modeling carried out by Colin Buchanan helped TfL in the design development of the improved junction, allowing for controlled pedestrian and cycling crossings to be installed while also delivering benefits to traffic," says Faiz Nassiri, head of transport modeling at Colin Buchanan, explaining the role the



traffic team played in paving the way for this work to go ahead. "In addition, we used an existing strategic model to assess the likely traffic reassignment and journey time impacts caused by the traffic management plans for the project."

Several models were used in this project, as Nassiri reveals: "TRANSYT and VISSIM A number of models were used to assess work on a junction improvement scheme at Henlys Corner in London

models built by our traffic team were initially used to develop the proposed junction improvement scheme, while the reassignment impacts of the traffic management plans during construction were assessed using an existing SATURN model.

"The outputs from the SATURN modeling were used to direct work associated with mitigating the impacts on the surrounding network during the construction period," he adds.

۲

"We also added a nearby TfL road improvement scheme at Bounds Green to the SATURN model assessment to identify what the combined traffic impact of constructing both schemes at the same time would be. The results showed that constructing both schemes concurrently would not lead to a significant increase in congestion or reassignment, but would minimize the overall cost and duration of disruption to the TfL road network."

Nassiri finds traffic modeling invaluable to his work, but he also offers a note of caution: "There are several products to choose from and it is important to pick the right tools for a specific task."



Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com

(

### **Road tested**



AVT cameras have passed the road test. Deployed in the most sophisticated ITS systems around the world, they feature up to 205 fps, remote lens control, and up to 16 megapixels. They've outmaneuvered the competition with advanced triggering, strobe, and synchronization features, flexible programmability, and up to 240 MB/s of continuous image transfer. With long-range connectivity options and a robust housing, you'll never worry where to park them. To find a model for your next traffic control system, make your first stop www.AlliedVisionTec.com/RoadTested.



Pavement Markings



۲

018 Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com



Pavement Markings

# Road angels

Cast aside any aspersions you might have about the humble pavement marking. As **Nick Bradley** finds, these life-savers are worth every cent, while developments on the horizon are set to advance safety levels to a much higher plane

Illustration courtesy of Tim Ellis

۲

۲

WWW hat's most appealing about road markings as a subject is that there's quite literally more to them than meets the eye. Increased demands for durability, enhanced retroreflective performance and cost remain the focus of much research and development, while advances in wireless communications, LEDs and power supply indicate the humble road stud has entered a whole new era of intelligence.

The upshot of such advances are the allimportant safety benefits. "A pot of white paint can save lives," advises George Lee, the long-time chairman of the UK-based Road Safety Markings Association, the activities of which are monitored globally. "One of our priorities is to keep the message out there that road markings are the most cost-effective road safety solution that Local Authorities can select – and now we believe we have the evidence to demonstrate that if you let them deteriorate, your roads will become more dangerous."

### The missing link

Lee is referring to the publication of a Road Safety Foundation report at the back end of 2010 that revealed the UK's 10 most dangerous roads based on KSI statistics.





### **DELTA** - we help improve driving safety

State of the art retroreflectometers that professionals rely on



- The leading global supplier of retroreflectometers
- Measures retroreflection from pavement markings and traffic signs
- Instruments are very easy to calibrate and very simple to operate
- Accurate measurements using state of the art technology



Measurements of all types of white and yellow pavement markings



**RetroSign GR1/GR3** 

Measurements of all colours and types of retroreflective sheetings in one



### **DELTA** - we help improve driving safety

State of the art retroreflectometers that professionals rely on



۲



Measurements of white and yell ment markings



۲

- The leading global supplier of retroreflectometers
- Measures retroreflection from pavement markings and traffic signs
- Instruments are very easy to calibrate and very simple to operate
- Accurate measurements using state of the art technology

roadsensors@delta.dk

We help ideas meet t

Eight of these fatal stretches featured center line markings that were so worn almost a third were non-existent, while 50% of those analyzed fell well below the minimum specifiable standard. "Historically, we've been able to state with confidence that if you improve your road markings, you reduce accidents," Lee continues. "But up until last August, we couldn't say with any degree of certainty that the opposite was true. It's the first time we've been able to say there is a clear correlation between poor road markings and high KSI rates."

According to the report, the most dangerous road passed through Eaglesfield in Sheffield, which Lee estimates would cost a mere £25,000 to bring up to the mark. "The leaders of some city councils are taking home more than that in expenses alone, so to see such a relatively paltry sum of money not being invested into the safety of the network is a travesty. You're only looking at just over £500,000 to rectify all of the roads in that list of 10 – that's not even a third of the cost of one life lost as the result of a road traffic accident."

But in these times of austerity and cutbacks, won't council leaders just claim there's not enough money in the pot? "A journalist from a local Wakefield newspaper posed that very same question a few weeks back," Lee recalls. "If councillors told me they couldn't find the money to sort this out, I'd tell them to resign and elect someone who could, because if you're not capable of finding such negligible sums needed to fix the road, you're not fit to be in office!"

Lee exudes all of the passion you would expect of a Scotsman (particularly one with a background in political spheres) but when armed with the type of statistics at his disposal, it's easy to see why a lack of foresight on the part of some authorities – although he is keen to stress not all – gets his back up.

One that deserves a pat on the back is Cheshire County Council. Between 2000-2003, there were 16 recorded personal injury accidents on the A556, two of which were serious, with four occurring at night and in wet conditions. Following the deployment



### 🕥 | The shining examples

you google 'LED road stud', you'll be confronted with more than 12 million hits – countless suppliers, many from the Far East, claiming to offer the best available technology on the market, yet in reality are far from effective. "One of the stand out is that they're designed to work throughout the annual cycle," explains Graham Muspratt. "You can get a stud from China, Korea or Malaysia and in the summer it's great; it charges throughout the day and remains on throughout the night. But you've still



got that stud installed in February, when the daylight is such that they are only charged for a few hours. You can't have that with a safety-critical product. "We have a battery capacity that will give 10 days of continuous light output, which means we can guarantee that in the middle of winter when they've been under snow for a couple of days, without any daylight to charge them, you know that when the snow melts they'll come on at dusk, switch off at dawn, and provide light every night throughout the winter period."

of a wet-night product, up until the publication of the results in 2007, there were just six accidents, none of which were serious or for that matter occurring during wet-night conditions. Cheshire prioritizes safety schemes based on a minimum ROI of 200%, yet reported a first-year rate of return of 550%. Subsequently, the council rolled out the deployment of wet-night markings on half of its A-class roads, resulting in an overall 14.3% drop in accidents, equivalent to a cost-



I'm the original reflector

George Lee, chairman, Road Safety Markings Association, UK



Left: The majority of thr UK's deadliest roads were also those with poorly marked or non-existent road markings

saving of £8.4 million to the local economy. Similarly, Durham County Council analyzed the safety benefits of enhanced road markings following extensive work to its intersection layouts. And the result? As well as a 50% reduction in accidents, directly attributable to improved road marking layouts, and a reduction in speed in the 85<sup>th</sup> percentile, the local council in Durham reported a reduction in vehicles breaking the speed limit and an average firstyear rate of return of a whopping 1,868%. Not bad for a pot of paint.

### The wider view

Such figures are all-too familiar to Paul Carlson, who heads up the Visibility Research Laboratory at the Texas Transportation Institute in the USA. Having been invited to speak at the RSMA's 12<sup>th</sup> Annual Conference in 2010, Carlson is well aware of Lee's latest findings concerning poor or non-existent road markings and high KSIs. "We have anecdotal evidence here, but nothing that concrete," says Carlson, who's been working in the field for nearly two decades. "If there are minimum maintenance levels over there in the UK, it sounds like they're not being enforced," he adds. "Whether good or bad, something that seems to work over here is the tort system. It tends to force agencies to abide by any minimum standards because if they don't, they know they're going to be sued!"

February/March 2011 Traffic Technology International 021 www.TrafficTechnologyToday.com

### Pavement Markings | 😋



Carlson was at the RSMA conference to reveal some of his findings about the safety benefits of wider markings, particularly in rural areas. "Our default margin in the USA is 4in (100mm), but there's a fair amount of interest to go to a wider marking," he reveals. "Some interstates have already done this but these are naturally the safest roads in the country anyway, so if you really want to maximize the benefits of deploying a wider edge line, the biggest impact would be on our rural, two-lane highways."

۲

Responsible for the visibility work that supported the USDOT's efforts when the Department initiated its rulemaking into minimum retroreflectivity requirements, Carlson's work at TTI is clearly valued within senior circles in Washington. But why does wider mean better in the field of pavement markings? "A lot of it is to do with long-range driving comfort levels - in other words, for how far can you see the markings," Carlson states. "On rural, twolane highways, you tend to have more curves, more hills – it's a much more severe road geometry than you experience on a freeway. The reason we're seeing a safety benefit is not because of the long-range distance but because of the easier vision of the edge lines in the peripheral vision. When you're looking straight ahead, you can see stuff at the side but it tends to be blurred - you stand a better chance of seeing a wider edge line. Our research shows that it doesn't have to be high milicandela to be effective. We're not necessarily suggesting wider edge lines and higher retro; we're suggesting wider edge lines as a result of the improved near-field vision, which helps the driver to maintain a better position on the road."

An obstacle to the more extensive deployment of wider edge lines, however, could be a shortage of the raw materials necessary, particularly the titanium dioxide ingredient in the binders, as well as certain resins within the thermoplastics. "This global shortage has been having an effect on the industry since the beginning of 2010 and it's still having an impact today," Carlson



...Instead of putting down more paint, a lot of agencies here in the USA are putting down less material. We always assumed these types of materials were unlimited, but they're not

Paul Carlson, Visibility Research Laboratory, TTI, USA



(Top left) Carlson's research could be critical for the UK due to the significant level of night-time accidents on rural roads consistently recorded each year reports. "So instead of putting down more paint, a lot of agencies here in the USA are putting down less material." Does Carlson therefore think this imbalance between supply and demand might dampen the enthusiasm to his research on wider lines? "Potentially, yes. But we do have a strong push for road safety here in the USA. Ultimately, if you can document the benefits of any countermeasure – whether that be signs, road stripes or studs – it has a good chance of being implemented, particularly if the research conducted is well-founded and credible."

#### If Apple made road studs

As traffic authorities worldwide search for more dynamic traffic management in order to reduce congestion and improve safety, they have turned to a centuries-old method of influencing drivers' behavior – light. There is an acceptance that high-contrast warning lights do reduce the number of fatal accidents – an alerted driver will travel at a slower speed and will drive with greater awareness, therefore reducing the number of accidents and saving lives.

That said, the lights used on today's roads are very different to more traditional installations, with LED lighting establishing a larger footprint in traffic management. Although the LED hardware costs are similar to traditional lighting, high energy savings, longer product life spans and lower associated product maintenance requirements have made them particularly popular and effective.

### Solution An electronic eye on quality

ow dependent are lane assist or lane departure warning systems on road marking quality and visibility? "We built a rain tunnel here at TTI in which you can drive and simulate rainfall," says Paul Carlson from TTI's Visibility Research Laboratory. "Our research shows that most, if not all, LDW systems based on optics fail under a cover



of rain when the markings are not visible enough."

"In general, if a human can see the lane marking, the system can too," suggests Abbas Mohaddes, CEO of Iteris, a leading supplier of LDW systems to the truck market. "But methods that can be used to compensate for bad visibility, blinding lights, etc, that may make them better in some cases." And if these systems are to be increasingly prevalent on an increasingly poorly marked road network, Mohaddes has another technical answer.

"Our system interpolates through the gaps [in the lane markings] as much as it can." ( )

"We've initiated some very preliminary work to use some new sensing technologies rather than something based on machine vision, so the sensing mechanism would be effective regardless of the conditions," Carlson continues. It's proposed that the marking have a sensor embedded within it that communicates with the vehicle, in order to help the vehicle maintain its position on the road at all times.

D22 Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com





(Left) **3i Innovation technology in the Saltash tunnel on the A38 in the UK** (Above) **Wider lines can bring safety benefits to rural road users** 

The topic of on-road LED lighting is very familiar to New Zealand's 3i Innovation. "We've sold more than 600 traffic applications in 16 countries, plus we have one the broadest range of traffic applications," reveals Charles Maud, CEO. "Our solutions are used in some of the world's most influential and important traffic infrastructures including the Golden Gate Bridge in San Francisco, Los Angeles' oldest and busiest freeway, the I-110, and the iconic Elbtunnel in Hamburg."

Core to this success has been the technical advantages of wireless power. Inductive Power Transfer (IPT) is the technique that sees power coupled across an air (or other non-metallic material) gap by magnetic induction. In other words, power is transferred without making direct contact with a cable, making it wireless. When it comes to traffic applications, the cable is sealed into the road and the light units are situated on the road surface above it. "As there are no wired connections, there's no corrosion so they have a much longer life expectancy, plus the system doesn't incorporate sparks or electrocution danger, making it much safer to use," Maud adds. "They're faster to install, detect faults quicker and the system is easier to maintain than traditional approaches. Also, the wireless connection means the light units' tolerance can be moved without breaking the power connection."

( )

3i Innovation has the worldwide licences for wireless powered LED lighting applications and using their power supply means that information can be sent via the cable and then wirelessly to each light, controlling its output (for example whether it flashes, what sequence they go in and the degrees of brightness) and receiving data from each unit. The power supply itself can run up to 2km with 200 road markers from a single source, plus it can be powered by both mains and by a solar panel.

The company has spent two years developing what Maud claims to be the first low-profile, inductively powered, intelligent road marker. The iiiLEVEL (pronounced eye level) is manufactured from high-tech polycarbonates and uses energy-efficient LEDs. "Leading traffic engineers have requested a road marker with a low profile due to snowplow problems and use in heavy traffic situations," he confirms.

Fifteen years in the industry has provided 3i Innovation with an in-depth understanding of not only the dynamics of the road environment but also how these products rely on a quality environment. "There's simply no point in having a US\$2 strap on a Rolex watch," Maud says. "LEDs do have long life spans, but they'll only last as long as the environment that surrounds them allows."

3i Innovation uses a combination of mechanical endurance evaluation systems, subjecting the road markers to destructive testing, so relative lifespans of individual products can be compared. "This allows us to isolate any weaknesses in the devices so we can continually improve their performance," Maud says. "We also employ a mechanical percussion system

### PTV. The Transportation Experts.



### Following your Visions – Make a difference.

Analyse and optimise your transportation network with PTV Vision, the benchmark for Transportation Intelligence.

Our sustainable software solutions help transportation professionals to develop future-orientated concepts and strategies – saving our resources and keeping us mobile.

### Come and talk to us at:

 Traffex in Birmingham, Booth No. C32

PTV AG Stumpfstr. 1 76131 Karlsruhe, Germany Tel. +49 721 9651-300 ptvvision@ptv.de www.ptvag.com



### Pavement Markings | 😋

for localized endurance testing, and to add greater integrity to the findings we use an independent university-based hydraulic cycling system. Applying a repeating sinusoidal load to the light's outer shell creates a reliable endurance testing method."

The growth of on-road LED lighting is not only about the underlying effectiveness and benefits but also the initial investment. "The companies that demonstrate a total cost of ownership calculation – including an initial upfront installation investment, product survival rates and ongoing maintenance costs, against qualified benefits to the traffic environments – will capture the greatest marketshare," Maud insists.

As for the future of on-road lighting, Maud predicts more dynamic systems that generate greater traffic control. "Our systems not only send information to lights but also receive data from each light unit," he says. "Each has independent diagnostic capabilities, including things such as a report of the marker performance, vehicle counting, road temperature and vehicle speeds. This could result in on-road lights that respond to drivers speeding into dangerous curves by flashing, or even alerting drivers to black ice by changing the color to blue. All of this is possible using current 3i Innovation technology."

#### The green party

(4)

Another company that's experimenting with such active road studs is Astucia. "They allow you to do so much more than the traditional variants, which do little else than reflect light back at the driver," says Clearview Traffic's Graham Muspratt. "We've done trials in the past where a series of studs between the inside lane and hard shoulder will provide drivers with advanced warnings of queuing traffic ahead, which is one of the largest sources of accidents on motorways. I definitely see a future for more dynamic lane markings, even in conjunction with hard shoulder running, enhancing safety at pedestrian crossings, at intersections, as well as real-

SolarLite road studs provide the driver a tenfold increase in visibility of the layout of the road ahead



Traffic Technology International February/March 2011 ()/4 www.TrafficTechnologyToday.com

### Measurement on the move

anish company DELTA pioneered the concept of collimated optics technology in handheld retroreflectometers around 30 years ago. Now, though, it's introduced LTL-M – a new generation of mobile retroreflectometers.

LTL-M measures the detailed cross-sectional retroreflection of markings. Many markings have strong transversal variation, so a reading taken by a handheld instrument with a 40-50mm wide measurement field in the center doesn't necessarily represent true visibility. LTL-M provides a detailed analysis of this variation, which can be correlated both to the true visibility as the driver sees the marking, or to a middle section for correlation with a handheld unit.

LTL-M can also measure white and yellow markings without recalibration, while markings with a profile depth up to 15mm can be measured, as well as the daylight contrast between the road surface and the road marking. It additionally measures the geometry of the road marking, including width and gaps in broken lines and damaged lines. One or two lines, such as double center lines, can also be measured simultaneously.

A marking offset function, meanwhile, enables the transverse offset on a restriped marking to be measured. Users can also detect missing or nonworking raised pavement markers (RPM) used separately or in combination with road markings. Easily calibrated in the field, using a calibration standard in line with NIST and PTB, the system can also be integrated in existing road monitoring vehicles or in standard cars with minimal effort and modification, negating the need for special vehicles.

Measurement data can be exported to a GIS to map the markings and requisite RPM properties. Annual monitoring coupled with additional data such as traffic density and accident site evaluations, can be used for decision-making in maintenance planning to help optimize safety and efficiency.



time warnings about accidents up-stream. Ultimately, the more you can do to warn drivers about road conditions, especially on motorways, the more you can enhance safety further.

"Road safety is obviously still high on the agenda, but there are all sorts of discussions ongoing within Local Authorities and at the Highways Agency about streetlight reductions and reducing the energy consumption of streetlighting," Muspratt continues, alluding to its type-approved Astucia solar studs playing a role. "Over the past 18 months, we've installed around 35,000 studs on the HA network – we've got 30km on the A2 and A20 in Kent, we've got them on the M25 between Junctions 5 and 6, as well as at two locations on the M40," he reveals. "We won't ever push them as a direct replacement for streetlighting because they never will be, but at specific locations they are more than suitable when authorities would prefer not to install streetlighting, or if they're looking at reducing the amount of time that streetlights are switched on, if at all, providing you've got other safety measures in place."

In the case of the Kent deployments, areas of outstanding natural beauty, Muspratt says the installation of streetlighting would have been frowned upon by local conservation groups, particularly in respect of light pollution. Equally, the areas are subject to very specific sea mist and localized mist and fog conditions, so visibility remains a cause for concern. "Traditional road studs just disappear in fog, which is really bad at scattering light – whereas an intelligent road stud that has its own light source will still continue to get at least some light through. Traditional retroreflective road studs also lose peformance after around six months, and after 18 months to two years they're virtually dead and buried. Active road studs perform better and for longer, even when faced with dirt, which is a big problem for retroreflective studs." O









### 🔘 | Brian Negus

### The RACV is the voice for more than two million Victorian drivers – and it's **Brian Negus**'s task to ensure that voice is heard

Interviewed by Nick Bradley

he RACV's general manager of Public Policy, Brian Negus, is a very busy man - so much so it is sometimes easier to establish his whereabouts through the Australian press, since he is continually in demand to pass comment on any number of transport issues. As we speak, he is disembarking a flight in Melbourne following a trip to Canberra, where he called on the new Australian coalition government to lift its game and "get serious" about its National Road Safety Strategy over the next decade. While in the capital, Negus may have also made his feelings felt about a proposed carbon tax, slated for introduction in the middle of 2011, as well as pointing out the consequences of not investing - and investing big - in transport infrastructure.

### The RACV family

These are all legitimate concerns of RACV members, some two million of them, and it is Negus's job to make sure their voices are heard at both a state and federal level. "My role encompasses formulating policy for the entire transport sector, through appropriate technical research of what is feasible and best practice, as well as through member research," he explains. This would cover aspects such as road operational and public transport issues, road safety, safer vehicles, road user behavior, driver education and training, as well as environmental issues. "The key is to come up with strategies and

It's absolutely critical for us to tackle the young driver problem, who represent 23% of all fatalities despite only making up 13% of the driving population



### Brian Negus | 🔘



proposals to improve the transport sector in all of those areas and to share those with our stakeholders. Our other role is to act as an advocate to government in the context of trying to get those improvements, as well as securing funding in order for those improvements to take place."

The RACV is a very effective policy formulator, evidenced not least in the area of road safety where it has played vital roles in not only getting the Victorian government to mandate ESC on all new cars registered in the state – a move now adopted at a federal level across Australia – but also in wider driver behavioral issues. "It's absolutely critical for us to tackle the young driver problem," he says, "who represent 23% of all fatalities despite only making up 13% of the driving population."

According to Negus, every year around 70 road users aged between 18 and 25 are killed in Victoria and a further 1,800 seriously injured. "They're most at risk as soon as they obtain their probationary licenses and in that first year of driving in fact, their risk of crashing is three times higher than that of an experienced driver." Moreover, crash statistics show that 26% of fatal crashes involving probationary drivers take place when the young driver is carrying multiple passengers - new P-plate drivers are four times more likely to be in a fatal crash if they're carrying more than one passenger. "We tackled this head-on and as a result the Victorian government limited the number of peer-age passengers in the vehicle to just one."

#### The taxation debate

Negus is hoping to exert similarly effective pressure in respect of motorists' taxation. "The former Treasury Secretary, Ken That 38¢ fuel excise is purely arbitrary – only 12¢ goes back to improve transport – so it's our view that government is ripping off motorists to the tune of 26¢ a liter to bolster their budgets

Henry, put forward a road user charge in his taxation reform report and we were broadly supportive of some of the measures he was proposing," Negus states. "The fixed taxes we have in place – fuel excise, sales tax, registration, the luxury car tax, and so on – are really counterproductive in sending the right cues to the motoring community about the real cost of their travel. Motorists are already being overtaxed. Our stance is that the arbitrary 38¢ a liter and some of the other fixed taxes be removed and a road user charge put in place with three specific components that take into account the use of (and damage to) the infrastructure, an environmental charge, and a congestion tax. Only 12¢ a liter goes back to improve transport, so it's our view that the government is ripping off motorists to the tune of 26¢ a liter to bolster their budgets. We suggest all of the revenue raised from a road user charge be spent on transport.

"The current taxation system doesn't send the right signals about mode choice," Negus feels. "With a properly structured road user charge, motorists in rural areas would pay less than their current charges, while those who use the infrastructure most, damage the road and pollute the air the most, and drive at peak hours would pay more. As acknowledged in the Henry report, our current road tax arrangements will not meet our future transport challenges – they're detrimental to the amenity, sustainability, liveability and productivity of our society. The report also predicted congestion may end up costing the Australian economy around AU\$20 billion a year by 2020 if we stand still. The best long-term approach to reducing congestion would be to better manage road use through efficient pricing."

A road user charge might be some way off though. In the meantime, the RACV and other motoring clubs in Australia are still fighting their members' corners and have sought assurances from the new government and Prime Minister Julia Gillard that previous commitments to offset any carbon tax on fuel with a corresponding drop in excise would be honored. "It should definitely be part of the existing fuel excise, which was the case with the original emissions trading scheme, but so far what's coming out of the government on this is long on rhetoric and short on detail."

They certainly need some new thinking in Melbourne, as any Melburnian commuter will testify, where the cost of congestion is expected to rise to AU\$6 billion a year by 2020 from its current AU\$2.7 billion a year. The Victorian Linking Melbourne report stated that around 640km of the arterial road network is congested at peak times, contributing 2.9 million tonnes of CO, a year. "It's early days for the new government," Negus says. "We want to work with them to identify key road and public transport projects that we believe can make a difference, such as closing some of the freeway gaps at the end of the Eastern Freeway, as well joining the Metropolitan ring road around to EastLink in the northeast of Melbourne. Our members certainly feel Melbourne's roads are worse than they were five years ago, and we need immediate action and good transport plans in place to make sure it improves." O



Brian Negus believes that PPPs have had a bad press in the Australian media, but when the risk profiles are properly structured and traffic predictions are realistic, he says they remain a solid delivery mechanism for major road and transport projects. "The problem is the press always lands on the projects that go belly up, and that's what people read, so they think all freeway and toll projects delivered by PPPs are basket cases! "Citul ink pretty obviously

"CityLink pretty obviously got it right, although funded

through investment bonds, and you have to say that EastLink – although it has suffered a bit in the stock market – is growing significantly in terms of both normal traffic and heavy vehicle traffic. They're on target to meet their goals."

Traffic Technology International February/March 2011 028 www.TrafficTechnologyToday.com













۲





### Make your city a model city.

Every day, thousands of transport planners around the world use INRO software to model urban, metropolitan and regional transportation systems, and to evaluate the transport policy that affects us all.

INRO software is built to handle the rigors of complex transport systems; to account for the diverse technological, social, and economic challenges facing planners today.

### **r** Emme **r** Dyname

Travel demand forecasting

**Dynameq** Dynamic traffic assignment

Learn how INRO software can help make your city a model city.

www.inrosoftware.com

**GRASSHOPPER**<sup>2</sup> HIGH SENSITIVITY + HIGH RESOLUTION CAMERAS



- Traffic surveillance
- Vehicle identification
- Speed enforcement
- Red-light enforcement

 $( \bullet )$ 

The Grasshopper2 CCD camera with Gigabit Ethernet interface is an excellent choice for ITS applications that require high quality images in demanding traffic environments. This superior imaging device provides an outstanding price-performance ratio, and features opto-isolated GPIO for industrial triggering and strobe output, multi-trigger mode support and automatic white balance.



For pricing or to order online visit www.grasshopper2.com





### Video Tolling

## Artistic license

A creative approach to road user charging using ALPR technology is helping to advance the business case and viability of such systems. **Louise Smyth** paints a picture of the current landscape

Main photograph courtesy of NTTA

۲

ny scheme that involves taking photos of a vehicle's license plate to bill that vehicle for its road usage is a complicated affair. Although it may sound easy in principle, there's an array of factors involved in operating such schemes successfully. Technology has contributed greatly to making video tolling more commercially viable, with credit due to improved cameras, better illumination and intelligent back-office systems. But it's the OCR software that enables automatic license plate recognition that has made the biggest impact. Most modern video tolling systems have embraced ALPR, meaning they can do away with armies of humans manually entering in plate details.

### Swede success

۲

One of the greatest success stories in this sector is still Stockholm's congestion charging scheme, which went live in 2007. Birger Höök, the director of the scheme at the Swedish Transport Agency says that the ALPR figures speak for themselves: "On an average day, around 95-96% of plates can be read by OCR; we only have to do about 4% or 5% manually. On some wintry days, we do have to read more manually – if it's snowing a lot or license plates are affected by mud, so on those days the manual readings can be up to 30%."

Höök is reasonably content with these statistics – after all, he remembers when the scheme first started and over 400 staff were in a control center to assist with billing, whereas today there are just 30. To further reduce those numbers, he says he wants to 'electrify' the whole system, by sending all bills electronically and so on. To obtain greater accuracy on the OCR side, Höök says that the STA works with Q-Free, whose Dacolian software powers the ALPR, on an ongoing basis. "We are getting more information all of the time, getting to know the system better and finding problems to solve, such as giving Q-Free extra details to improve the programming."

Höök explains that Sweden's choice to embrace a video-based system was in part due to the fact that the country already had a very good traffic registry – if plates could be read, they could easily be found in this up-to-date register. Not every authority working in this field has that luxury.

In North America, where video tolling is big business, license plates and their associated details are a whole lot more complicated



### Video Tolling | 🕒

۲

#### than in Sweden. One agency that is being proactive in addressing the issue of 'problematic plates' is the Central Texas Regional Mobility Authority (CTRMA). "Approximately 20% of our total transactions are video tolls and 12% of those are problematic," explains Steve Pustelnyk.

INEX/Zamir's ALPR camera with built-in

illuminato

A chunk of that 12% is comprised of temporary plates, meaning the problem is not something the toll authority (or indeed the video tolling integrators) can possibly control. "This issue is being addressed by better accountability for those plates," Pustelnyk continues. "The Department of Motor Vehicles (DMV) is requiring that vehicle owner information be submitted promptly when temporary plates are issued, which allows us to run the plate number and issue video bills to these customers just like any other customer."

Another long-running issue is that of out-of-state plates. "This revolves around the cost of acquiring the owner information compared with the generally small toll charges that most out-of-state drivers incur," Pustelnyk observes. "There is also the challenge of collecting from out-of-state drivers who fail to pay – is it cost-effective to pursue such drivers unless they are chronic offenders with high outstanding balances?"

Pustelnyk is happy with the current ALPR technology that's deployed in Texas, a state where most plates are black text on a white background so consequently don't present a huge challenge to the OCR systems. In his view, however, the biggest hindrance to OCR is the proliferation of specialty plates with color schemes that are problematic for OCR engines. "Also, DMVs in some instances are issuing specialty plates that have the same number as other specialty plates," he adds.

### Vanity at what cost?

This issue in particular prevents ALPRbased tolling from becoming more costefficient and is a source of frustration to the technology vendors that are trying to encourage wider adoption. "If the states got organized among themselves and communicated when assigning syntax numbers and letters to make it a little easier for those of us trying to read their plates, life would be far simpler," says Jim Kennedy from INEX/Zamir. "That's unlikely to happen though, because millions of dollars are realized in sales of vanity plates; in some states, one in six plates is a vanity plate."

Kennedy's company has supplied the ALPR systems for some of the flagship video

### 🕥 | Just passing through

great example of the business case for video tolling can be seen in the PlatePass system. "Essentially, PlatePass is an intermediary between toll authorities and fleets," says Philip Underhill, vice president of operations, as he explains how the scheme works. "Those fleets can be rental car customers or commercial fleet management companies. We establish accounts with major toll authorities in North America. We prefund those accounts and we either register license plates or we purchase transponders that we then provide to rental fleet customers or

fleet management company customers.

"Once we download the tolls that occur against either the vehicle license plates or the transponders that are registered to our accounts, we aggregate those transactions, match them up with individuals and then we will either charge credit cards, charge fleet accounts or invoice customers for the tolls that they incurred during their time of possession of a specific vehicle."

The particularly smart thing about this system is that it is making use of exisiting technology. PlatePass simply does



a lot more with the data that video tolling systems produce. "We're the biggest customer for some of these toll roads, and we work collaboratively to help identify which vehicles we own so they can charge us. We're already setting an example and being referred to as 'the nationwide interoperable toll network' - we just need others to follow that example."

tolling projects in the USA. Miami Dade's widely heralded conversion to AETC relied on INEX/Zamir systems, as does the Illinois Tollway, which – with an initial deployment of 225 cameras – is one of the biggest US projects so far in terms of lane equipment. What is rare about INEX/Zamir is that the ALPR is offered as an entire system, all created in-house. The company supplies a camera with built-in illuminator, the OCR software, as well as the processor upon which the software resides. There is no badge engineering and nobody else to blame if any one of these components fail. This absolute dedication to getting every part of the system right has led to the company being able to offer exceptional levels of accuracy, although Kennedy is wary of making general claims about this matter. "It's dangerous waters," he says. "With some systems, for

### In the long term, I believe an RFIDtype solution that is built into the vehicle or permanently affixed to it would be the best solution

Steve Pustelnyk, Central Texas Regional Mobility Authority, USA



instance in Israel where every plate just has numbers and no letters, we are achieving 98% recognition accuracy. But there are few places tougher than the USA and we'd be foolish to claim a set figure for every situation. Tolling is undoubtedly a demanding application for us. Unlike the work we do for gated communities or travel-time systems, in tolling every vehicle that goes by represents revenue."

Similar to Stockholm, ongoing development on the OCR side is key to raising accuracy levels even higher. "One example is that up to 85% of toll violators are actually subscribers to the toll road; they have a transponder that's broken or that just didn't read," Kennedy explains. "So right away we know that up to 85% of these plates are listed somewhere. If we're clever enough to tie together the time and place that we read a plate – say we read a plate with 'ABC 123' and there's a subscriber that passes through the same toll gantry at the same time every day – that allows us to make some assumptions. So we are constantly data mining to help raise the confidence levels."

032 **Traffic Technology International** February/March 2011 www.TrafficTechnologyToday.com



(Left) INEX/Zamir offers what's known as 'triple flash visualization' (Below left) Charging in Stockholm (Below right) Toll signage in Texas



ETC Corporation is a well-known systems integrator that has brought INEX/Zamir into the bid for several big video tolling projects. As well as the previously mentioned Miami Dade and Illinois Tollways schemes, the two companies recently worked together on the North Texas Tollway Authority's conversion to AETC, where ETC designed the ZipCash video billing system that is now in use. ETC's CEO, Tim Gallagher, relishes the projects that allow his team to have a say in the technology that's deployed. "As an integrator, we don't always get our choice – sometimes the toll agency asks us to integrate with some legacy equipment – but when it is up to us, we don't necessarily look for the cutting edge; instead we look for advanced, proven and reliable products and that's what we see with the INEX/Zamir product set.

"They are high-resolution cameras that are digitally controlled, coupled with a very good OCR engine," he continues. "We've had excellent results with INEX/Zamir in several projects, including the highest volume and most technically complex."

Despite these "excellent results", Gallagher says that work can be done to make video tolling more cost-effective and appealing to authorities as a result. He agrees with Jim Kennedy that what happens in the back-office is as important as the quality of the equipment at the roadside. "We're building smarter back-end solutions that incorporate things such as recognition of prior plates to help improve results. Even with such advances, I don't think you'll ever do away with the need for some human interaction.

"Moving forward, I don't see a future in which video tolling is the only solution for the US market – unless there's a dramatic change in the license plate itself. The plates here are just too complicated. I think video tolling goes hand-in-hand with other charging technologies such as DSRC and that they should be regarded as complementary – not as competition."

CTRMA's Pustelnyk concurs that complementary technologies would offer the greatest benefits: "I believe an RFID-type solution built into the vehicle or permanently affixed to it would be the best solution. Mexico is in the process of requiring RFID registration stickers on every vehicle in the country. In my opinion, this type of solution, using video as a backup, offers the highest degree of reliability in the capture of vehicle information and offers the best opportunity to collect revenue while minimizing operating costs." O



See the big picture Improve your vehicle identification with VIS-CAM 500

12 pixels per inch

Get the image quality and lane coverage you need with JAI's new VIS-CAM 500 vehicle imaging system. The VIS-CAM 500 adds 3.2-megapixel resolution, increased dynamic range, and an improved housing to the proven performance features of JAI's VIS-CAM family.

With VIS-CAM 500, you can achieve a full 15' horizontal and 12' vertical field of view, while maintaining the high pixel density needed to maximize automated plate reading. Proven VIS-CAM lane controller integration ensures consistent positioning within the image, while the wide FOV and high-res color capabilities support higher read rates and easier vehicle identification when manual review is required.

And with on-board JPEG compression, standard network interfaces, and built-in FTP and DHCP clients, the VIS-CAM 500 can be easily integrated into almost any ITS project.

To learn more, give us a call, and see your next project from a wider perspective.

Americas: +1 800 445-5444 Europe & Middle East: +45 4457 8888 Asia Pacific: +81 45-440-0154 www.jai.com



()


034 Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com

# Private Provide the second state of the second

Illustration courtesy of Shutterstock

۲

he engineering solution to traffic congestion is simple to describe but very complex to deploy. The keystone to its solution, congestion pricing, has evident technical and economic components, but its core and most difficult issues are social. Issues such as affordability, fairness and equitability are complex to argue as well as to solve. But the issue most commonly raised in protest against congestion pricing is privacy. And this is frequently expressed in the most personal of terms – for example, 'I don't want my spouse to know where I am.' I'm sure you'll agree that privacy is important for more reasons other than this.

Privacy is a concern because congestion-pricing systems need some mechanism to be sure the right vehicle (or vehicle owner) will be billed the correct fee on behalf of the correct road operator. It doesn't matter which technology we propose to use, the privacy issue can always be raised. To make matters worse, all of the technologies used to collect payment for road use – even the collection of fuel taxes – can be viewed as having a privacy issue. The reason for this is that any payment that is made at a specific location – or because your vehicle was at a specific location – could

# | The 7 Foundational Principles of Privacy by Design

۲

 Privacy by Design is proactive rather than reactive.
Preventative rather than remedial, it anticipates and prevents privacy invasive events before they happen.

SOAD

MAP

MEDIA

н ING

TACT INFO

IDEO

RON

Ш

FO

VER

TIONING

**FNAL** 

ELLITE

)GET

 Privacy by Design operates as the default setting. It seeks to deliver the maximum degree of privacy by ensuring that personal data is automatically protected. As the default rules, no action is required on the part of the individual to protect their privacy.

- Privacy by Design is embedded into the design and architecture of IT systems and business practices. Privacy becomes an essential component of core system functionality.
- 4. Privacy by Design seeks to accommodate full functionality – handling all legitimate interests and objectives in a positive-sum, 'win-win' manner, rather than a dated, zero-sum approach with unnecessary trade-offs.
- 5. Privacy by Design is embedded into a system prior to the first element of information being collected in order to provide end-to-end security and lifecycle protection.
- 6. Privacy by Design engages visibility and transparency to assure all stakeholders that the business practice or technology involved is operating according to the stated promises and objectives, and subject to independent verification. Its component parts and

operations remain visible and transparent.

 Privacy by Design requires architects and operators to keep user-centricity and respect for user privacy uppermost, by offering measures such as strong privacy defaults, appropriate notice, and empowering user-friendly options.

Distilled from http://www. ipc.on.ca/images/Resources/ 7foundationalprinciples.pdf



# Private disclosure

Ontario's information and privacy commissioner, **Dr Ann Cavoukian**, explains about the Privacy by Design concept and how it applies to electronic road tolling

### Dr Cavoukian, I understand that you have been thinking about privacy and road use since 1994, triggered by the first use of automated toll collection in Ontario. What were the original reasons your office looked at the issue?

AC: When we first learned the 407 ETR would be using electronic technology to collect data on highway users for the purposes of automatic billing, we proactively contacted the Ontario Transportation Capital Corporation (OTCC) as a result of the privacy issues involved – ranging from tracking to secondary uses of information.

Intelligent transportation systems have the capability of being privacy invasive, but with privacy built in, these systems can be transformed into privacyenhancing ones. My office worked extensively with the OTCC to ensure that privacy was considered throughout all phases of the development and implementation of this project.

For example, together, we were able to ensure that the public had the option to travel the 407 ETR anonymously. This included making an initial payment into an anonymous account from which toll charges would be deducted automatically, with no invoice or bill sent to your home.

# How hard was it to align the 407 ETR with your privacy principles?

*AC*: Not very. The OTCC was already considering privacy issues when we contacted them. They were receptive to building in full privacy protection from the outset. With the help of my office, they were able to meet the Seven Foundational Principles of a concept I developed called 'Privacy by Design'. This included taking a proactive approach, embedding privacy protections directly into the design of the system and, above all, exhibiting respect for user privacy.

### Can you say more about Privacy by Design? What is its most important feature?

AC: Privacy by Design (PbD) advances the view that the future of privacy cannot be assured solely by compliance with regulatory frameworks; rather, privacy assurance must become an organization's default mode of operation. Initially, I advanced the deployment of Privacy-Enhancing Technologies (PETs) as the solution. Today, I believe a more substantial approach is required – extending the use of PETs to PETs Plus – taking a positive-sum (full functionality) approach, not just a zero-sum trade-off.



from the outset. In that sense, it is technology-neutral. Whatever system is involved – including navigation satellites for road tolling – PbD requires that you build it from the ground up, with privacy as the default setting.

Data minimization is key. The Sofia Memorandum already requires that the anonymity of drivers be preserved. If the service can be provided anonymously, then it should be. Indeed, eliminating the collection of personally identifiable information also eliminates the subsequent duty of care that extends to the collection and retention of personally identifiable information. Where no personal information exists, the privacy concern disappears.

۲

If a system cannot function without personal information, then such information should not be kept for longer than is necessary for the purposes collected. Of

### 66 Whatever system is involved – including navigation satellites for road tolling – PbD requires that you build it from the ground up, with privacy as the default setting

This encompasses three things: IT systems, accountable business practices, and physical design and networked infrastructure. The most important Principles of PbD are its proactive, positive-sum nature and respect for user privacy. PbD is not intended as a conceptual abstraction. I developed it to ensure real and positive changes in our everyday lives.

How would PbD influence the use of navigation satellites for road tolling? *AC*: PbD is all about building privacy in

course, no secondary uses should be permitted without consent. These are the fundamentals, and here PbD and the Sofia Memorandum are very closely aligned.

So you're saying that these provisions must be accounted for in technology architecture and program design from the beginning in order to get it right? AC: Absolutely, otherwise you risk what my colleague, Professor Kai Rannenberg, calls 'Privacy by Disaster'. It's not enough to fix the problem after thousands of users have already been exposed to a privacy

### Privacy By Design

# TECH ELECTRONIC PRIVACY VIDEO

breach. That's why the first principle of PbD is to be 'proactive, not reactive'. PbD anticipates and prevents privacyinvasive events, before they happen. It does not wait for privacy risks to materialize, nor does it seek to offer remedies for resolving privacy infractions once they have occurred – it aims to prevent them from occurring.

I believe it is critical to be proactive and constantly address privacy issues through a prolific yet targeted campaign such as PbD. Unless the public, government and businesses are well informed on what the issues are – and the concerns associated with privacy – the issues may only surface after the fact, as privacy complaints, which in my view is too little, too late.



Cavoukian applied Privacy by Design principles to Ontario's 407 ETR in the 1990s

### entail revealing that you and/or your vehicle was at that location at a certain time. Hence, if you pay for fuel with a credit card, it is easy to infer that you were likely at a certain fueling station at a particular time.

At the other extreme, the road use payment collection technology most commonly feared – GNSS (GPS) – is arguably the most private, as we shall see, but it has to be managed properly to achieve that status.

From 2002 to 2010, I worked with an innovator of road use metering technology that used Global Navigation Satellite Systems (GNSS). Hence, I have been concerned with driver privacy for quite

If we collect and retain trip data from private vehicles for the

agreed purpose, say, of assessing road use fees or pay-as-you-drive insurance premiums, this could create a fabulous source of data for secondary applications

> a while. During this time, I have come to appreciate the work of several privacy experts and privacy commissioners. Singular among these is Dr Ann Cavoukian, PhD, Ontario's privacy commissioner (see interview opposite).

### More data for more purposes

We tend to approach complex problems such as healthcare, smart grids, and now traffic management by capturing, storing, mining, and analyzing more data, which may be kept longer to study yet more trends. Most data now has multiple purposes – and some of these purposes may be unanticipated when the data is collected. In many ways, it is the opportunity to piece together data from disparate sources - for good or harm - that creates more alarm than data coming from any single application. Whether for capability, precision or profit, data-heavy applications are increasingly interconnected, integrated, and pervasive. As they grow in span and power, one can only imagine the migraines this can cause for privacy commissioners.

If we collect and retain trip data from private vehicles for the agreed purpose – say, of assessing road use fees or pay-as-you-drive insurance premiums – this could create a fabulous source of data for secondary applications, such as traffic studies, congestion studies,

Many people are talking about using road-use data for improving the transportation network, for planning expansions and transit, and for improving real-time navigation. If trip data must remain under user control, as the Sofia Memorandum insists, what does that imply for those programs? AC: Whether we are talking about new systems, technologies, or business practices, the key from a privacy perspective is

the key from a privacy perspective is embedding privacy right from the outset as a core functionality of the system requirements. In the kinds of examples that you mentioned, thinking through the privacy issues in the design stage would make it clear that most of these applications don't actually require personally identifiable data. Aggregated or anonymized data would provide most of what is needed.

Indeed, building privacy in as a design requirement can be eye-opening. Designers often assume that personal information is necessary, when it is not. But where personally identifying information really is necessary, then you need to have clearly identified purposes for collecting the data, and transparent rules about how it will be used, disclosed, and later destroyed.



February/March 2011 Traffic Technology International www.TrafficTechnologyToday.com



### Privacy **By** Design 6

# LINK ROUTE OF DIGITAL TREND TECH ELECTRONIC OF PRIVACY VIDEO

# The Sofia Memorandum

The International Working Group on Data Protection in Telecommunications has been active since 1983. Founded in the framework of the International Conference of Data Protection and Privacy Commissioners, it formulates recommendations to improve the protection of privacy in telecommunications. The Sofia Memorandum – issued at the 45<sup>th</sup> meeting of the WG in March 2009 – directs its guidance toward road pricing.

Four recommendations were made by the WG that were designed to protect the privacy of drivers and vehicle owners:

1. The anonymity of the driver can and should be preserved by using the so-called smart client or anonymous proxy approaches that keep drivers' personal data under their sole control and do not require offboard location record-keeping. 2. Road pricing systems can and should be designed so that

the detailed trip data is fully and permanently deleted from the system after the charges have been settled, in order to prevent the creation of movement profiles or the potential for function-creep.

- 3. Processing of personal data for other purposes (e.g. payas-you-drive insurance or behavioral-based marketing), should only be possible with clear and unambiguous consent from the individual.
- 4. In terms of enforcement, the system should not ascertain the identity of the driver nor owner of a vehicle unless there is evidence that the driver has committed something that is defined as a violation of the road pricing system.

The above recommendations have been distilled from www.datenschutz-berlin. de/attachments/647/WP\_Road\_ Pricing\_Final\_675.38.12.pdf

navigation optimization, and for all sorts of marketing and planning purposes. Integrated with other data we could develop a phenomenal degree of valuable knowledge about an urban area, a city, or a group of people. At the same time, this data could obviously be directed to harmful purposes.

### Seven design principles

۲

The Seven Foundational Principles of Privacy by Design sidebar) to preserve and enshrine



It's encouraging for anyone concerned with privacy to know that there are tested guidelines such as Privacy by Design (see







Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com

and mining. Dr Cavoukian's work for the past couple of decades has not only sharpened and formalized that focus, but has even applied it specifically to road tolling. Her pre-science foreshadowed the 2009 Sofia Memorandum (see sidebar, above) that is specifically designed for satellite-based road use charging. The seven principles of Privacy by Design incorporate privacy throughout the design and operation of technology, operational systems, work processes, management structures, and physical spaces. According to Cavoukian, they "explode the myth that privacy competes with other values in a zero-sum equation". That myth suggests, for example, that in order to realize fully the efficiencies of a system, such as a smart road use metering system, we must give up some privacy. "But this is a myth based on false dichotomies and a paradigm that posits our core values as being in conflict with one another. That simply is unnecessary." Approaching the development of a satellite-based road

privacy in the face of the ever-growing juggernaut of data capture

tolling system with these seven principles in mind means we can realize all the benefits of a reinvigorated traffic management and road-funding system, while enabling drivers to enjoy full privacy for their private trips.

Privacy can and must co-exist alongside functionality, operational efficiency, organizational control, security, and usability in a positive-sum – rather than zero-sum – equation. There are likely many important and necessary uses of trip information in the context of solving the congestion problem. Without diminishing the benefits of the available solutions, it is possible to design privacy directly into them by making it the default in all physical, administrative, and technological aspects of the system.

### More privacy, not less

The two most common comments I hear regarding road-use charging and privacy are "over my dead body" and, in contradiction, "they already have your cell phone and credit card data". Neither are helpful or useful. There is no need to invade privacy to assess and collect a road use fee. And there is no need to taunt drivers by reminding them of existing and unrelated privacy risks. No-one wants more privacy exposure.

The Sofia Memorandum makes road use charging more private than credit card purchase at a fueling station and far more private than current RFID/DSRC methods. Systems that can protect privacy to this degree already exist - i.e. systems designed using PbD and according to the Sophia Memorandum guidelines. If you advocate greater privacy than you have now, ensure that any proposals for road user charging include these safeguards, then buy an all electric vehicle, charge it at home, and stay away from fueling stations! O

# EFKON PROVIDES INNOVATIVE ITS AND TOLLING SOLUTIONS

۲



EFKON is one of the worldwide leading providers of Intelligent Transportation Systems (ITS), Electronic Toll Collection (ETC), enforcement, toll operations and traffic telematic solutions. EFKON has significant know-how on all major electronic tolling technologies and provides customized turnkey solutions. With headquarters in Austria, EFKON's activities are worldwide, with important references from Asia, Europe and Africa. Subsidiaries and joint ventures are in Germany, Austria, Ireland, Bulgaria, Romania, Malaysia, South Africa, India and Pakistan.

( )

We are bringing value to our customers.



E-Mail: office@efkon.com Website: www.efkon.com

**EFKON – FREE TO FLOW** 



### **SWARCO AG**



۲

# TURNKEY TRAFFIC SOLUTIONS

FROM A STRONG GROUP OF COMPANIES - IMPROVING ROAD SAFETY AND TRAFFIC MANAGEMENT

Maybe you already knew that SWARCO is a leading manufacturer of reflective glass beads and LED traffic signals.

### But did you also know that:

- > we help manage public transport in cities like Barcelona, Trondheim, and Bucharest?
- we are one of the leading worldwide suppliers of adaptive traffic control software and we support a wide variety of protocols and standards to help you retain existing legacy systems?
- > we can help municipalities save money with FUTURLUX, the bright choice in LED street lighting?
- > we give road markings a durability boost with our SOLIDPLUS glass beads?
- > we offer conspicuity and safety to paint with highly reflective SWARODIT?
- > we support e-mobility by offering a system of battery charging while electrical cars are parked (EnergieParken®)?
- > we help cooperative systems work so that cars and infrastructure can communicate with each other?
- > we have expertise in detection and traffic data acquisition?

Talk to us first when you want to make your traffic safer, flow better, and more environmentally sound.

SWARCO AG, Blattenwaldweg 8, A-6112 Wattens, Austria T. +43-5224-58770, F. +43-5224-56070, E. office.ag@swarco.com, www.swarco.com



SWARCO | First in Traffic Solutions.

Having written a book about traffic forecasting for banks, infrastructure funds and institutional investors, **Robert Bain** discusses some of his research and the track record of PPPs in the highways sector

Interviewed by Lloyd Fuller

ust back from finance conferences in Canada, Hong Kong and Malaysia, Rob Bain has certainly been racking up the air miles of late. The reason? His book, *Toll Road Traffic & Revenue Forecasts: An Interpreter's Guide*, has generated such considerable interest that he has been in demand to showcase his work in person. But why would investment professionals need a guide to traffic forecasts?

Bain left transport consultants Steer Davies Gleave back in 2001 and joined the credit rating agency Standard & Poor's. He spent the next five years with the agency, becoming a director in its Infrastructure Finance Ratings practice with specific responsibilities for transportation projects. Within minutes of the interview kicking off, he's talking about 'transaction structuring', 'collateral quality' and 'cash-flow volatility'. It sounds like a foreign language but things start to become clear pretty quickly.

"In many toll road deals the revenue forecasts represent the commercial proposition," he says. "This is the projected cash-flow stream that you are lending against – the economic value of the enterprise. And revenues derive from traffic forecasts. Yet these traffic forecasts and the techniques and assumptions underpinning them are frequently opaque to those charged with assessing credit quality and investment potential. I know because I often had to interpret them for colleagues in There's a rich seam of material on accentuating the positive, downplaying the negative and underestimating risk and uncertainty in many areas of forecasting

financial services – hence the concept of an interpreter's guide."

۲

Bain has researched traffic forecasting accuracy for many years and has published extensively on the subject. He was a traffic forecaster himself so knows models, modeling and how models work. "And how to make them work for you," he adds, acknowledging that forecasts can be manipulated as part of a well-crafted sales pitch to government agencies or candidate investors. This is a big money game, after all, with powerful vested interests and economic incentives at play.

### **Bias and error**

"Sadly, parts of the transport profession remain in denial," Bain continues. "I remember reading an article a while back reporting the results from early research into optimism bias in road and rail forecasts. Some senior industry figures were quoted as saying systematic mistakes and deliberate misrepresentation did not occur. This goes on all the time, either consciously or subconsciously. It's well documented. Look at the psychology literature on organizational pressure, attribution error and cognitive bias. There's a rich seam of material on accentuating the positive, downplaying the negative and underestimating risk and uncertainty in many areas of forecasting. And that's before we consider specific commercial motivations for lying. In the book, I highlight this in the context of traffic forecasts, with research evidence in support."

Robert **Bain** 

Highlight these facts he certainly does. One of the chapters is provocatively entitled 21 ways to inflate traffic and revenue forecasts! "That was fun to write, but it has a serious side to it," Bain says. "People can be seduced by some of the technical aspects of traffic modeling to the extent that they treat forecasts as gospel. In terms of bias, I simply demonstrate that it's perfectly possible to skew modeling outputs if required and I identify some of the danger signals to

### Robert Bain 🛛 🕥

watch for. The best way to teach people about this is to show them how it's done."

Reminding Bain that we all know that traffic models are imperfect, he interjects. "Remember that the primary audience for my book lies outside the transport profession. Over-emphasis on the technicalities of modeling is often used to provide pseudo-comfort to the recipients of traffic forecasts, to baffle them with science, infer spurious levels of accuracy and defend hopelessly narrow confidence intervals. However, my interest lies more with the applied challenges of forecasting than with modeling per se. As an example, I saw a near-perfect model recently. It explained the growth in vehicle kilometers traveled in a European country in terms of past movements in GDP, fuel price and car ownership. A goodness of fit exceeding 98%. Perfect. But for forecasts we need future predictions of the explanatory variables themselves - GDP, fuel price and car ownership. We started with GDP, but the central bank could only give us GDP forecasts for the next five years. Our forecasting horizon was 30 years! So even with a perfect model the forecasting challenges remain significant - and most transport models are far from perfect."

Bain initially comes across as being hostile to his ex-colleagues in the traffic forecasting community, although as the interview progresses, you start to understand where he's coming from. At the rating agency he faced a succession of bankers – sometimes with their traffic

...What the European roads sector really needs in the longterm is a sensible funding solution - and that's road pricing

consultants in tow - insisting that their forecasts could be believed to the extent that investment-grade ratings could be assigned to their projects. High credit ratings significantly reduce the cost of debt capital. And with large success fees at stake this insistence was often very assertive. This is the reality to which his book responds. So can transport modelers realistically improve traffic forecasting reliability to the satisfaction of private investors, beyond reliance on mere arguments of assertion?

'The issue needs to be attacked on a number of fronts," he responds. "For sure there are examples of good forecasting practice out there. Transparency, credible sensitivity testing and rigorous peer reviews rank highly. In concert we should be more realistic about uncertainty and the limitations of models. That would be a major step forward. However, the important issue for me is the context within which traffic forecasts are set. Investor-financed road projects are highly structured and a number of them are aggressively financially engineered with little margin for error. All of the evidence suggests that this is

Toll road traffic forecasting accuracy While working for Standard & Poor's, Bain collated the traffic forecasts and outturn figures from over 100 separate toll roads, bridges and tunnels around the world. This was the largest comparative study of its type to have been conducted globally as this wealth of commercial-in-confidence data is seldom shared with 1.2 parties outside the financial 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.3 1.4 1.5 services sector. The chart Actual/Forecast Traffic summarizes his findings as ratios of actual-to-forecast over-optimistic by 20-25%. respective forecast. The full results from this research, traffic. A ratio above 1.0 The range of forecasting means performance has error, denoted by the large the results from other exceeded the prediction



standard deviation, is considerable. In some toll projects, traffic performance exceeded expectations by 50%. In others, outturn traffic was less than 20% of the

smaller-scale comparative toll road forecasting studies from around the world - and their implications for investors – are described further in Bain's book.

fundamentally wrong. Sustainable projects need flexibility to accommodate the inevitable departures from performance expectations that will occur over the typical contract period of 30 years or more. They should be able to survive the stresses of the full business cycle and periods when cashflow volatility may be higher than usual. There's the real answer. Adult conversations about risk and uncertainty, and realistic deal structuring - not some fruitless search for the supposedly perfect forecast."

### PPP roads

Talk of investor-financed roads broadens the interview from traffic forecasting to the bigger picture of PPPs and their role in the transport sector. Bain has witnessed publicprivate partnerships around the world from various perspectives - as a technical consultant, as a rating analyst, as an academic researcher and, most recently, reviewing lending exposure for commercial and development banks. So do PPP roads offer value for money for public sector contracting authorities?

( )

"This was the focus for my PhD and, in terms of the traditional PPP model, the roads sector certainly has some appealing characteristics. What we're discussing are long-term, vertically integrated and relatively complete contracts that seek to optimize risk-sharing between the public and the private sectors. Roads are generally uncomplicated assets with construction technologies and risks that are widely understood. There are strong build-maintain synergies. These are good starts. The pace of development in the sector is gradual - important when you're locked into a 30year contract. Similarly, the public policy context for roads is unlikely to change in the foreseeable future, perhaps with the exception of road pricing - and this eventuality can be accommodated contractually. Risk allocation is relatively straightforward and it's possible to carve out road projects in ways that make them separable operationally, economically and institutionally from other activities. This is key. They can be developed as clear standalone projects with limited interface risk or reliance on third parties. And as a result of the history of private sector road

(i.e. the forecast). The

fitted distribution shown is,

meaning that on average toll

however, centered on 0.77,

road traffic forecasts were

### 🔘 | Robert **Bain**

construction and maintenance in many countries, road projects do not face the same barriers to perceived creeping privatization as say projects in the health and education sectors. Add all of those attributes up and you have a potentially winning formula.

"Incidentally," he adds, "if you map rail projects against many of the criteria I've just mentioned, you can start to understand why a number of international PPPs in that particular sector have found it more challenging to deliver value for money."

Bain's theories appear sound. But what of the evidence relating to value for money from PPP roads. During his PhD, he negotiated access to previously unreleased data from the UK Highways Agency that allowed him to recreate the public sector comparators for the first eight Design Build Finance and Operate (DBFO) shadow toll roads, so he understands the economic arguments well. "Two of the main criticisms leveled at the Agency's early DBFO roads were that the optimism-bias adjustments were overcooked and that the high discount rate inherently penalized the conventional procurement option. By reformulating the comparators in spreadsheets and changing key input assumptions, I showed that the early roads program continued to represent value for money with almost zero optimismbias uplift and at today's test discount rate of 3.5%. The PFI procurement policy appears to have had a stronger justification than even the Highways Agency maintained. And, looking beyond the UK at some other reviews I've conducted for banks, it's clear that PPP roads generally meet their policy objectives in terms of on-time and withinbudget asset delivery, and providing value for money for the public sector. But it's not all about buying insurance policies against over-budget and behind-schedule projects, and demonstrating economic worth."

Surely these issues are exactly what PPPs are all about? "Let's be very clear," Bain says. "We started by discussing traditional toll roads with point-of-use charging; we've now moved on to PPPs. PPPs can involve user charges or, as is often the case in the UK and elsewhere, a payment stream from government spread over the life of the contract based on measures of asset availability and service quality. These are very different animals. The former breaks the link between government support and infrastructure provision. The latter maintains that link and simply reprofiles the financial commitment over 25 or 30 years - with interest. My comments are directed at shadow toll, availability or performance-based road schemes. Evaluation of these PFI or PPP projects – whatever you call them - should not focus







Toll roads, bridges and tunnels represent the most popular class of infrastructure attracting international private finance today. Many deals, however, expose financiers, insurers and other project counterparties to demand risk

solely on a comparison with public sector comparators. There is a real-world restriction that needs to be considered and that is the affordability constraint – although this is commonly, rather conveniently, overlooked."

Bain comes across as being very positive about private sector finance vet here he is issuing a stern caution. "Estimates suggest that between 35% and 40% of the Highways Agency budget is required to support its PFI roads portfolio, yet the roads themselves account for around 17% of the network. In the health sector, there have been rumblings about PFI hospital affordability at a couple of NHS Trusts for some time. Portugal developed an ambitious program of shadow toll motorways only to discover it couldn't service the aggregate payments. Now it's trying to move from shadow tolls to real tolls and renegotiate a number of concessions. In Spain, PPP debtrelated commitments are starting to impact on public sector credit ratings. Some time back, Standard & Poor's assigned a negative outlook to the Autonomous Community of Madrid because servicing PPP debt accounts for 60-75% of its spending severely constraining future expenditure flexibility. Commentators have labeled the phenomenon 'silting-up'. That is what happens when you buy infrastructure on the government's credit card without acknowledging the supply of funds is finite and incorporating the affordability constraint within the appraisal framework. The situation is thrown into sharp relief in a

recession when the tax-take is reduced, and is exacerbated further if public spending starts getting squeezed to cut a sizeable national budget deficit. Add to that political statements about protecting health and education spend, and it casts commitment to long-term transport PPPs in an interesting light."

### Weighing up the risks

Although a finance guy, Bain's comments repeatedly have been reflections on public policy. Is that really his primary focus? "Credit analysis looks across all project risks," he replies, "and political risk should never be overlooked in PPPs that rely on ongoing state support." So the solution is? "Road pricing and commercialization of the sector. Shadow toll, availability or performance-based road PPPs are a financing solution. They're a step in the right direction but what Europe's roads sector needs in the long-term is a sensible funding solution – and that's road pricing."

Bain leaves the interview heading for Leeds University's School of Civil Engineering where he lectures as a visiting research fellow. He is a firm believer that the engineers of tomorrow need to understand the basics of credit and the workings of the financial services sector. For engineers to make intelligent use of private finance, he says, you need finance-literate engineers. No doubt his lecture will be well received by his students. O

For further information, please log on to www.robbain.com

# Panoramic VIEW

This vision-based traffic monitoring and control solution presents a more than viable alternative to inductive loops and other video detection systems. **Brian Shockley** reveals why GridSmart could be the smart choice for future intersection designs

Images courtesy of Aldis Corp

( )

ne of the solutions to solving congestion that doesn't receive too much airtime is the timing and optimization of traffic signals. According to the FHWA, around 75% of traffic signals could be improved by updating equipment or by simply adjusting and updating the timing plans. Poor traffic signal timing reportedly accounts for 5-10% of all traffic delay or 295 million vehiclehours of delay on major roadways alone. Indeed, the FHWA recommends traffic signal retiming as one of the more costeffective ways to help keep traffic moving, producing benefit-cost ratios as high as 40:1.

The Tennessee-based company, Aldis, was established in 2006 to provide an intelligent alternative to the inductive loops and video cameras used today for traffic signal vehicle detection. Following several years of dedicated R&D, GridSmart was unveiled, which now boasts almost 200 deployments in nine countries.

### What is GridSmart?

Unlike sensors such as loops and cameras that require one or more sensors for each



The GridSmart platform is a software-based appliance and one of the most technologically advanced products on the market, which provides new functionality with minimal costs





# 🕥 | High-tech, big impact

The city of Sevierville, Tennessee, attracts 13 million tourists a year, which places great strain on the main route into the region, Highway 66. The subsequent congestion, coupled with the irregular flow created by the many entertainment, dining and shopping options along the way, led to a course of roadway expansion. During construction, though, the loops used for detection were either damaged or not properly placed as a result of lane shifts – a lack of detection that created manpower and expense issues for the police department. GridSmart was introduced to provide detection both during and after the project. Benefits included ease of installation, reduction of equipment and cost, the ability to redraw detection zones anywhere within the camera's 360° view to accommodate the lane shifts, and annual maintenance savings. The traffic data available from

GridSmart was an added bonus, as Sevierville is frequently asked for counts for tourism purposes as well as for construction planning.

The technology now provides vehicle detection for seven intersections along the main corridor into the Great Smoky Mountain area, while police overtime associated with traffic control has been reduced by 80%. The city also projects savings of between US\$125,000-US\$175,000 over 10 years by deploying the system at these locations.

approach to a signal, GridSmart uses a single ultra-wide-angle, no-aim, no-focus camera, providing images to a ruggedized image processor running advanced algorithms to detect and track vehicles throughout the entire intersection. The processor features interfaces to both TS1- and TS2-type controllers, providing almost universal application. The reduction of hardware provides for reduced installation and maintenance requirements; a typical intersection can be equipped in as little as three hours. The advanced vehicletracking algorithms and application software benefit users with additional functionality not available from other technologies.

Aside from the obvious difference of using one sensor for the entire intersection – and the resulting cost advantages (equipment, installation and maintenance) – GridSmart differs drastically from other solutions due to the R&D employed by Aldis to leverage stateof-the-art advancements in computer vision and image processing. Collectively, the relatively small team at Aldis boasts over 100 years of machine vision and image processing experience. "We make our jobs really difficult, so that our customers' jobs don't have to be,"





comments Jeff Price, director of Software Engineering. "We put our collective experiences to work to satisfy the real needs of our customers." GridSmart accomplishes this through the use of very sophisticated 3D omni-directional vehicle tracking.

### How does GridSmart Work?

It all begins with the creation of a background model to understand what the environment looks like without vehicles, which is much more difficult for GridSmart than other video looking at a small 'spot in the road'. The model is advanced and adaptive and changes and evolves over time to accommodate for 'expected' changes to the scene due to shadows, reflections, changes in color or image texture due to weather patterns, and countless other variables. Sudden changes to a region, or to the entire image, are taken into consideration to improve the accuracy of the tracking algorithms.

With an accurate background model in place, GridSmart then takes the images seen by the camera and 'subtracts' the expected background to allow the tracking algorithms to identify items of interest. These are then tracked frame by frame in order to detect motion and establish moving points of interest. As a point of interest moves, GridSmart assigns a classification model (vehicle - length based, pedestrian, or other) to the point by analyzing the space around it for other moving points of interest that meet certain rules and characteristics. The model is assigned a unique tracking identification (ID) number for continued tracking throughout the camera's field-of-view. The model can change, while retaining the same unique ID number, as the confidence level improves with each frame and the vehicle or pedestrian approaches. With GridSmart not simply acting as a 'tripline' detector, points of interest tracking in an unexpected direction will be ignored, or will soon be able to flag an alert if so configured (perhaps to identify a wrong-way driver or a pedestrian hitchhiking along the roadway).

The use of 3D omni-directional tracking enables a great deal of additional features for users as well, one of the most impressive of which is the rich amount of traffic data generated. As a result of vehicles being tracked throughout the intersection, the system is able to provide data not available from other sensors, such as average speed, turn movements, vehicle classification, queue length, headway, light state, and more. This data may be communicated live from the intersection into a central GridSmart traffic database, or The Aldis GridSmart system dynamically tracks vehicles, pedestrians, and even bicycles imported manually. An assortment of reports are available from the reports module, including turn movement counts, traffic counts, speed (including 85<sup>th</sup> percentile), vehicle classification, queue length, volume-to-capacity, and gap time. These reports can be configured to run on recent or historical data, and broken down by user-defined time periods.

Another valuable feature is enabled by Gridmart's horizon-to-horizon visibility. Within the software, the image is digitally flattened from its native 'fisheye' view, so users may easily visualize the intersection, make changes to zone plans, and more. This allows for a software PTZ feature, so that users can pan-tilt-zoom around the intersection at any time without movement of the camera and without affecting the tracking or data collection. This software PTZ can improve situational awareness at a traffic management center, and can also aid in incident response.

### What's next?

Still a relative newcomer to the traffic world, Aldis will continue to expand its GridSmart

### As a result of vehicles being tracked throughout the intersection, GridSmart is able to provide data not available from other sensors

product offering to include additional modules of functionality leveraging its 3D tracking, and also expand (organically or through strategic partnerships) into other relevant markets (parking, safety, security, and others) where this unique approach to imaging, tracking, and modeling will provide value.

"GridSmart's tracking algorithms are a new paradigm for the next generation of video technology for traffic management," concludes Bill Malkes, president and COO of Aldis. "It's a great example where innovation, truly listening to customers, and execution redefine value in the market. The R&D is extensive but we are already seeing the results in deployments around the world. We are looking forward to delivering real solutions to traffic professionals everywhere in the way that they want to see them." O

• Brian Shockley is the vice president of marketing for Aldis and boasts a diverse background in industrial and B2B marketing, product management, and business development

February/March 2011 **Traffic Technology International** www.TrafficTechnologyToday.com



Design Challenge 😔

They're the scene of hundreds of thousands of accidents resulting in lost lives and serious injury, as well as harmful emissions and delays costing economies billions of dollars. Is it time for a rethink on the traffic intersection? **Nick Bradley** enlists traffic management's A Team who feel the rulebook is there to be rewritten

Illustration courtesy of Magictorch

۲

ow do you solve a problem like the intersection? It's a conundrum that's puzzled traffic engineers for the best part of 100 years – and perhaps it will for another century or more. Nevertheless, that's the task we set 10 forward-thinking traffic specialists in the first of *Traffic Technology International*'s 'Design Challenge' features, for which we've put our feelers out for concepts and strategies to transform a particularly troublesome facet of the traffic management sector – in this first instalment, the traffic intersection. Ideas submitted spanned the very futuristic, including teletransporting vehicles through the intersection and wormholes (courtesy of TRL's Gavin Jackman – a Trekkie and *Doctor Who* fan, no less) to the seemingly common sense Superstreet (in which lefthand turns are outlawed) and smart WiFi-based V2I intersection.

There are literally hundreds of ways that today's existing designs can be improved upon. And although we're not suggesting you should go out and tear down your existing infrastructure and investigate ways to send vehicles through the space-time continuum, these choke points on our networks – the perfect stage for a crash – are certainly worthy of some fresh thinking. Based on the massive response to this article, perhaps you feel they may have had their day also... **O** 

046 **Traffic Technology International** February/March 2011 www.TrafficTechnologyToday.com

# The 3D approach to safety

Traffic accidents are among the leading causes of death in Korea, seemingly on the rise every year, particularly at pedestrian crossing zones. The increasing amount of visual distractions in our urban areas is also a cause for concern, taking driver attention away from important traffic signal information.

My concept, Virtual Wall, is based on laser plasma technology developed by The Japanese National Institute of Advanced Industrial Science and Technology (AIST). By modifying a 2D image device with a linear motor system and a high-quality and high-brightness infrared



۲

pulse, AIST created a spatial display of 'real 3D images' consisting of dot arrays, which created a working three-dimensional display. The high-quality and highbrightness infrared pulsed laser (repetition frequency of pulse approximately 100Hz), enables plasma production to be more precisely controlled, resulting in brighter and higher

۲

contrast image drawing. Unlike ordinary traffic lights, a Virtual Wall just triggers instincts that make you stop, as if a brick wall suddenly popped out in front of you. It is designed to heighten driver and pedestrian awareness and encourage both to follow crosswalk rules. The premise is that plasma laser beams would assist pedestrians while they cross from one side to another.

Instead of showing a red light when it's time for pedestrians to cross the street, a curtain-like, two-dimensional image of giant people crossing the street is projected. The real pedestrians walk behind their virtual counterparts. Hanyoung Lee is a Seoulbased concept developer working in product design, public design and interaction design, with a special interest in the future technologies of safety for public space and cutting-edge design

Design Challenge

February/March 2011 Traffic Technology International www.TrafficTechnologyToday.com 047



scout

miovision

# Introducing Scout

The most versatile portable video data collection system ever

۲

Automate *nine* types of traffic studies using Scout and Miovision's cloud-based software platform.

See the unveiling at Traffex 2011, Booth A63 on March 29 in Birmingham, UK.

Get a sneak peek at: www.scoutvcu.com

Nine study types at your fingertips...

JUNCTION · ROUNDABOUT · LINK · ALPR · O/D · TRAVEL TIME · PARKING · TRIP RATIO · GAP



# RTMS

# offers the best value bar none.

It's everything you need - and nothing you don't need.

No loaded expenses. No added fat.

All-in-one...no added costs Cabinet-less Bluetooth® 12 lane coverage - not just 10 Zero setback - install on existing poles No extra cabinet training required



۲

Radar sensors for the detection and measurement of traffic on roadways

Contact us: 416.785.9248 Visit our website for a distributor near you. RTMS-by-ISS.com

۲







Dr Carlos Gershenson is a researcher in the Computer Sciences Department at the National Autonomous University of Mexico A lternatives to traffic lights regula include bridges (freeways), are consistent parts of the Netherlands simply vehicl removing the lights altogether. Bridges remove the conflict between different directions of traffic flow, but they are expensive. If an intersection should have a high throughput or than a

vehicles are expected to go at high speeds, roundabouts and lack of traffic lights are not a good option. In such a case, traffic lights should work as efficiently as possible. It is well known that the coordination of traffic lights is an 'exponential-complete' problem – i.e. it is computationally intractable. In other words, there is not enough time

in the universe to find an optimal arrangement for a moderate number of intersections. There have been two main approaches for traffic light coordination: one tries to optimize expected traffic flows, while the other tries to adapt – manually or automatically – to current flows. Both have been successfully applied, but which is more efficient?

One of the main drawbacks of the optimization approach (which is the most commonly used worldwide) is that it assumes that traffic flows are

regular and predictable. Both of these are coarse approximations. On the one hand, having an average flow of 6,000 vehicles an hour does not mean that every minute there will be 100 vehicles using an intersection. Some minutes there will be no vehicles, some minutes there might be much more than expected. On the other hand, traffic conditions change constantly, making it inherently infeasible to predict the position of a vehicle further than two minutes. There is no escape from these conditions, as they are part of the nature of traffic flow: relevant information is lost when traffic flows are averaged and chaotic dynamics limit their predictability.

Adapted for global coordination

The adaptation approach does not assume predictability of traffic flows, hence why they change the regulation dependent on the current situation.



But most adaptive systems also assume regular traffic flows, since they adapt slowly.

In recent years, a new class of adaptive traffic lights has been developed using the concept of self-organization. These lights can adapt almost instantly to the state of traffic. Moreover, they are independent: by adapting locally to streets with highest demand and preventing flow into streets that are blocked, a global coordination can emerge, considering many opposing flow directions. In simulations, they can reduce waiting times by 50% when compared with the classic 'green wave' optimizing method. Also, for a broad range of densities, they can achieve a maximum flow for several intersections - i.e. vehicles are always crossing intersections, utilizing their maximum capacity.

The technology for deploying self-organizing traffic lights has been available for at least 30 years, so why has it not been applied? Similar methods were applied in the 1980s, but in isolated intersections. It was never intuited that independent adaptive intersections would self-organize to produce global coordination.

# Signal control by satellite

Traffic control at intersections currently relies on data from quite crude detection systems. True, the data gleaned from them can be used effectively, but there are inefficiencies due to the fact that the signal control strategies do not have a complete picture of precisely what is happening onstreet at any one given time.

One way to improve on the information gathered is to use GPS. What if information about the position of vehicles is fed to a signal control strategy? The potential for a sophisticated efficient signal control strategy is huge. Consider an isolated signal-controlled intersection. With information taken from any distance away from the intersection – and with accurate speeds available – a complete and accurate picture would be

known. The changing of signal stages could be made precisely to minimize or maximize some objective function (e.g. minimize delay or maximize capacity). And with speeds of vehicles known, signals could be changed such that drivers can either stop comfortably or continue safely, so full account of the dilemma zone effects can be accounted for in a precise manner. Take the concept to the network scenario and there are many further possibilities for maximizing efficiency. Today's systems can be possibly too effective, and by maximizing throughput at one intersection problems downstream may arise. This is especially true if the downstream intersections are unsignalized (e.g. a priority roundabout). Also, today's

۲

systems cannot fully account for the consequences of incidents.

With full knowledge of the position and speed of every vehicle in the network – including at non-signal controlled intersections – full account can be taken of the consequences of letting more traffic through a given intersection, and of incidents. You could also place the signaling in the vehicles, allowing control at a microscopic level, telling each driver when they can go, what speed to travel at to avoid stopping, and when to stop. The intergreen could be customized for each driver based on the precise position of conflicting vehicles. You could even build in collision avoidance – or take off systems to make sure drivers take that gap!



Mark Crabtree is a principal engineer, Transportation at TRL in the UK



### Design Challenge | 🕒



Jeff Ferzoco is creative and technology director at the Regional Plan Association in New York City, USA



# The future of materials is critical

Walking into an intersection is a very human experience. It's approaching a crossroads, a place of cooperation, history and interaction. Modes are vital when it comes to safety, but the interesting part of an intersection is the record it offers of humanity - everyone who's been there and their stories. So how can the human experience be properly amplified through technology into a complex and dangerous place such as an intersection? How can we amplify people's awareness of the space, sending them thoughtfully and safely

into a crossroads? We need to turn the ground into a large, pressure-sensitive display. Already we are seeing energy companies such as Solar Roads testing electricitydistributing, superstrong glass panels that double as LEDs. so let's use them. Each car, each person traveling through the space leaves a mark and those marks cumulatively add up to a story. Using the color language of the intersection green, yellow, red – to show intensity, each participant would contribute to the end result:



color patches showing volume of traffic. Busy corners would be bright red, raising attention and creating a connection, or perhaps offering a chance to avoid a heavily trafficked space. The transparency of information becomes a data visualization of the space. From above we see a patchwork of color that affirms life and activity. As a side benefit, the people on the ground might even be cast in the color of the intersection, giving warning to the passing driver.

Safety – specifically the scale difference between cars and people – is also a big issue. Everything that happens needs to be subservient to that. But as there is room for play and informative experience, how does a good, future intersection level the safety field and also make a connection with its users?

As we've got a huge display to work with, the cars can be extended, their future paths – identified through the pre-programmed GPS route – outlined on the ground in front of them. Equipping folks on the ground with information about exactly where the car they see is going will certainly influence their decision-making. A speeding car is instantly identified and everyone in the path has fair warning to get out of the way – a similar feeling to being in the path of an ambulance, with all the urgency that comes with that experience.

Let's also bring that onstreet data visualization into the driver's view. We can augment the windshield to see that color as a mass, giving drivers more information about the intersection being approached. Red corners are a warning: people are here. Over time, they start to act as stoplights, changing traffic rules into a natural, cooperative system. Everyone works together, gets home safely, and we know a bit more about our city and spaces we encountered that day.

# Self-organized for better flow

e're fixed on the idea that lights should cycle on and off in a regular and predictable way, but this is restrictive. Less orderly patterns could be far more efficient, reducing travel times for all and making traffic jams far less frequent.

Traffic engineers normally tailor the cyclic operation of lights to match known traffic patterns from the recent past. Lights on main roads stay green longer during peak hours, for instance. But so far it has required supercomputers or engineers to do the tuning. But what if traffic lights could devise better solutions on their own, if given some simple traffic-responsive operating rules, they are left to organize their own on-off schedules. In our research, we modeled the flow of traffic as if it were a fluid and explored what happens at intersections when traffic leaving one road has to enter another, much like fluid moving through a network of pipes. Each set of lights should have sensors that feed information about traffic at a given moment into a computer chip, which then calculates the flow of vehicles expected in the near future. It also works out how long the lights should remain green in order to clear the road and thereby relieve the pressure. By doing this, each set of lights can estimate for itself how best to adapt to the conditions expected at the next moment.

Our research found this simple rule wasn't enough – the lights sometimes adapt too much. If they're only adapting to local conditions, they might stay green for too long and cause problems further away. We therefore modified things so that what happens at one set of lights would affect how the others respond.

Computer simulations showed lights operating in this way would achieve a marked reduction in overall travel times - reducing delay by between 10-30% – and keep no-one waiting at a light too long. The key is that this kind of control does not fight the natural fluctuations in the traffic flow by trying to impose a certain flow rhythm. It uses randomly appearing gaps in the flow to serve other traffic streams. The variation in travel times goes down as well, although the signal operation tends to be non-periodic and therefore less predictable. This scheme also eliminates waiting a long time at empty intersections as the lights' schedules are determined by the flow at busier times, or lights cycling at night when there is no need.



۲

Stefan Lämmer is a professor at the Institute of Transport & Economics of TU Dresden, Germany



**Traffic Technology International** February/March 2011 www.TrafficTechnologyToday.com

### Design Challenge



Mike Shulman is the technical leader in Ford's Active Safety Research and Advanced Engineering Department



( )

# Dawn of the smart intersection

The 'smart intersection' Ford has established near our Research & Innovation Center in Michigan communicates with specially equipped test vehicles to warn drivers of potentially dangerous traffic situations. The intersection is outfitted with technology that can monitor traffic signal status, GPS data and digital maps to assess potential hazards, and then transmit the

information to vehicles. New technologies such as wireless comms and GPS navigation may enable us to offer more safety features in the future. Ford's new smart intersection transmits several pieces of data to the test vehicle, including a digital map of the intersection, six additional maps of surrounding stop-sign intersections and crosswalks, lane-specific GPS location, as well as traffic light status and timing information. Once the



information is received, the vehicle's collision avoidance system may be able to determine whether the car will safely cross the intersection or if it needs to stop before reaching it. If it determines the need to stop and senses the driver is not decelerating quickly enough, it issues visual and audio warnings. This technology also has the potential to augment vehicle navigation systems to enhance safety by helping people who are distracted, drowsy or can't see the traffic light due to a visual obstruction. Our research is helping to identify the kinds of warnings they may find both more effective and easier to understand.

A vehicle equipped with a collision avoidance system could also act as a traffic probe, and communicate its presence and travel history when it encounters a smart intersection. This could complement a feature already available on our vehicles, Sirius Travel Link, which combines real-time traffic speed and flow data by GPS with accident and incident information to allow users to avoid congestion. If smart intersections were widely available, such traffic information could be combined with information from other vehicles and would complement and enhance the information that Travel Link already provides. It could even include future vehicle travel, based on a destination entered into the satnav or past trips.

# S | Making danger a thing of the past

Distance estimation, fine-grained control, and reaction times are all areas where humans have a lot of room to improve, but are essential for safely traversing intersections. In the vehicles of the future, humans won't need to perform the low-level tasks at which they are so bad. Instead, computer programs will efficiently and safely pilot vehicles, including through intersections. To make those intersections more efficient, the programs piloting the vehicles will communicate with one another, determining in advance which vehicles will pass through the intersection at a given time. This will render our current system of signals obsolete, as it was designed for human drivers and includes huge tolerances for human drivers' previously mentioned shortcomings.

Imagine such a vehicle approaching an intersection. It signals ahead to let the intersection know it is approaching. Instead of needing to slow down, as is frequently the case today, the vehicle can negotiate with the intersection and other approaching vehicles to find a time at which it can cross without needing to stop first. By crossing at a higher speed, it occupies the intersection for a shorter period of time, making it even easier to schedule other vehicles. As intersections are a big source of congestion and inefficiency, the benefits would spread to other parts of the road, alleviating delays for all travelers.

There are several approaches to making a system such as this work. Although they all involve fitting vehicles with wireless transmitters, such as DSRC, there are two fundamentally different categories: managed and unmanaged. In a managed approach, an additional computer would be placed at the intersection, which would act as an arbiter, deciding



۲

independently which vehicles could and could not pass at any given time. In an unmanaged approach, vehicles would need to work completely on their own, in a distributed or ad-hoc fashion. Both managed and unmanaged approaches have their benefits and drawbacks, and in all likelihood both would be necessary – the former for the larger, high-traffic intersections and the latter at low-traffic intersections, such as those governed by stop signs (or no signs) today.

The Autonomous Intersection Management (AIM) project at the University of Texas in Austin is dedicated to making just such a system a reality. The systems described above have been created, both in simulation and on real vehicles, and the early results are very promising, reducing delays at intersections dramatically. In addition to decreasing delays, allowing computers to operate the vehicles instead of humans will improve safety, ideally making the 'big dangerous intersection' a thing of the past.



Until recently, Kurt Dresner worked in the Department of Computer Sciences at the University of Texas, Austin. He is now a software engineer at Google in Kirkland



### Design Challenge | 🕒



Dr Joe Hummer is professor of Civil Engineering, Transportation Systems and Materials at North Carolina State University, USA

# Journey down the superstreet

ith the superstreet, left-hand turns are re-routed along with traffic from side streets that needs to cross thoroughfares, with drivers required to make a right turn and then a U-turn around a broad median. Although this may seem time-consuming, it results in faster travel times and much fewer accidents; our studies show a 20% overall reduction in travel times compared with similar intersections that use conventional traffic designs. Unsignalized intersections also save about 50% of collisions compared with conventional intersections.

There are a number of reasons why the concept has not caught on, such as liability concerns among highways agencies, the fact the concept is not in the design manuals as well as it being more expensive than a traditional intersection design. Many agencies require proof that it will deliver benefits before they try a new design. Now we're starting to gather that proof. Roundabouts went through something similar in the USA around 10 years ago or so, and I think



superstreets are getting there now. The positive reaction is building.

Designers now have at least 15 alternative intersection designs and 10 alternative interchange designs for any given site. None is perfect, but there is almost always an alternative that is superior to a conventional design. With a stable funding stream it'd be a great time to be a designer!

The big obstacles to superstreets we hear of are high side street volumes, road width, other higher costs, crossing pedestrians, effects on businesses, and crossing bicycles. We have good answers for all but the latter. For high side street volumes we can choose a related design such as a median U-turn or continuousflow intersection. We can mitigate the need for a wider road using loons, which are semi-circles of pavement at a U-turn crossover to allow a large vehicle room to make their wider turn. Other higher costs – for signals and overhead signs and such - are coming down as we gain experience with the design. Crossing pedestrians should be helped at a superstreet compared with a conventional intersection as the crossing is completely signalcontrolled, we can reduce vehicle speeds on the main street, and we can easily install pedestrian signals almost anywhere along the main street without harming traffic flow. Businesses should benefit from the flexibility in crossover location, from slower speeds, and from the ability to signalize any crossover without harming main street traffic flow. Only the presence of a larger flow of crossing bicycles presents a serious design challenge at this point, as bicycles have little choice but to dismount and cross like a pedestrian. We need more thought on how bicyclists can cross superstreets.

# The magic number for intersection safety

Vehicle-to-vehicle and vehicle to-infrastructure communications will be the bedrock of traffic intersection safety and efficiency in the future. There are a number of ways 5.9GHz will help achieve this – and maybe sooner than you think. Under contract with the USDOT, we've already deployed the technology on 14 intersections on the Telegraph Road testbed in the Detroit Metro area, as well as in the City of Owosso. We're transmitting signal and timing data to the vehicle from the traffic light controller, which is being used to deliver messages in-vehicle, such as red light warnings or recommended green speed advisories for safe passage through the intersection. One day, this will even interact with the vehicle's functionality, such as automatic braking. Cars fitted with 5.9GHz will also have much improved situational awareness at the intersection – where 40% of all traffic accidents and 20%

of crash-related fatalities occur – so they will be able to communicate with one another, issuing warnings about red light runners, etc.

a modification of the 802.11 standard and is optimized for the vehicular environment so that we can achieve the low-latency requirements of the frequency In 2010, over a billion WiFi chips were shipped. Once deployment of 5.9GHz really gets going, it will naturally become more cost-effective as penetration reaches the levels of traditional WiFi. Once there's a high enough penetration of 5.9GHz in the vehicle fleet, you'll also be able to use those vehicles to gather data and optimize traffic signals in real-time. Many traffic signals today are out of sync, hence why you get stop 'n' go traffic, which itself is a hazard and a huge source of congestion, but 5.9GHz will help smooth the

traffic flow. which inherently is going to prevent collisions. I'm very confident 5.9GHz will be deployed in the next few years in the form of the USDOT's Connected Vehicle program, and we will get on the way to increase penetration, which is needed to realize intersection safety benefits. That's why we are working on products that will advance the deployment of 5.9GHz today, such as our 5.9GHz products for ETC. Today, we already have a full 5.9GHz tolling product line that includes a transponder and all necessary roadside equipment, is FCC certified and commercially available. We're also developing an aftermarket product utilizing later in the year and will have additional safety capabilities. As USDOT is aggressively pursuing 5.9GHz as a way of saving lives and reducing congestion, I see no obstacles to its full deployment.



Justin McNew is vice president, ITS Strategy and Commercialization, Kapsch TrafficCom IVHS





Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com



# Themed controller

Intersection control has come a long way since the days of traffic being directed by policemen. And even though today's systems are a far cry from the mechanical and semi-mechanical technologies that followed, we can anticipate so much more. It's fairly obvious the future will revolve around intelligent communications - V2V and V2I, etc

- all of which will optimize intersection throughput in terms of safety, mobility and ecology. These three themes were pretty evident at the recent TRB Meeting in Washington and they'll underpin developments over the next decade, too.

All roads users should expect to pass through the intersection safely - that's a given. Maybe in this V2I future, pedestrians will have an implanted communications chip for added safety also!

Mobility, or shall we say efficiency, is obviously vital. Controllers that are not only independent and self-organizing but interconnected intelligently will ensure much more efficient operations on a network-wide scale, and be able to adapt to a variety of conditions - at night, for example, when the traffic density is low, controllers could keep signals on red and switch to green only when vehicles approach. Perhaps in the day, the real-time data gathered from the V2V and V2I systems could optimize signal coordination, as a means of minimizing traffic



Jo Versavel is the founder of the Belgiumbased detection specialist, Traficon

congestion and reducing associated fuel consumption and emissions. Further advances in LEDs and power consumption will also assist in this ecological goal.

We're 10 years off at least until the communications elements in this smart infrastructure penetrate enough for it to truly pay dividends, so in the meantime situational awareness will be key - awareness of the cars, the pedestrians, cyclists, riders, direction of movement, when participants arrive at the intersection, what their needs are, and how all of these movements can be orchestrated. The algorithms to solve these issues are not complicated - our cell phones feature more complex ones already.

We're working with an award-winning designer called Stefan Schöning on an intelligent intersection controller concept that combines all of the necessary communications apparatus and sensors in one aesthetic package. That control unit could communicate with cars, to pedestrians, have semigraphic VMS capabilities, acoustics for the blind, and even have the intelligence to watch disabled pedestrians safely across the road before allowing cars to pass. Smart thinking will lead to smarter intersections – and as a result, safer, more efficient and greener intersections.

۲



# Intelligence for traffic management



Integration with traffic management systems. On-the-fly pattern matching. Strategy management. Parallel simulations. Constant validation and learning. Real-time ranking of response strategies.

۲



www.aimsun.com

<sup>o</sup> Wouter Wynen – Aversis/Stefan Schöning Studic

Sing Mong Kee 🛛 🕥

Bringing power to the people is key to Singapore's ongoing success in ITS, as **Sing Mong Kee** explains

Interviewed by Tori Read

hroughout the course of a conversation with Sing Mong Kee, 'empowering the motorist' is a phrase that crops up a fair amount – and its meaning is at the heart of Sing's current efforts within Singapore's ITS community.

Now in his 50s and heading up ST Electronics' ITS business, Sing has watched Singapore evolve over the years to become one of the most impressive adopters of ITS worldwide. He spent 18 years working at Singapore's Land Transport Authority, doing everything from designing new roads to deploying the first ITS technologies in his country, all part of an overall transport masterplan. From the start, he consciously took a holistic, integrated approach to transport. Town planners were involved in the design of new transport infrastructure, consideration was always given to multimodal transport (Singapore is one place where the motorist is not always king), and ITS meant more than just high-tech gadgetry. "When we look at ITS we do not look at it only from the technology angle, we also look at it from the operations angle. This means we are always asking, 'How can ITS technologies help us achieve our operational needs?' That approach helps us to see the bigger picture and how we can best leverage all the different kinds of technologies available in the market to enhance our operations."

We look at ITS from the operations angle. We're always asking, 'How can ITS technologies help us achieve our operational needs?' That approach helps us to see the bigger picture

#### The final countdown

One of the more memorable early ITS projects Sing spearheaded was the introduction of pedestrian countdown systems at traffic signals. The intention was obvious – to improve pedestrian safety by clearly showing how much time remained for pedestrians to cross the road. The inspiration was a little less obvious, as he recalls: "I love cooking noodles in a microwave oven – you press a button and can see exactly how much time you have left. I thought a similar idea would be great for helping people – children in particular – see how much time they had left to get across pedestrian crossings safely."

۲

Even deploying a seemingly innocuous system such as this provoked a flurry of concern in a country that simply hadn't witnessed anything like it on its streets before. Sing remembers questions such as 'What if pedestrians see this counting down ('three, two, one') and use that signal as if it were a countdown to the start of a race?' Visions of pedestrians hurtling across roads were, fortunately, dashed when a trial of the technology worked smoothly, and today these countdown systems are widespread. This initial skepticism is something that Sing has experienced numerous times. "I think people and technology are not natural bedfellows," he says. "It can be hard for an operator used to manually logging incidents in a book to see the benefits of an automated incident detection system, for instance. And even harder to explain to the motorists on the road what the benefits of such systems are. This again is helped by our 'bigger picture approach' and is something that we at ST Electronics are particularly good at. We don't just describe the need for an intelligent camera network to monitor incidents. Instead we explain how an incident can negatively affect traffic flow on our expressways and how technology can help systems run more smoothly.'



### Sing Mong Kee



<image>

Singapore was the first city in the world to implement an electronic road toll collection system for purposes of congestion pricing and its ERP scheme (soon to enter its next generation) is world famous

Over the years, Sing has observed operators enjoying the benefits of incident management systems, improved communications technologies and more. Indeed, he describes ST Electronics as "a one-stop mobility solutions provider", which indicates the array of applications in which his company is involved.

One of the things of which he is most proud is the integrated traffic management that can be seen in Singapore. "In the old days, we had the expressway network control center, a tunnel control center, a traffic light control center, and none of them spoke to each other," he says. "We have now brought all of these systems together under one roof. The whole of Singapore is managed by one control center with only four to six operators. Everything is brought directly to the operator's console and they are able to assess all of the different systems to have a clear picture of traffic conditions."

Where Sing feels there is room for improvement takes us back to empowering the motorist. "We have worked hard to empower the transport operators – and not only those in control rooms," he says. "Just look at the world-renowned taxi dispatch system that ST Electronics devised. The next challenge is to offer the same benefits to motorists.

"We're coming up with a telematics system where the motorist will reap the benefits of the real-time information that our ITS technologies collate. We want to offer them dynamic routing based on realtime information. We're looking into how best to alert the motorists as they make their way along the road; to tell them where the problem areas are, where speed limits change (e.g. in school zones) and so on. We want many different sorts of service providers to interact with the motorist. The aim is to give motorists the power to make well-informed decisions about how and where they want to move, based on parameters that are of interest to them – such as cost, distance or travel time."

As well as introducing new concepts such as the above, Sing and his team are very busy on developments of existing schemes. ST Electronics has previously won the contract for Singapore's expressway incident management system, known as EMAS (Expressway Monitoring and Advisory System), and has also won a contract to provide an EMAS for the arterial roads leading into several major corridors.

#### Technology on trial

The other project currently occupying Sing's time relates to Singapore's famous electronic road pricing (ERP) scheme. "The system is moving toward the next generation and there will be trials for new technologies." Although ST Electronics is competing with other big players, Sing is confident his team has the edge: "It is a good opportunity for us to leverage the technologies we have already developed and integrate them with new technologies to make them work in a real situation. With our taxi dispatch system, all of the cars are equipped with GPS communications, so we're already operating a means of detecting vehicles and pricing journeys. For the ERP, we will be taking this technology a bit further."

When Sing is not working on his day job at ST Electronics, his other role as president of ITS Singapore keeps him just as busy. He's always focused on the need to communicate with other ITS organizations to get a grip on the worldwide market - something of vital importance when you are based in a small country on the other side of the world to many others deploying such systems. Sing states these relationships (especially with other ITS organizations in the Asia Pacific region) have proved very beneficial to Singapore over the years. "We can shortcut the learning curve and avoid mistakes - sometimes we can even jumpstart the solutions others are working on and bring them to life here."

In keeping with ITS organizations across the world, ITS Singapore's current focus is on standards. "We want to create awareness that there are standards out there (such as ISO and others) that we need to pay attention to, and at the same time we also want to develop our own standards that we can share with the world." O



#### Silver si silver silver silver silver silver silver silver silver silve

۲

A very special anniversary event deserves a very special preview. Here's 25 things you won't read about Traffex 2011 anywhere else. **Louise Smyth** toasts a selection of this year's movers and shakers. Here's to the next 25 shows!

Illustration courtesy of AI Grant

raffex 2011, to be held March 29-31 at the NEC in Birmingham, UK, is the 25<sup>th</sup> edition of this everpopular event. Billing itself as 'the international meeting place for anyone involved in traffic management, road safety, highway infrastructure and ITS', this year's event will feature more exhibitors than ever before.

۲

Co-located with Parkex and Street Design, there is something for everyone who is involved in the transport sector. Indeed, more than 10,000 visitors are expected to descend on Birmingham.

Alongside a world-class exhibition, many industry experts will be giving presentations in the seminar sessions. Encompassing a broad range of subjects – from road safety to carbon reduction to traffic modeling – the high-quality, free-toattend seminars are a worthwhile port of call for all visitors eager to learn about the issues that matter.

Over the coming pages, *Traffic Technology International* has hand-picked 25 mustsee features of this 25<sup>th</sup> event. A mix of exhibitor information and seminar presentation summaries, the following highlights will help you plan how to best spend your time at this busy event. **O** 



Traffex Theatre

056 **Traffic Technology International** February/March 2011 www.TrafficTechnologyToday.com

### Traffex Preview



Traffex's Bill Butler has seen everything at the event, from canoodling couples to women giving birth. He's also seen start-ups transform into multimillion dollar organizations. Here, he pinpoints some of the highlights of 2011's show

# What can visitors expect from Traffex 2011?

۲

We've spent an enormous amount of time with our content partners - the Highways Agency, Department for Transport, ITS-UK, the Chartered Institution of Highways & Transportation, and the Institute of Highway Engineers - to bring together a first-class seminar program. We've got some great speakers covering the balance of technical issues, but there's also some thought leadership about dealing with change management and how Local Authorities can stand up and react to a lot of the challenges that are being thrown their way. As usual, the sheer size and scale of the exhibition itself is a big pull. Exhibitors don't just come along with pop-up stands - they bring all of the kit, we get the back-office boys. It's not iust about the salesmen - visitors get to see and feel the solutions.

### How has the planning gone?

A lot of our work was done over two years ago. Everyone thinks I put my feet up in between events, but we go through a lot of feedback from visitors and exhibitors to try to shape the event based on that feedback. My favorite time is the night before the show opens, when the cleaners are in and the finishing touches are being applied to the stands – it's a bit like Changing Rooms, seeing everyone pulling together. Exhibiting at any trade fair is an experience that throws up a lot of challenges; you can never plan for everything. Traffex is never without its trials and

tribulations. We've had everything over the years from trackside fires and IRA bombs to major pile-ups on the motorway. There's always something that crops up.

# What trends are you gauging from your exhibitors in 2011?

The word 'efficiency' is being bandied around in our industry at the moment. There have been some really big changes in local government, but it's not all bad news out there. As long as Local Authorities and highways departments can demonstrate that they're spending their money wisely, further funding is being made available. We're also seeing a great focus on carbon reduction, specifically how the highways industry at its broadest level can help reduce emissions by making journeys more efficient.

# What's the special Traffex ingredient?

We bring together the whole integrated world of traffic management, parking and street design under one roof, so if you're into the built environment, landscape planning, etc, you've got to consider those three factors. As a team, we go out of our way to help visitors and exhibitors resolve any problems that they might have, whether it's requests for a kosher restaurant within 10 miles of the venue to looking after people's children! Traffex is a family affair. We love organizing the show; it's really close to our hearts. We carry a vanguard for Michael Stone and Janet Orna, who worked tirelessly to grow Traffex for a large chunk of their lives, and I still feel their presence over my shoulder every day when it comes to delivering this as a first-class event.

۲

# What do you hope visitors will take away from Traffex?

I hope they'll see something that will inspire them; just a nugget that they can take away to help them change the way they're doing things, something that will offer an improvement, deliver a better service, or a way to do things more efficiently. I think there's a definite need for this industry to come together at the moment, to stand up for itself. Yes, we are in strange times, but it's a great opportunity for Local Authorities up and down the country and beyond to get together and talk about how things really are – not how they're being portrayed in the press.

### And finally, the best place to eat?

If you're in a hurry, I tend to go for the Subway option when on site, which offers the best value at the NEC. In the evening, though, I'd have to say Jessica's, the twostar Michelin restaurant – particularly if you fancy something flash. But there's loads of good restaurants in the center of Birmingham – you're spoilt for choice!

۲

ENTRANCE

### Traffex **Preview** | 😋

# Eagle-eyed

### **NEAVIA TECHNOLOGIES** STAND Z176

Neavia Technologies is using Traffex to launch its new webcam for traffic applications, WebLynx. Neavia describes WebLynx as 'an autonomous, smart and wireless webcam'. It offers embedded processing capabilities and extreme triggering features and can be equipped with various lenses and optical heads, including a day/night variant. WebLynx communicates to a traffic management center through GPRS/3G/HSPA radio links. The video streams can be easily accessed through any server.



۲

Neavia also provides its own or a customized internet server for video stream display. WebLynx can be powered via a small solar panel or a battery. It is aimed at mobile or fixed applications at sites where mains electricity and communications are not available. Such applications include traffic studies, mobile law enforcement and permanent traffic monitoring in suburban or rural areas.

Neavia's president, Jean-Hubert Wilbrod, says his company is developing solutions in response to two industry trends - mobility optimization and infrastructure optimization. "Mobility optimization leads to greater promotion of public transport and multimodality. As a consequence, a better knowledge of real-time traffic conditions becomes mandatory. This means there is a growing need for easyto-install roadside sensors. Neavia has already introduced some new concepts and products (such as EagleVia) that are currently expanding. But the new trend is now data fusion between data collected from roadside units and floating data from cars, cell phones or other devices. Neavia is working on such algorithms that will be the heart of future ATMS.

"Infrastructure optimization means making traffic fluid on the



existing road network instead of building a new bridge, for instance," he continues. "The use of traffic sensors that measure queue length or travel times for controlling red lights will grow. From project experience, Neavia is now building a suitable device.

"Infrastructure optimization also means sharing the road – between cars and PTWs, for instance. Around Paris, motorcycle traffic is rapidly growing, reaching 10% at peak times and this impacts safety. Sharing space between private vehicles and public transport is also an issue. The growth of dynamic lane allocation and prohibited spaces will require more video surveillance. With WebLynx, we are offering a versatile, easy-to-install solution."

### **Plate** expectations

### CITYSYNC **STAND A10**

On the Image Sensing Systems Europe stand, CitySync will be launching its new multiple plate-tracking software, which was developed for the Italian police. "Lane discipline is often poor on Italian roads, so to help police capture every plate (and not miss potential criminals), CitySync has developed its Jet ALPR engine to track multiple plates in a hi-res image, including small moped plates," says the company's Jane Haywood. "These are transmitted to the back-office system, which triggers alerts for any plates on a 'hot-list'.'

ISSE will be presenting its RTMS G4 sensor and its new Wireless Echo radar, demonstrating how

۲



radar technology detects presence and measures traffic parameters across many lanes. A recent contract success for ISSE was to provide complete city-wide detection for Wroclaw in Poland. This will include the supply and installation of its RackVision Terra intelligent video detection product, locally built, high-quality CCD cameras, complete installation on the street and setup for several hundred camera channels.

### Laser show

### TRUVELO STAND H50



There will be a new launch on Truvelo's stand. as UK operations director Peter Hill explains: "The

D-Cam L is a dual-capability speed and red light camera that uses laser technology."



Why did Truvelo choose Traffex for the launch? "Traffex is an international show. We find that in the UK everybody is used to piezo sensors. However, in other parts of the world, non-invasive solutions are preferred for a variety of reasons. That's why we came up with a permanent laser installation for speed measurement - and why we want to promote it to an international audience." Truvelo has recently won a contract for this technology in Durban, South Africa.



highlight of the Truvelo stand will be a range of products from Kustom Signals: "We've been representing the company in the UK for over five years. New to Traffex is the

Another key

recently approved Kustom LASERwitness digital video speed enforcement system, which comprises a laser gun and a digital video color camera on a tripod all packaged together with builtin infrared illumination."

Hill hints that more news is still to come: "We're creating a new radar-based system."



Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com



# Solutions For a moving market

۲

ARVOO Imaging Products BV is an innovative developer and manufacturer of high performance electronics for demanding Intelligent Traffic Systems (ITS). ARVOO delivers ITS products – camera's and embedded systems – based on 15 years traffic systems knowledge and experience in state of the art hardware solutions.

۲

# ACCESS ANPR IN-CAR ANPR ALL-IN-ONE ANPR

# ITS301DU0

The ITS301DUO encompasses a dedicated ANPR processing unit with infrared camera and overview camera. The world's smallest full blown in-car ANPR system.



### MANUFACTURED IN THE NETHERLANDS 🕸

# Intelligent approach

### 11.00hrs. MARCH 31 TRAFFEX SEMINAR THEATER 1

"In our industry, we've been thinking of intelligent transport systems (ITS) for many years. We have regarded ITS as something special and a niche within transport itself. The very words we use sum this up - 'Intelligent'. So is the rest of transport dumb? 'Transport' - that's a very 19<sup>th</sup> century word associated with trucks. As for 'Systems', well they are perceived as expensive IT kit that generally doesn't work well.

This branding is no longer sustainable, as ITS has now started – at long last – to be not just a part of transport but of everyday life. People don't use ITS to learn about congestion – they use a satnav (over eight million in the UK and counting). They don't use ITS to see if the train is running, they use an app or a GPS-driven sign at the station. And they simply do not know or care about how any of the stuff works.

So I argue that the time has come to move our ITS thinking from niches to not only wider transport but also as a full part of how we live and work. ITS now means 'I Travel Smarter' and has to be subsumed into wider business.

By smarter travel, we actually mean that the stressful decisions and impacts of travel (congestion, which subway line to take, when to leave for the airport) simply disappear. You do not care or worry about how an iPhone works, but you love the way you can order and read books, watch movies and even pretend to be Luke Skywalker with a lightsaber (you have downloaded that app, haven't you?).

In our old thinking, users would have had a dedicated unit for travel information fed by a dedicated system – now it is all done 'by magic' on one device. Technology and services are converging so that

> Andy Graham, White Willow Consulting ITS is dead – long live ITS

users just do not see transport as separate from anything else, and we should look at this in the same way. Smart travel can mean smart as in 'clever', but also smart as in 'well presented and tailored to you'.

Of course, we will still need the same systems, communications, CCTV and even consultants, but as far as users are concerned, this is iust a means to smarter travel. And the new ITS brand should also be at the forefront of new initiatives: would you buy an electric car without a satnav to get you to an available charge point?

A rebrand using the same acronym is nothing new; Howard Hughes renamed Transcontinental and Western Air (TWA) to Trans World Airlines (TWA) so he could be a bigger airline player without the cost of changing his logo. We can do the same. Long live ITS!"

# Light display

GARDASOFT **STAND Z86** 



( )

**David Richards** will be manning the Gardasoft stand to showcase his company's latest lighting products. "We

will be launching the new generation of our VTR2 and VTR3 lights at Traffex," he explains.

The VTR3 is a new design that Gardasoft is targeting toward large OEM customers. "It allows complete housing of the camera, lights and lens along with optional motorised lens controller, power supply and GigE switching,' Richards says.

Over the past couple of years, the Gardasoft man has witnessed a growing awareness in the traffic industry of the need for improved lighting solutions





- he cites the rise in demand for LED-based solutions (as opposed to Xenon-based solutions) as a prime example of this. The widespread use of vision-based systems across the ITS sector (consider the relentless rise of ALPR systems) has been another boon for Gardasoft. And although the company is active in many different industries, for 2011 at least, ITS will be its main concern: "The traffic market is the focal market for us this year. In accordance with this, we have just signed an agreement with a distributor in Brazil to cover South America for us."

This focus is already paying off with regard to contracts. Richards hints that a couple of new projects have gone particularly well: "I've had some good feedback from a big client - see me at Traffex to hear more!"

۲

# Study session

### **MIOVISION TECHNOLOGIES** STAND A63

Traffic data collection 5 equipment and software

manufacturer, Miovision Technologies, is using Traffex to launch its latest product - the Scout video collection unit. "Scout is the next evolution of our system and will provide the video quality we need for our four new study types," explains Shane Walker from Miovision. "The new study types are ALPR, origin/destination studies, travel-time studies and parking studies. This new version will also provide improvements in battery life, recording time and portability over our existing model.'

The advances in Scout have arisen as Miovision responds to the growing interest in non-intrusive technologies for collecting traffic data. "These technologies do not require staff to enter the roadway during set-up, are safer, do not interfere with traffic and are much less likely to be damaged during the study," Walker adds. "Using video to collect traffic data has been common in parts of Europe for years and this trend is now spreading to other areas of the world, including North America. The focus was often on cost but now engineers are demanding quality data at a fair price.'



### Traffex Preview

Q VP-P

TRAFICON

### Modeling portfolio

### TSS STAND E21

۲

The well-known traffic modeling company, TSS, will be showcasing the latest version of its popular software, Aimsun, version 7 of which is capable of running simulation models of large metropolitan areas much faster than real-time. Aimsun now has nearly 2,000 licensed users in over 60 countries. In the UK, they include Southampton, Bradford and Leicester City Councils, the Universities of Leeds, Newcastle and Southampton and consultancies such as Arup, Halcrow and MVA.

The key new software feature is the hybrid simulator, which allows users to take a simultaneous mesoscopic and microscopic approach and combines the benefits of both at minimal performance cost.

TSS intends to continue to expand its presence in the USA in



2011. Aimsun Online in particular is coming into its own as the modeling package of choice for both a large-scale evacuation study on the East Coast and also the San Diego pioneer site for the USDOT's nationwide Integrated Corridor Management (ICM) initiative. Alex Gerodimos, president of TSS Inc, recently moved to the USA from the TSS headquarters in Barcelona, Spain to be able to lend onsite support to projects such as this. "We decided to set up TSS Inc in no small part to provide simulationbased decision support to the groundbreaking projects that are currently taking place in North America. The timing of this ICM project couldn't be better - we are thrilled to have the opportunity to contribute our product and experience to making it a success."

# Very important processor

### TRAFICON STAND D31

Video detection specialist Traficon will be demonstrating its first automatic incident detection (AID) board analyzing images coming from network cameras. This new video image processor for traffic control, called VIP-IP, has been developed to respond to the upcoming trend toward IP cameras.

VIP-IP integrates automatic incident detection, data collection, vehicle presence detection, digital recording of pre- and post-incident video sequences and streaming video in one board for a variety of traffic management applications.

Product manager Eddy Vermeulen explains why the VIP-IP was developed: "Network cameras are already widely used in the surveillance industry and what happens in that sector often gradually enters the traffic market. So it's just a matter of time before the new generation of traffic cameras will all be using IP signals. "

FIBER OPTIC CONNECTIVITY AND ETHERNET NETWORK SOLUTIONS FOR INTELLIGENT TRANSPORTATION SYSTEMS

Communication Solutions from the Company that Supports You Every Step of the Way



### ComNet: Where Delighting the Customer is an Everyday Experience

- Free Design Center Application Support
- Pre and Post Sale Technical Support USA- and UK-based Staff
- The Industry's **broadest** line of Fiber Optic and Ethernet Transmission Products
- Hardened for use in Harsh Industrial Environments
- No-Questions-Asked Lifetime Product Warranty
- 'Customer is always right' attitude

For more information about ComNet and our complete line of connectivity and communication network solutions visit www.comnet.net, contact ComNet at info-europe@comnet.net or call +44 (0)113 307 6400



 $( \bullet )$ 

3 CORPORATE DRIVE I DANBURY, CT 06810 I USA I WWW.COMNET.NET T: 203.796.5300 I TECH SUPPORT: 1.888.678.9427 I INFO@COMNET.NET 8 TURNBERRY PARK ROAD I GILDERSOME I MORLEY I LEEDS, UK LS27 7LE T: +44 (0)113 307 6400 I F: +44 (0)113 253 7462 I INFO-EUROPE@COMNET.NET

# Model behavior

### 10.00hrs. MARCH 30 TRAFFEX SEMINAR THEATER 2



The forthcoming Traffex presentation will provide delegates with an ideal opportunity to fully understand the development of the TMG, which has captured expertise from over 20 contributors both within TfL and across the industry. The event will also be used to launch version 3.0 of MAP, which has been updated to include support for networked LinSig 3.1 modeling.

۲

The presentation will illustrate how MAP and the TMG complement each other to provide a transparent signposted route from initial model

scope through to a fully modeled and assessed proposal. In essence it will describe how the guidelines contain information on fundamental modeling principles, as well as tried-andtested modeling techniques that complement the advice provided by the Department for Transport. The presentation will also explain how the MAP establishes technical benchmarks through a common decision-making structure for all model submissions to London Streets.

MAP has been applied to all TRANSYT and VISSIM modeling undertaken within London Streets since 2008, with over 1,100 traffic models following the process. The extensive use of MAP and the TMG has had a cultural impact; the formalized approach to modeling standards has encouraged software developers to incorporate new features that allow better scrutiny of a model to identify areas of potential weakness. This has increased modeling standards and led to more efficient working practices. Results from a recent user satisfaction survey will also be presented at Traffex, which show that these modeling support documents result in the efficient delivery of high-quality, costeffective scheme designs, and make a valuable contribution to smoothing traffic flow in London



James Smith, Transport for London affic modeling guidance for London

# A brighter future

### VMS LIMITED STAND E41

"In a small to medium enterprise such as mine, priorities are sometimes set by a single event of enormity to which you have to respond above all else because your company's future could well depend on the outcome. Such an event is happening in the UK right now," says Roger Stainforth, director, VMS Limited.

"The decision to consolidate procurement, potentially, of all traffic management technology including consultancy through the government's 'Buying Solutions' organization (described as "the national procurement partner for UK public services") is the most radical change in purchasing policy I have seen in my 24 years in the industry. The PQQ was submitted on February 21, 2011 as the starting pistol in the selection process. I mention this event because Louise Smyth, the

# Better by design

### 12.00hrs, MARCH 29 **TRAFFEX SEMINAR THEATER 1**



"LinSig is a comprehensive design and modeling package for traffic signal junctions and networks. Since its release in 1985, it has

consistently been the most widely used signal design software in the UK. LinŠig3 is the latest version and its features and functionality improvements have been largely driven by customer requests and feedback.

A major leap forward is its improved suitability for modeling complex networks of junctions. These networks can accommodate a mixture of signal control and priority junctions. In the networks, every junction is a separate entity, allowing each signal-controlled junction to have its own controller model with its own individual personality. This allows modelers to code the junctions exactly as they appear on-street and be confident of an accurate representation. Conversely, the use of individual controller models makes the

deputy editor of Traffic Technology International, has been gently caioling me for my contribution to this pre-Traffex issue. I have no idea how the Buying Solutions initiative will turn out but I do know it has had to take priority because, in common with many others that will be completing their submissions, if you don't succeed in the process, Traffex 2013 might just be academic!"

Stainforth recalls his first trip to Traffex in 1987 and mentions how much things have changed since: "Back then, the electronic displays were magnetically pulsed reflective discs and IBM compatibility was standard for computers. LED displays were in their infancy and if you wanted yellow characters, the pixels were created by mixing large numbers of red and green LEDs. The LED signs and signals on our stand today are state-of-the-art in LED technology. The powerefficient Pegasus sign and post system takes advantage of the

task of translating the model into a controller specification straightforward and simple. Networks can be built from scratch or existing LinSig models can be stitched together using a zone-merge wizard. It is also possible to convert older LinSig models into LinSig3 and add them to a network model. These features will allow modelers to quickly assemble networks using their existing stock of discrete LinSig junction models. To assist in the construction and use of network models, LinSig3 has new tools more normally associated with larger strategic models. These include Delay Based Assignment and Matrix Estimation. The Delay Based Assignment tool allows traffic flows to be assigned to a network (or junction) based on route choices that balance out delay. In many cases this should provide a more realistic assignment. The Matrix Estimation tool can be used to create origin/destination matrices from discrete junction turning counts and will report the 'goodness of fit' with GEH



### Traffex **Preview**

latest LED technology and the message setting capability flows from local authorities' desire to have MS4 high-resolution motorway style signs scaled to the urban environment." Pegasus offers three matrix areas suitable for the display of four lines of 16 characters with text height of 160mm, 100mm and 50mm. The two larger format signs employ dual-color amber and red matrices; the 50mm version is amber only.

Stainforth makes a key point about the evolution of priorities: "You didn't hear much about environmental issues in 1987; now it is a priority in the design to make products sustainable, energy-efficient and recyclable. A good example is the VSLS (variable speed limit sign). It emanates from an HA initiative on weight reduction of their advanced motorway indicator and a desire to halve the weight from about 100kg. The only way to prove it

# STION

was possible was to make one. It weights just 55kg. Obviously, it uses less material and is more energy-efficient but just about everything can be recycled. The rollout of technology

across the motorway network has put reliability high on the agenda for three reasons. Firstly, because equipment needs to be available; maintaining and servicing equipment to which there is no access is costly; and as a result of health and safety practices to protect the workforce and road users. A seminar on Reliability will be held in Seminar Theater 1 at 10.00hrs on March 30."

# The enforcers

### JENOPTIK STAND B10



of speed and red light enforcement solutions, along with some new sensor technology for 3D radar tracking sensors. Heinz Marburger will be at the show to promote the company's integrated solutions that it calls 'Traffic Service Provision': "This means not only having traffic safety equipment on the roadside but bringing it all together in an end-to-end solution, including communication, secure data transfer into the back-office and processing center and also providing services for processing the data," he explains.

The need to diversify its range of services in this manner was prompted by Jenoptik reacting to the growing demand for enforcement programs across the world – a trend that Marburger reminds us is evident in developing countries as much as developed ones. He's also noted more and more

tenders where traditional ITS applications (such as surveillance or traffic control) are to be combined with traffic law enforcement. "On the surface, it looks natural to combine the two", he says. "However, when you think about it, most ITS applications are for monitoring and controlling - there is no interaction with the end-user. Enforcement, on the other hand, means issuing citations and communicating with the driver. It takes expertise in both sectors to combine the two – and that's something Jenoptik can assist with.

Another trend is toward section speed control, which is keeping Jenoptik busy, as Marburger details: "In 2010, we realized three section speed control projects, one in the Middle East, one in Switzerland and another in Austria. We have received approvals for the systems in those countries."

۲

(Geoffrey E Havers) statistics. Other new network-based features are due to come online shortly, including Layered Flows (which allows discrete modeling of buses, etc), a TranEd import tool, multiple cycle times within networks and a new lane flow input tool.

۲

Major improvements have also been made to LinSig3 in terms of discrete junction modeling such as pedestrian delay modeling, which allows designs to be compared in respect of utility to pedestrians. Again driven by customer demand, LinSig3 will shortly be able to model multiple intergreens (allowing better simulation of puffin crossings) and will include a file comparator function that will assist in tracking changes to models and model auditing.

LinSig has also been making some new friends abroad. An

### John Nightingale, JCT Consultancy

LinSig3 – The UK's favorite signal design software gets smarter and makes new friends abroad



opportunity to showcase LinSig's versatility came in the form of a commission to design the first two permanently signalled roundabouts in New Zealand at Welcome Bay and Mangatapu. In response to these successful commissions, New Zealand and Australia took an interest in LinSig3 and are becoming important markets. Users in these countries have driven the introduction of SCATS-based terminology into LinSig3 and work is underway to refine the product to better represent the overseas controller model and control strategies.'

# Chevrons apart

### тwм STAND A70



On display on the TWM Traffic Control Systems stand will be a number

of new products, including an interactive chevron with LED illumination to suit both day- and night-time operation. Traffex is also the UK launch of TWM's new data download module, which allows clients to download stored traffic data remotely via GSM telemetry.

"We have recently been awarded a contract by Derbyshire County Council to replace all the existing manually programmed school twin-amber flasher units in the county," says Roger Mann from TWM. "The replacement units are fitted with Activ8 GSM/radio telemetry that enables school



warning signs and flashers to be programmed and monitored remotely.'

Mann has noticed that, due to current budgetary constraints, one of the biggest trends in his sector is for suppliers that are able to provide a total management solution to the end-users' signage needs - and TWM is well placed to meet these demands: "In these challenging times, it is our intention to remain one of the UK's leading suppliers of LED interactive signage, systems and services and over the coming year we will continue to develop innovative products to solve the many signage problems our clients face on a daily basis.'



### Traffex **Preview** | 😋

# Green Street

### 15.00hrs, MARCH 29 **TRAFFEX SEMINAR THEATER 2**

"Questions and ideas about how the UK can reduce greenhouse gas emissions is now a regular headline issue, and in particular how surface transport's significant contribution to emissions can be tackled. Interestingly, the latest national statistics for the UK show a reduction in emissions from surface transport due to the recession – and this trend is expected to continue as the economic forecast remains gloomy. As such, the key challenge going forward will be how we manage to continue this decline in emissions, while at the same time stimulating economic growth.

The transport white paper Creating Growth, Cutting Carbon published in January 2011 sets out some of the techniques that can be employed to achieve both objectives. The deployment of a range of ITS technologies will be one way of achieving this aim. Such technologies include: ITS to support the roll-out of electric vehicles (space-booking systems, payment technologies and trip advisory systems); UTMC systems to manage people and freight movements in urban areas (in conjunction with 'greening

( )

UTMC' measures); payment systems (smartcards for single and multimodal travel payments); data-processing systems (for analyzing the changes in greenhouse gas emissions as a result of implementing measures, closely associated with the new DfT tool for estimating changes to greenhouse gas emissions); journey planning and route guidance/information systems to assist with multimodal endto-end journeys; and improved communications technologies to reduce the need for travel.

In addition to these measures there will also likely be pressure to declutter the urban space, with the removal of signs and other street furniture. This, combined with the need to reduce energy consumption, could lead to a rethinking of the way ITS services are delivered in the urban space. For example, roadside posts and cabinets may start to become a thing of the past, being replaced by less obtrusive, low-power infrastructure.

These issues and more will be discussed at the Traffex seminar.



Keith McCabe, Atkins

Achieving carbon reduction by using ITS technology

# Smarter surveillance

### WIRELESS CCTV STAND G11

Wireless CCTV is using Traffex to launch its 3G Analytics and HD ALPR products. Julia Stoney, international business manager, explains the advantages of these new systems: "They offer the same portability as our standard products. but also offer a proactive approach to CCTV, suiting enforcement and journey analysis requirements. Our analytics system identifies unusual traffic behavior as it occurs, alerting control room operatives to situations that

they have predefined in the software, such as illegal turns and bus lane restrictions. Our HD ALPR system is unique on the market and can monitor up to five lanes of traffic through a single camera. The advanced software has been developed to work with multiple lanes of traffic and incorporates a highly efficient plate-finding system." WCCTV will also have

its new Tower product on the stand, which has been designed to offer autonomy where no electricity supply is available.

In 2011, the company will be focusing on expanding operations by further developing its international



network of partners and resellers, as well as opening new premises in Washington, DC.

### Stimulating simulation

### STAND C32

ΡΤΥ

Traffic modeling software expert PTV will be

using Traffex to showcase the latest advances in its wellknown products. Head of PTV's traffic software division, Thomas Schwerdtfeger, outlines the latest developments in VISUM: "Besides speeding up procedures through parallelization,



the new version (11.5)

provides the first step toward an integration of a powerful scenario management tool. The new developments include a new PuT fare model, extended PuT line blocking, scenario manager, HBEFA emissions modeling, upgraded graphics parameter dialog, and Google transit import.

"On the VISSIM side, recent developments have centered on the trend for pedestrian simulation," Schwerdtfeger says. "Both pedestrians and motorized modes of transport can be included in simulations of complex intersections or sequences of intersections, for example."

2011 will see PTV focusing more on ITS, as Schwerdtfeger explains: "With our transport planning software, PTV Vision, we are market leaders; in the ITS sector we're not that far yet, but we're working on it."

# Transforming Motoring Experience

# with ST Electronics Mobility and Telematics Solutions

- Unified Transport Management
- Transport Security
- Highway and Arterial Road Management
- Traffic Enforcement
- Enhanced Fleet Management
- Vehicle Telematics

A leading Singapore company in transport solutions - ST Electronics (Info-Comm Systems) is a one-stop mobility solutions provider of systems and technologies for integrated transport management, intelligent traffic management, fleet management and telematics solutions. Our patented and award-winning solutions are deployed worldwide to empower government agencies and commercial enterprises to operate in a safe, sustainable and resource-efficient manner, optimising service levels and operations, paving the way for a better future.

info\_infocomm@stee.stengg.com www.stee.stengg.com/group/infocomm





INNIN 1

# Plethora of packages

### TRL STAND C30

"We have a jam-packed stand! There are so many new releases and things to talk about," says an excited Gavin Jackman, head of software for TRL. A number of products will be on display for the first time. These include the ARCADY 7 and AutoTrack Junctions Link, a new solution that links two leading products. "By dynamically linking TRL's ARCADY 7 and Savoy

Computing Services' AutoTrack Junctions and combining the two operations, the time taken to produce efficient and robust roundabout designs is significantly reduced," Jackman explains. "The link is initiated automatically and the two programs communicate seamlessly to each other."

Jackman also has a whole list of other solutions making their debut. "The latest generation of our signal control tool, MOVA, will be released to coincide with Traffex," he says. "The developments to MOVA 7 include features to



assist with operations, such as Traffic Management Act logs, measurement of saturation flow, and improved layout.

"We'll also be promoting SCOOT MMX – the latest version of the SCOOT adaptive control software operating in the Siemens and Peek UTC systems." Other highlights

include TRANSYT 14.3, and the launch of PCMOVA2, which is compatible with MOVA 7 and also allows simultaneous integration into VISSIM models that also have PC SCOOT emulation. Many of these new solutions

are in line with TRL's overall strategy on greater integration. "The biggest trend we are active in is the integration of services, data and processes," Jackman says. "The reuse of data, automating the processes and making more of what you have got - that's our main product development focus."

### **Calculated** approach

### **RSMA** STAND Z124



( )

"The Carbon Reduction Commitment is an additional challenge for Local Authorities and, as a

consequence, for the road markings industry," says George Lee, chairman of the Road Safety Markings Association (RSMA) in the UK. "This is why we've developed our Environment Impact Management Programme, or E-IMPTE, within which we've created a carbon calculator for road markings materials and operations, which we're launching at Traffex 2011."

Lee feels as an organization, the RSMA has to lead the way in such practices. "We looked at the marketplace and at the obligations that are going to fall upon our contracting and manufacturing members in the years to come," he reveals. "As they work so



heavily with public bodies - which have a legislative, statutory requirement to reduce their carbon outputs - it was becoming clear that our members were going to get caught up in this. We decided it would be far better to be at the front end of change than be at the back and become a victim of change in the future."

Lee's colleague, Duncan Powers, is a research associate at the RSMA and the University of Lincoln and is leading the E-IMPTE initiative. "Our carbon calculator will help our clients and road markings companies to be in a position to identify and ultimately reduce their carbon impact," he explains. "It goes into incredible detail. We will actually be able to give you the carbon value of a liter of road marking, painting an arrow, or even the 'G' of 'Give Way' – any sign that's in the TSRGD (Traffic Signs, **Regulations and General** Directions 2002). We've prepared the carbon cost for the top 50 thermoplastic materials, analyzing the installation techniques, the types of vehicles used for application, and the carbon cost of moving those vehicles over set distances. Continual improvement will help the industry to fulfil its responsibilities.

## Host with the most

**BUCHANAN COMPUTING** STAND Z2

Commenting on Buchanan Computing's recent introduction of hosted and managed web services for traffic engineering, MD Simon Morgan says: "In the current climate, Local Authorities are understandably more nervous about purchasing, but remain committed to the importance of IT in achieving savings. Options that many are considering include the outsourcing of IT functions (such as website hosting) that might previously have been done in-house, and sharing

technical functions with adjacent authorities.

"Our launch of TraffWeb - a ready-to-use, versatile and configurable system for web-based sharing of traffic data – has been a great success. Five authorities are already using the system."

Morgan says one of the selling points is its flexibility: "It can cope as easily with road casualty data in Essex as it can with public consultation for onstreet parking in Hounslow."

Morgan reveals that during 2011, additional functions will be added to TraffWeb, and he expects many more authorities to adopt the system to help achieve their cost savings.



Traffic Technology International February/March 2011 066www.TrafficTechnologyToday.com



# Auto express

### SAVOY COMPUTING SERVICES STAND A60

"At Traffex this year, we will be focusing on AutoTrack Junctions – a new faster way to design roundabouts with a unique analysis link to TRL's ARCADY program," explains Simon Ayers, director, Savoy Computing Services. "The system combines the traditional design and analysis of roundabout design, allowing the



۲

engineer to monitor the performance of his design as he makes changes to the geometry. Also on show will AutoTrack Roads Pro, which can model almost any type of vehicle and is uniquely able to model fully independent secondary steering – i.e. axle groups controlled either by secondary controls in the driver's cab or by someone other than the driver."

Savoy Computing Services has been offering AutoTrack Roads Pro on a rental basis for several years, and its launch of AutoTrack EXPRESS represents a convenient solution for those who don't need AutoTrack frequently. "Users always get to use the latest version of the software without paying an annual charge," Ayers says.

He also hints that 2011 will be busy: "We're not saying exactly what we've got planned but it includes updates to AutoTrack modules and the launch of a brand new module."

# Star-studded stand

# CLEARVIEW TRAFFIC



Us and Golden River – are using Traffex 2011 as the launchpad for a number of new products, perhaps the most interesting of which is the new Flush Intelligent Road Stud. "Our hardwired road stud previously only faced into the oncoming traffic, so now we've developed a version that offers the added advantage of being bidirectional," explains Graham Muspratt, group product and marketing manager.

So what's the benefit of this enhancement? "Imagine you've got a tunnel with twin bores, and two lanes in each direction," he says. "Under general running that would be two lanes north and two south. However, should there be an accident in one of the bores – or even routine maintenance – tunnel operators would have to close one and switch to contraflow running in the other, so a single lane north and a single lane

# **Detector gadgets**



Since the 2009 Traffex event, TDC Systems has enhanced

its existing range with a number of new products to help its clients perform their network management duties more efficiently. Tony Di Monaco from TDC explains what he and his team will be showcasing at this year's show: "New products on display include the HI-TRAC Blue traffic impact analysis system, the HI-TRAC iLOOP non-intrusive loop counter classifier, the HI-TRAC CMU cycle monitoring and pedestrian detection unit, and the HI-TRAC UTC range of traffic counters. Alongside these new technologies, we will also be providing live demonstrations of our weighin-motion systems, which are southbound. Our new bidirectional studs will help to ensure safe passage through the one bore by providing bidirectional delineation for the traffic flowing north and southbound. We've installed 868 of these studs in the 1.8km-long Hindhead Tunnel at 4.5m intervals. Under normal running, every stud will be switched on, so you'll have



a 9m-interval stud, switched on only in the direction facing the traffic, giving you the effect of driving on a standard stretch of dual carriageway. But when one of the bores is switched to contra-flow, we will turn all studs on in bidirectional mode, in doing so creating the effect that you're driving up a single carriageway road with a double white line up the center."

Muspratt reveals he has had tentative discussions with the Highways Agency about developing the product for further uses, such as in hard shoulder running, where the active, color-changing and bidirectional features could be highly beneficial. Indeed, Astucia demonstrated such a concept in the Netherlands around five years ago: "It's one of those ideas that's had a gestation period before gaining widespread acceptance," Muspratt says. "One of the issues is legislation: a road stud is a road stud and as soon as it starts giving drivers traffic signal information, it becomes a traffic signal that might require different Type Approvals. Potentially, though, you could reduce the number of overhead gantries displaying information for hard shoulder running or managed motorways because the studs would do some of it. Not only that, the stud is in your immediate field of vision – you don't have to look up for pictograms, arrows, etc. I certainly see a future for more dynamic lane markings.'



widely deployed in the UK as well as overseas."

Di Monaco is particularly keen to highlight the merits of the HI-TRAC Blue system. "This is an exciting new development that is aimed at providing Local Authorities with a very cost-effective method of collecting traffic flow data," he says. "This can be used to provide evidence that applied traffic reduction measures are having a positive effect on the network."

TDC was recently awarded a 10-year-term contract to support the development of an ITS infrastructure across the 10 Local Authorities that make up Greater Manchester. together with Derbyshire County Council and Derby City, who were keen to adopt the same approach and became contract partners. "Manchester City Council was looking to renew the traffic count network and make it more efficient, in particular to automate data collection and to get the majority of sites on telemetry," Di Monaco comments. "The client wanted to go a step further to use automated equipment more widely and to develop an ITS infrastructure including ALPR and other new technologies, including Bluetooth journey time monitoring systems."

### Traffex **Preview** | 😋

# Safety first

### 11.00hrs, MARCH 29 **TRAFFEX SEMINAR THEATER 1**

"Siemens, in partnership with Springdale First School, Poole Borough Council, Dorset County Council and Dorset Safer Roads, has installed the UK's first trial of an average speed enforcement system around a local school.

This joint presentation from Siemens and Poole Borough Council will demonstrate best practice for engaging the local community and media in supporting the use of innovative enforcement technology to address road safety issues and enhance the quality of life for local residents. It will include analysis from three independent traffic surveys conducted to measure vehicle speed prior, during and at the end of the six-month trial to measure the solution's impact.

It is hoped that these findings will be of interest to Local Authorities and community groups looking for ways to improve road safety without resorting to road engineering schemes or traditional enforcement systems.

The Springdale Road trial site was chosen as there was concern from local residents and parents that vehicles were traveling past the school gates at speeds in excess of the 30mph limit at school opening and closing times. This concern was gualified prior to the start of the trial with an independent traffic survey. Over 190,000 vehicle speed measurements were captured, with an analysis of the results highlighting the average speed of vehicles was indeed above the ACPO guidelines for allowable enforcement. On average, 85 vehicles an hour were measured traveling above 40mph, at the

## Red alert

### REDFLEX STAND C34

۲



stand, the company will be showcasing its range of mobile (Radarcam and Lasercam) and fixed (Red-speed) enforcement products as well as offering demonstrations of its backoffice and camera network monitoring systems.

On the Redflex

'A large investment in our R&D center over the past year has seen a significant number of clients benefit from the fixed and mobile radar solutions that can be operated in built-up areas," suggests Redflex's Tabitha



Mitchell. "Full forensic radar return data is stored in the offense file, which provides clear evidence of the situation before, during and after the infringement. This obviates the need for expensive civil works for intrusive deployments. The radar system detects two independent speeds for each vehicle and confirms the speed before an infringement is recorded. This is a key safety measure that protects the integrity of the program."

Mitchell cites the increasing trend for average speed systems as an area that Redflex is currently focusing its efforts on. "Consistent data from existing deployments of our point-to-point average speed enforcement systems shows that they are a very effective tool in changing driver behavior. We pioneered point-to-point technology in Australia and are now seeing a growing demand for these systems from across the world."



times when children were entering and leaving the school.

Three SafeZone outstations were installed along Springdale Road, with each single camera monitoring two lanes of traffic, in both directions. The SafeZone system uses 3G mobile communications to send both summary data and evidential images to the back-office system, hosted at Siemens' premises in Poole. The trial was installed in September 2010.



and 95% agree or strongly agree that "Involvement of children in the SafeZone project by designing street signs, is a good thing". 78% of respondents noted that "vehicle speed has decreased and there is an increased awareness of the need for safe speeds."

Initial results from the second

According to a survey conducted by Springdale First

School, 94% of parents agree or

strongly agree that: "The use of

average speed cameras as part of the SafeZone trial is beneficial"

### Mark Bonnor-Moris, Siemens

Road Safety in action – a case study of the Springdale Road SafeZone trial

### Politically charged

**KAPSCH TRAFFICCOM** STAND E40



UK division, Sharon Kindleysides is optimistic about the coalition government's commitment to implement road user charging for heavy trucks, a topic she's been following closely ever since the days of DIRECTS in Leeds. She's not too sure that the proposed vignettebased system, slated for April 2014, is the best way forward however. "The goal is all fine, and the haulage sector has welcomed the fact that the scheme will be broadly revenue-neutral," she says, "but I'm slightly concerned it's not going far enough in the first place." Hauliers in the UK are generally pleased that foreign trucks will at last make a contribution toward the impact their vehicles are having on the UK infrastructure, just as

UK trucks have to pay their dues in France, Germany, etc. Kapsch is at the forefront of such schemes in Austria, the Czech Republic, and has Poland on the horizon, and Kindleysides feels a paperbased scheme potentially limits the contribution these non-UK trucks can make. "It won't be proportional to the damage they're causing - there would be little difference to the amount a truck pays using the system 365 days a year to one that uses it just 100 days.

"Ultimately, with the dawn of hybrid and electric vehicles, we have to prepare for a future in which there will be a reducing source of revenue from fuel duty, so I think more widespread road pricing is inevitable."







### smart detection

BirdWatch® VL Virtual Loop

BirdWatch® RL Red Light Non intrusive red light detection

۲

SmartLPR® SPEED Automatic Number Plate Recognition



۲



۲
CONCESTON CONCESTON CONCESTON



The PEGASUS Urban Variable Message Sign is a new kind of VMS, offering a range of flexible matrix displays with a choice of mounting configurations.

The power efficient and environmentally friendly Pegasus sign takes advantage of improvements in LED technology performance, reliability, and message setting capabilities flowing from the latest generation of high resolution motorway sign designs.

Three variants offer different matrix areas suitable for display of four lines of text with character heights of 160mm, 100mm, and 50mm. The two larger format signs employ a dual-coloured, amber and red matrix; the 50mm version is a singlecolour amber sign. All offer high resolution which can display simultaneous text and pictogram information.

۲

The slim and attractive design is well suited to today's urban streetscape and the flexible mounting options, for either landscape or portrait fixing, ranged left, right or centred, can work around the most demanding space restrictions.

In fact, the installation options are almost as variable as the messaging capability.

Variable Message Signs Limited, Monkton Business Park, Mill Lane, Hebburn, Tyne & Wear, NE31 2JZ, UK T +44 (0)191 423 7070 F +44 (0)191 423 7071 E traffic@vmslimited.co.uk W www.vmslimited.co.uk **YMS** 

۲

IABLE MESSAGE SI

HIGH SIERRA ELECTRONICS environmental monitoring solutions

## RWIS

۲

### MEASURING THE WEATHER TO PROTECT THE PUBLIC AND IMPROVE TRAFFIC SAFETY

۲



High Sierra Electronics, Inc. 155 Spring Hill Drive, Suite 106 Grass Valley, CA 95945 T: 530-273-2080 / F: 530-273-2089 USA Toll Free: 800-275-2080 E: sales@highsierraelectronics.com

ISO 9001:2000 Certified

www.highsierraelectronics.com



۲

### **Smart sensor solutions**

The use of sensors in ITS is not new, but it is certainly an application that has stood the test of time. Today's traffic management systems rely on a plethora of sensors that are put to work across a variety of tasks. And the future of such sensors is looking decidedly assured, if their unstoppable march today is anything to go by.

 $( \bullet )$ 

The TrafiCam was one of the first integrated video sensor products developed for this market, and since its launch in 2003, has become a dominant force in this sector. TrafiCam is a concept that combines a CMOS (complimentary metal-oxide semiconductor) sensor (camera) and video detection technology in one. It is primarily used for stop bar and advance detection at signalized intersections. The ethos behind it was to combine the benefits of video detection and sensor technology in one easy-to-use, compact box.

The goal of deploying such intelligent technology is to

### Need to know?

How the evolution of sensors has led to a new breed of detection systems

- From the launch of the first integrated video sensor products to the wide variety on offer today
- Going beyond expertise gleaned on highways and in tunnels and bringing that technology to intersections and pedestrian crossings
- The need to reflect all road users – not only drivers – in traffic management and road safety systems

better manage traffic at intersections: to turn traffic light controllers into active management devices. The controller program can be optimized so that it reacts to various scenarios as needed. 'Green on demand' is one such strategy; meaning that if a vehicle is detected as waiting,

The TrafiCam was one of the world's first integrated video sensor



the light will be immediately switched to green. Lengthening the green time is another valuable application: this delays the amber light to allow any detected vehicles through. ۲

Traficon's TrafiCam detects both moving and stopped vehicles and has a recognition rate of more than 98%. It is a highly accurate, low-cost alternative to older technologies such as inductive loops, and to less effective alternatives such as radar. The concept also appeals because of its flexibility: it allows the user to view the intersection and position up to eight detection zones – a feature that no other solution offers.

### **Continual evolution**

But Traficon did not stop driving forward development after its first integrated video sensor. Responding to the global trend of environmental awareness, in April 2008 the first solarpowered, stand-alone video detection sensor was added to

February/March 2011 Traffic Technology International www.TrafficTechnologyToday.com



Pedestrian sensors detect and monitor people on foot

pedestrian and motorist traffic more efficient, thus providing cost-savings.

Using both of these pedestrian products together with TrafiCam detection of vehicles on the road makes a very powerful and intelligent tool for traffic managers. This is good news wherever safety is a top priority. Any improvement in detection helps to make road crossings safer and reduces accidents. But while safety may be a prime consideration, installers also have to consider cost and ease of deployment. After all, inductive loop detection systems are highly effective but have in many instances been priced out of the equation because of the cost of closing and cutting roads.

Although video detection is a sophisticated, intelligent technology, these integrated sensors couldn't be easier to use – an important factor for cost- and time-conscious authorities. Installation and sensor configuration are quick and simple: the unit is mounted on a traffic signal pole, the cable connected to a laptop and users can then see where they have put the detection zone. With other detection systems (such as radar), you cannot see exactly what you are going to detect.

( )

The task of integrating vulnerable road users, such as pedestrians and cyclists, with vehicle users will become increasingly challenging. Cities are already crowded, with people on foot, two wheels and four wheels jostling for right of way. So in the not too distant future, cities will need more intelligence so that people can live and travel safely in these crowded urban jungles. But Traficon's range of video detection solutions are more than up to this challenge. O



Traficon +32 56 37 22 00 traficon@traficon.com www.traficon.com

the TrafiCam product range. Later that year Traficon added another combination of TrafiCam platform and field-proven data collection algorithms to its product range: the Collect-R. This is a costeffective solution for gathering traffic data, monitoring flow and emulating or simulating loops on highways and inter-urban roads. In 2009, the 'x-stream' version of TrafiCam was introduced. Key developments included IP addressability and video streaming.

In 2010, Traficon brought its first pedestrian detection sensors onto the market. The main goals of the SafeWalk and C-Walk systems are to provide better protection to all vulnerable road users, to reduce the number of pedestrian injuries and fatalities, and to avoid delaying both pedestrians and motorists unnecessarily.

Both developments are based on Traficon's video image processing (VIP) technology, which is now widely deployed across the globe at both traffic junctions and as part of incident alert systems within tunnels.

### 3D stereovision technology

Conventional detection is based on motion detection or background segmentation. If pedestrians leave their cars in

a tunnel, or enter through an access door, the system detects the motion and immediately triggers an alarm. At the curbside, it is quite different. The pedestrians may not be standing still and after a period of time they tend to just become part of the image, blending into the general scene. The detection system doesn't only need to trigger an alarm but also to hold the detection. It is difficult to keep the detection active, to keep seeing the pedestrians and then to drop the detection when they move out of the zone.

SafeWalk uses two CMOS sensors. An automatic system using a single camera finds it relatively easy to identify a vehicle - they are roughly all the same shape and normally progressing in the same direction. By comparison, pedestrians vary enormously. They can be tall or short, pushing a wheelchair or holding an umbrella. By using two cameras, SafeWalk is able to give the system three-dimensional information. In essence, the two CMOS sensors are the eyes and the intelligent video processing capability the brain, mimicking how humans see and perceive depth, height and motion, etc.

The stereovision system does two things. The first is that it captures the image in real-time. Then the algorithm, using highlevel logic, looks at the image and recognizes people. It then tracks them to see if they are standing still or not. This means that this 3D system knows precisely when the pedestrians enter the zone and when they leave. The system knows where they have come from and in which direction they are heading. All this information makes the detection system far more intelligent.

#### C-Walk

C-Walk is the other pedestrian detection sensor, which is designed to track pedestrians as they cross the road. C-Walk does not use 3D stereovision but is based on the TrafiCam platform. This sensor only focuses on the movement of the pedestrian and can estimate and detect the direction of the person walking. It is possible to deploy units to give advance warning to drivers that someone is crossing the road, by triggering an alarm or warning signal to oncoming traffic. It also makes it possible to hold the green time for a pedestrian who is crossing slowly or has stopped within the zone.

C-Walk not only ensures improved safety for pedestrians at intersections and (mid-block) crossings, but also makes both

72 **Traffic Technology International** February/March 2011. www.TrafficTechnologyToday.com

# Traffex 2011

# The road ahead

See what the future holds for the traffic and transport industry at the 25th Traffex event, the world's most important traffic industry forum.

Gather insight, advice and research from industry experts at over 36 thought-leadership seminars.

Source the most innovative and cost-effective products and services from over 350 specialist suppliers.

Visit traffex.com for who's exhibiting and what's on.



29-31 March 2011 | The NEC, Birmingham, UK Register online now for your FREE ticket at www.traffex.com





( )

### New vehicle identity recognition suite

۲

Among other responsibilities, law enforcement and homeland security organizations are also responsible for detecting vehicles with false license plates. Cars with stolen plates are usually associated with organized criminal activity.

Numerous parameters identify vehicles, and license plates are just one of these factors. Basic license plate recognition (LPR) systems are limited. Until recently, LPR systems were unable to provide details such as vehicle make, model and color. The latest LPR systems can, at best, only provide a partial representation of those parameters. Even though today's LPR systems can almost perfectly identify a car's license plate as genuine and original, most of them cannot indicate any discrepancy between the license plate and the car the plate is on. Therefore vehicles equipped with stolen license plates would not cause any alerts and would be able to pass freely through the road.

#### See the bigger picture

۲

HTS believes that its new VIR suite is a generation ahead of basic LPR. The technology incorporates video analytics, advanced image processing and computer vision capabilities. Working with HTS's LPR systems, the VIR suite recognizes vehicle manufacturer badges (car make), car model, vehicle body and plate colors,



Screenshot of the VIR suite's ability to recognize vehicle make – in this instance, the system has identified a Toyota



country or state names and special plate icons. It makes comparisons between vehicle parameters, providing a more complete picture. LPR combined with VIR can report, for instance, that there's a red Honda from Kansas with handicap plates, with a given plate number for toll billing, stolen vehicle or plate identification.

Figure 1 shows an example of the front view of a vehicle, with the registration state appearing above the registration number. In this example the state is SP -Sao Paulo. In some countries, only the country title or flag is printed on license plates, while in others the additional identifier may be missing altogether. The car make is also prominent in this picture. The majority of car badges are located in the center of the vehicle on both the front and rear sides, and some of them are located off-center. Their external shape includes various designs (rectangles, circles, ellipses, and complex shapes), and their internal design includes graphical symbols and letters.

Usually, the state/country identification and/or vehicle make is not handled by the LPR system due to low picture resolution or an inability to read

### Need to know?

The next generation of vehicle identity recognition software

- Moving on from regular LPR and its limitations, newer systems offer a range of benefits when it comes to recognizing vehicle make, model, color and more
- > The security advantages offered to law enforcement, traffic managers, businesses and gated communities
   > How VIR helps with
- regard to cross-checking important data

special symbols. In some LPR systems the state is inferred from the format of the recognized registration string, but this is only viable when formats are distinct from one another. VIR technology ensures accuracy of results by recognizing the state/country using the actual symbol string. The VIR suite can identify most US, European and Asian vehicle makes and models, state or country name on the license plate, specific badges and both vehicle and plate color. It can be integrated with third party databases and applications to enhance capabilities over a number of scenarios.

At airport entrances, toll booths, parking garages, gated communities and corporate campuses, LPR systems outfitted with the VIR suite can be installed on access lanes. There, they automatically monitor vehicles entering and exiting the area, detecting any discrepancies between the vehicle type and its license plate. The suite can also work at high speeds, enabling law enforcement, security and tolling agencies to benefit from the extra recognition data.

The VIR suite's recognition capabilities greatly enhance verification and classification.

074 Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com

### 🚳 | Eric Sampson

Making correlations between vehicle types, plate numbers, and data stored on police and homeland security databases, immediate alerts can be sounded when suspicious vehicles pass through.

One example of an application may be law enforcement officers looking for stolen or suspect vehicles. Quite often the suspect will change the license plate on the vehicle to avoid detection. In essence, the body color, make and model of a car are the first things noticed by law enforcement officials. By comparing these details to the licensing database, an immediate result can be received with respect to the match between all parameters (car make, color and license plate) belonging to that car. Should the license plate not match the car make and color, the officer will stop the vehicle in order to ascertain the reason.

For access control to critical facilities, the VIR suite adds additional security parameters so that officers at the gate can match the vehicle to its plate and ensure that only authorized vehicles are allowed to enter.

Tolling operators also benefit from VIR where specific groups of vehicles receive discounts based on icons on their license plates, such as disabled drivers. The VIR technology recognizes the symbol on the license plate and includes it in the result of the license plate read. In addition, VIR state identification provides an accurate method for verifying and billing out-ofstate and unregistered toll road users, as well as reducing false violation notices via a crosscheck with vehicle databases. O

### Ontact

HTS HiTech Solutions +972 3 9634601 info@htsol.com www.htsol.com



۲

#### eric.sampson1@btinternet.com

I was recently in correspondence with Roger Ford, the exceptionally knowledgeable and wise technical editor of Modern Railways and he quoted the Abilene Paradox at me. In brief, this is a scenario where someone suggests doing something (originally a 100km family trip to Abilene, subject of the song by George Hamilton IV, on a hot Texas day) which is done but afterward everyone involved realizes not only that the event was most unsatisfactory but they knew from the start that it would be, that they didn't want to do it but they did not feel able to object. Hence the paradox: agreeing to do something while knowing it's the wrong thing and you didn't really want to agree to it.

So why is this relevant? Because I've started to realize that Abilene Paradoxes are emerging in transport. What follows are some examples.

BA cabin crew: Voting for strike action over pay and perks while recognizing that (a) the airline is fighting to survive in a hostile market and must cut costs, and (b) that both the pay and the perks are significantly better than those for any other UK airline.

Tube and Docklands Light Railway train drivers: Another vote for strike action while recognizing that most of the job is done by computers, the pay is already very good, the arguments used to justify striking are pathetic, and vast numbers of commuters would cheerfully string you up from the nearest lamp post for being both cussed and stupid. Localism: One of the coalition's new policies meaning giving power to the people but unfortunately some subjects, and transport is probably the archetype, need a national approach not a shortsighted local one.

Road pricing: The coalition has turned its face against this policy for light vehicles during this Parliament but at the same time it knows that (a) congestion is getting worse and needs a powerful demand-restraint process to come into action, (b) road user charging is such a process, (c) and it would probably raise a very large sum of money (it would definitely raise a merely 'large' sum) that would help reduce the national deficit.

Safety cameras: The Pavlovian reflex that led Ministers to attack safety cameras because they felt that motorists were unreasonably targeted by the previous administration, especially with regard to 'active observation' meaning safety cameras and CCTV, was not thought through. And so the large percentage of cameras that merely enforce the local speed limit are at risk and consequently road fatalities will increase and everyone will be agitated and nobody will take a cool, systematic look at expenditure on transport safety across all modes.

Inter-City Express Programme: I'm in Roger's territory here but the Paradox is very obvious... Specify the procurement of some idiosyncratic trains that try to meet two if not three different requirements then compromise and wriggle when everyone points out that spending money on changing the starting conditions would massively reduce your prices as you would be purchasing in established markets rather than ones created just for you.

And I've not even mentioned fuel duty!

The Pavlovian reflex that led Ministers to attack safety cameras because they felt motorists were unreasonably targeted was not thought through

Professor Eric Sampson, Newcastle University/ITS-UK, UK

 $( \bullet )$ 

February/March 2011 **Traffic Technology International** www.TrafficTechnologyToday.com





## Intelligent Mobility

ITS for sustainable transport of persons and goods in urban regions

Join us in Lyon, centre of excellence for the automotive and ITS sectors, for the next ITS European Congress and Exhibition.

- Meet with over 100 world-class exhibitors showcasing the latest innovations in ITS
- Network with over 1500 international delegates
- Take part in a dynamic Congress programme, focused on the key fields of mobility and sustainability
- Enjoy a full social and networking programme
- See current ITS projects in action on the technical visits and tours.

To register and for the latest information, visit **www.itsineurope.com** 



۲

Ahône Alpes ONLY LYON



Under the high patronage of:



supported by:

 $\bigcirc$ 





# Russia's revolution in speed management

Traffic levels in Russia have grown significantly over the past 20 years. And although both city planning and interurban roads are essentially well designed, the sheer length of the road network places huge demands on maintenance resources, subsequently leading to a maintenance backlog that has proved difficult to resolve. But when compared with the increasing number of road users, this is a relatively small problem. Russia is a massive country and driver behavior varies from region to region. Speed violations are problematic in some areas. On country roads, for instance, distances are lengthy with much less dense traffic than in urban areas - an implicit invitation to drive just that little bit faster than the signs on the roadside tell you. Within city limits, though, congestion has the effect of reducing average speeds, while on free sections of major roads the signed speed limits are often violated. Indeed, statistics show such infringements are one of the main causes of traffic incidents resulting in casualties.

۲

To combat this scourge, road authorities in the Russian Federation are applying numerous technologies to enforce speed limits. Radarbased speed cameras



### Need to know?

How the Russian police force is reducing accidents and saving lives through a technology-based approach to speed management

- Fixed, mobile and handheld speed enforcement devices to reduce the number of road traffic accidents and casualties
- Legally accredited performance and costeffective operation
   Studies showing the success of speed management strategies are encouraging road management authorities

to expand their use

manufactured by Olvia, for example, are already widely used. Among the features highly valued by Russian police forces are robust construction, advanced radar technology (developed in-house), highresolution cameras with smart integrated ALPR, and userfriendly violation-processing software. Such systems are also deployed in many other countries where both accuracy and reliability are sacrosanct.

#### Ease of installation

The Arena stationary system is based on Doppler radar technology, which allows for installation without much disruption to the traffic. Systems not based on loops also require far less maintenance that directly impacts the road surface and consequently the traffic flowing upon it. (Above and bottom left) The Arena photo radar enforcement systems are either tripod mounted or stationary at the roadside (Right) The Vizier uses Doppler radar technology to measure speed and records a video of the infraction

READER ENQUIRY NO.

503

Both automatic and 'fined-onthe-spot' speed enforcement are deployed in Russia. Automatic systems have integrated ALPR that allows the license plate number to be embedded as binary data in addition to the vehicle image itself. In a central control room, the plate number is analyzed to trace the owner of the vehicle before issuing a fine. The measurement data generated by the Doppler radar and the graphical image is used to provide legal evidence of the infraction. Automatic speed enforcement has proved to be highly effective way of reducing speeding.

However, the fact the systems are fixed means the driving public eventually becomes familiar with their location, which ultimately limits their effectiveness after a certain period of time. Both overt and covert mobile enforcement systems are thus also utilized.

In addition to this, Olvia's handheld radar guns, Vizier, are



used for enforcement where the speed violator is stopped on the spot and presented with an accurate video recording of their infraction.

As well as handheld or, if preferred, tripod-mounted use, Vizier can be used from within moving vehicles.

Although Olvia is not the sole manufacturer of speed enforcement devices in Russia, its solutions have over the years proved to be among the most popular with the Russian police force. The company is therefore looking forward with anticipation to Traffex – to be staged at the NEC, March 29-31, 2011 – to showcase its range of solutions to a wider international marketplace. O

### 💿 | Contact

Olvia office@olvia.ru +46 767 066 380 www.olvia.eu

February/March 2011 Traffic Technology International 07

### Technology **Profile** | 🕞

### Video's role in data collection

Video has the power to greatly simplify traffic data collection; saving time and money, increasing field-worker safety, and accurately recording traffic without missing a movement. Emerging portable video-based data collection solutions are using the power of video and the convenience of portability to easily collect traffic data, then using innovative video processing software to automate data extraction and reporting. These advancements create more versatile and accurate traffic survey reports, and simplify the data collection process through automation.

۲

Data collection methods such as road tubes, electronic count boards or manual observations are generally single-purposed, while video-based systems are more adaptable to different study types. The versatility of data that can be extracted makes video-based systems more efficient for data collectors by reducing time in the field and consolidating many traffic study types under one process.

Traffic data collection equipment and software manufacturer, Miovision Technologies, has been automating traffic studies using video and proprietary cloudbased video processing software since 2005, and is now poised to launch its latest product, the Scout video collection unit. Scout is a portable, all-weather unit that is temporarily deployed in the field to record video from a count site. This is Miovision's most advanced video collection unit to date, adding ALPR capability, origin/

### Need to know?

How video can assist data collection applications within the transportation sector

- > The benefits offered by a new breed of portable video-based data collection solutions > A new approach to
- gathering and processing
- data for traffic systems > The latest video collection unit, equipped with ALPR
- capability and the ability to perform a variety of traffic studies

destination studies, travel time studies and parking studies to the existing collection of automated traffic studies.

Miovision will be launching Scout and its new ALPR studies at this year's Traffex, held from March 29-31 in Birmingham, UK. Scout and its ALPR capability will build on the company's existing service offering of junction counts, roundabout counts, annual average daily traffic (AADT) counts, trip generation studies and gap studies. Scout also provides the equipment necessary for Miovision to launch new automated traffic study types in the future.

Scout's recorded videos are processed to extract traffic data via the cloud-based website trafficdataonline.com, and then compiled into traffic survey

a new, advanced video collection unit for ITS (Right) Screenshot from trafficdataonline. com, Miovision's cloud-based website

۲

READER ENQUIRY NO.

504

as both the video processing software and the centralized database for managing all past and future studies, regardless of format or data collection method. Together, the videobased system produces accurate data reports, which are packaged with video recordings for customers - representing a new approach to data management solutions.

#### Data as building blocks

Data underpins transportation system improvement projects and is used to inform major engineering decisions, which means that accuracy is very important since a small margin of error can directly affect the capacity of a system. Inaccuracies can lead to decisions that cause longer

( )

travel times, increased emissions and even future level of service (LOS) failure. Conversely, accurate data represents the building blocks for properly optimized systems and potentially large annual savings to the motoring public.

Tom Springer, director of planning for engineering firm Qk4, considers accuracy to be hugely important. "We look at traffic data as the gospel," he says. "Decisions about major public investments to the sum of hundreds of thousands of dollars are predicated on data." To mitigate future LOS failure, current (and accurate) realworld data must be collected.

Springer and Qk4 project manager Jeremy Lukat explain that there is no substitute for basing major public investments on real-world conditions. Using

Cancel reports. The website functions

(Above) Scout is



scout

miovision

existing data and artificially inflating volume to account for growth may save a small amount of money during the planning phases of a project; however, the ramifications can have expensive consequences in the future. Lukat says: "Traffic is unpredictable from year to year. Factors such as an economic downturn can greatly reduce the accuracy of simply applying a growth factor to historical data." For example, an area hit with job losses will likely see a peak volume reduction rather than an increase.

To make certain that projects are built on sound foundations, Qk4 and other engineering firms use the video recordings produced by Miovision to visually audit their traffic modeling software against the prevailing conditions.

#### Seeing is believing

Video-based solutions not only offer the required accuracy, but also preserve data with a bird'seye view recording of the countsite. Each video recording accompanies its data report, which can act as a catalyst for conversation with project stakeholders. Using video processing and data management software such as trafficdataonline.com provides a globally accessible database in which to store every data report with its respective video recording.

The future of data collection lies in solutions such as these. Video data collection and processing software offers accuracy, versatility, safety and efficiency. Cloud-based software makes solutions such as Miovision's accessible to any organization with only an internet connection, and customers have instant access to the latest product offerings and software updates. O

### Ontact

Miovision Technologies info@miovision.com +1 519 513 2407 www.scoutvcu.com



۲

sweet – William Shakespeare

A recurring theme of this column is the impending revolution in car-to-car communications, not necessarily so that my car can Facebook yours, although I am – and assuredly many of you are – fascinated by the plethora of mobile applications soon to be enabled by wirelessly connected cars. Rather, and in keeping with a safety theme, car-tocar communications will enable my car to avoid faceplanting yours. (I am not so sure this audience is familiar with the lexicon of an American teenager, circa 1976, but the analogy is, um, prima facie.)

When I travel to Europe, I hear – and love - a term for this transformational vehicle-to-vehicle and vehicle-toinfrastructure safety concept: cooperative systems. Within the USA, this same idea had been formalized into a USDOT program called IntelliDrive. Recently, it has been renamed, but to what? Maybe the Connected Vehicle. Regardless, it's an interesting and fascinating concept. If it takes off in such a way that most of our cars are cooperative, connected or intellidriven, wonderful! We could name it Rose at that point, for whatever I care. (Actually, I would love it to be named Rose or better yet, Fred. This would be fodder for yet another column.)

### 🌀 | Smart Cars

But how do we get the concept up and running? There is the scientific way, and there's the populist way. Both are necessary. And in the USA at least, I observe that just maybe a friendly scientific Rose is emerging: just hours before I began to pen this column, the USDOT announced via request for proposals its Safety Pilot Model Deployment. This would place for perhaps a year in the order of 2,500 vehicles interacting with a bit more than 60 cars, plus a few buses and heavy trucks. Those 2,500 vehicles would essentially tell the 60 Freds and Roses where they are to avoid any faceplants. In the end, if the wireless engineering and behavioral science works out, there could be some scientific impetus for the US government to provide a regulatory framework and get this car-to-car communications up and going. If all new cars beyond Year X were appropriately equipped, and if the retrofit market took off, car-to-car faceplants would be as quaint as this vernacular...

An important companion would be to captivate both the imagination and ingenuity of the public, or in other words, the populist Fred. Enter stage right, the Connected Vehicle Technology Challenge, where any adult resident of the USA can until May 1, 2011 submit an idea for an application (see www. challenge.gov for more details). Brilliant, I say! This is not Facebook in a car! Can there be other, innovative safetyenhancing connected vehicle ideas? Can Fred not faceplant Rose? We shall see. In the end, given the convergence of technology, standards, science, creativity, public awareness and policy, indeed the USDOT will connect vehicles and the infrastructure. And the result may smell so sweet.

In the end, if the wireless engineering and behavioral science works out, there could be some scientific impetus for the US government to provide a regulatory framework and get this car-to-car communications up and going

Jim Misener, executive advisor, Booz Allen Hamilton, USA

( )



### Virtual loop technology for traffic management

Over the past few decades, ITS devices have proved to be a good solution to help to control and manage traffic. However, their standardization and expansion in rapidly growing cities also depends on their evolution and ability to adapt to the urban environment. Reliability should be linked to concepts such as 'non intrusive, 'easy to install', 'small size', 'lightweight' or 'portable'.

Virtual-loop based technology is an above-ground solution based on powerful artificial vision algorithms. It is a reliable, non intrusive, cost-effective, easy to install, low maintenance method to optimize signal control and traffic management, as well as to detect red-light running.

**( ( ( )** 

Quercus Technologies has built on its lengthy experience in artificial vision to create a new range of above-ground detection devices. They are designed to bring ITS technology closer to system integrators and their final customers' needs, while taking into account the environment where they will be integrated.

#### Virtual loop sensors

BirdWatch is a range of traffic monitoring, data gathering and enforcement products based on



Need to know?

A virtual approach to traffic management and intersection safety applications

- > An innovative shift from the physical to the virtual
- Moving on from more old fashioned technologies such as in-road inductive loop sensors
   How towns, cities and
- other authorities can reap the benefits of a more flexible way of managing traffic and enforcing laws
- New product family consisting of a range of systems that are designed to be all-in-one units that are reliable, efficient and easy to install

the use of vehicle presence sensors called virtual loops. The sensors take their name from the analogy between them and traditional inductive loops.

The range includes cameras with built-in intelligence to recognize and count vehicles, detect queues, collect traffic data and detect red-light running.

This type of above-ground technology uses artificial vision algorithms and a combination of virtual loops that can be easily edited and modified. Detection locations are drawn on the image of the area that has to be covered by the camera. As the 'virtual' name indicates, there is no need for physical triggering devices, such as in-road sensors. Complex algorithms combined with the right hardware minimize issues such as sudden light changes. BirdWatch products can also distinguish between vehicles and

background. This helps to avoid possible mistakes in the case of non-moving queues, and helps distinguish between vehicles and shadows.

The combination of nonintrusive and all-in-one features leads to the 'easy to install' concept mentioned previously. Processor, camera and communications are integrated in the same housing. BirdWatch VL and VL Plus are extremely small sensors that gather all the necessary information to detect vehicles and queues, gather traffic data and classify vehicles, all within a ruggedized housing. Inputs and outputs for communications are integrated in the same unit. Installation and maintenance is minimal. Each unit is autonomous and its performance does not depend on external parts or interfaces.

The 'non intrusive' and 'easy to install' concepts are best demonstrated in the BirdWatch RL red light detector. Traditional red-light enforcement dates back to systems divided into different external parts (e.g. camera, lighting, processor, in-road sensors) or huge devices that include many parts within a heavy and difficult to install housing. Such complexity could act as a deterrent and dissuade cities from deploying them.

> (Above) The BirdWatch redlight detection unit (Left) Showing how a redlight offense is captured by the BirdWatch system



OSO Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com

Quercus's red-light system has been developed to get closer to the concept of a standalone unit. Virtual technology is used to configure the detection zones that will indicate when a vehicle is running a red light. Just four mouse clicks are needed to draw the detection zone. The camera will take three high-resolution color pictures (before, during and after the offense). However, the system is even more nonintrusive as it does not need to be connected to the traffic light or controller to know if the light is red or not. A 'virtual traffic light' is configured so the system recognizes the position of the color of the light without cables or physical triggering.

Processor, camera and lighting inputs and outputs are included in a hand-sized, lightweight housing, with the ability to self-trigger without the need for external cables or physical sensors.

The small size and light weight of the system are also relevant to its efficacy. Research has shown that following the implementation of a red-light system, an intersection becomes significantly safer within a year or so, as drivers realize that it is monitored. Many red-light systems are still very heavy or not all-in-one and are difficult to move. BirdWatch RL can be easily moved and recalibrated for a new intersection.

The trend toward aboveground technology is a reality, but its standardization relies on a sum of features: nonintrusiveness, reliable results based on powerful algorithms, all-in-one systems, easy installation, low maintenance, small size, and lightweight. The BirdWatch line is designed to gather all those features and prove that managing safety through virtual-loop based ITS is both reliable and easy. O

### Ontact

Quercus Technologies +34 977 300 377 svilanova@quercus.biz www.quercus.biz



۲

#### awalsh@roadsafe.com

There is a new dynamic developing in road safety – one stimulated by technical innovation which itself is market driven. But our governments still believe we need legislation to drive safety forward. The new EU Road Safety program published last year aims to cut the number of road deaths by half from 2011-2020, and sets out a range of initiatives focusing on vehicle safety, the safety of road infrastructure as well as user behavior.

The Commission has set seven strategic objectives for the next decade, including improved safety measures for trucks and cars, building safer roads, developing intelligent vehicles, strengthening licensing and training, better road safety enforcement, targeting injuries, and a new focus on PTWs.

A quick glance at these objectives shows that many acknowledge the important role of new technology. There will be an emphasis on 'active safety' in vehicles. The program sees eSafety devices such as lane departure warning systems, mandatory automatic emergency braking for trucks and buses, and speed limiters for commercial vehicles as becoming mandatory. However, due to innovation led by the private sector, which has brought such systems to the market already, the pace of this innovation is keeping legislators on their toes and causing them to play 'catchup'. Even EuroNCAP - which has had such

### 🚳 🛛 Adrian Walsh

an important role in delivering improved road safety – is having to develop new protocols to acknowledge this innovation, and now in addition to crash test scores rewards not only seatbelt reminders, but also speed limiters and the standard fitment of electronic stability control.

It's not only the traditional advocates of safety such as Volvo that has a vision that "by 2020, nobody shall be seriously injured or killed in a new Volvo", but the component manufacturers, too, which see the importance of eSafety and collaborate to promote consumer awareness through programs such as eSafetyAware.

Despite this, market surveys still show a surprising lack of awareness of the value of eSafety systems. Prior to the eSafety Challenge event last year, a study was commissioned to look into the status of these technologies in car fleets across 10 EU countries, including Austria, Belgium, the Czech Republic, France, Germany, the Netherlands, Poland, Spain, Sweden, and the UK. Implementation rates for key eSafety technologies are still alarmingly low with only 28% of all respondents having ESC fitted on less than half their fleet, and a further 21% not having ESC fitted on any of their vehicles. Results for the other technologies are even more worrying. While availability of eSafety systems can be limited, more than half (55%) said they did not have advanced emergency braking on any of their fleet vehicles, 59% did not have blind-spot monitoring and 66% did not have lane support. With such a poor level of consumer awareness among a group that should be better informed, perhaps the EC is right to push for legislation.

The Global Decade of Action for Road Safety will be launched in May – let's hope that it serves to alert consumers to what they can do to make roads safer simply by ordering vehicles with the best available eSafety systems installed. The 2010 eSafety Challenge takes place on May 31, 2011 at the ÖAMTC safe driving center in Teesdorf, near Vienna.

<sup>[1]</sup> www.esafetyaware.eu

۲

With such a poor level of consumer awareness among a group that should be better informed, perhaps the EC is right to push for legislation...

Adrian Walsh, director, Roadsafe, UK

( )

### Modeling for ICM strategy

According to the California DOT, the state's road users experience more than 500,000 hours of delay on a daily basis. Reducing congestion has long been a state priority and in 2006 the US DOT introduced the Integrated Corridor Management (ICM) Initiative, a nationwide project aimed at ending gridlock in urban areas through the coordination of transportation operations.

The ICM Initiative is now moving from the initial research and preliminary studies into the demonstration phase, which should be completed by 2013. Of the eight ICM pioneer sites located across the USA, San Diego was one of the three selected (along with Dallas and Minneapolis) to participate in further analysis, modeling and simulation. The San Diego Association of Governments (SANDAG) is responsible for designing, building and implementing the ICM system in coordination with its local agency partners and will be focusing the preliminary demonstration phase on the Interstate 15 (I-15) corridor, a heavily congested northsouth interstate corridor where the system is scheduled to go live in November 2012. This 21-mile stretch of road forms the primary artery for the movement of commuters, goods and services from northern San Diego County to downtown San Diego and is already a model for the deployment of the latest technologies for data collection, demand management and pricing strategies through its I-15 high occupancy vehicle (HOV) Express Lanes project.

۲

SANDAG aims to configure and integrate an online modeling package and deliver a pioneering Decision Support System (DSS) that can build on the advanced systems already in use on the I-15. The DSS is a 'smart' traffic management



### Need to know?

The software that is forming an integral part of San Diego's innovative ICM Initiative

- The modeling tool at the heart of a new Decision Support System (DSS)
- The DSS is designed to improve situational awareness, enhance response and control, better inform travelers, and improve corridor performance
- Predicting future traffic conditions through the use of current real-time data feeds

system that will give system managers comprehensive awareness of the performance of the entire corridor. It will also allow them to take proactive steps to prevent system breakdown using enhanced controls across multijurisdictional devices such as traffic signals, ramp meters and message signs.

At the heart of the DSS is Aimsun Online, a predictive algorithm and real-time modeling tool developed by TSS-Transport Simulation Systems. Aimsun Online uses live traffic data feeds and simulations to dynamically forecast future corridor traffic conditions based on the current state of the network and to evaluate incident response or traffic management strategies.

### Right tool for the job

Peter Thompson, technical manager at SANDAG was looking for a tool that would help resolve the key questions of accurate prediction, timely information, strategy impact and DSS flexibility under duress. "Core to the vision for an ICM solution is the ability to forecast and simulate congestion and capacity imbalances in 'nearreal-time'. We chose Aimsun Online for several reasons: its conceptual architecture ensures that what is being simulated reflects the actual state of the network, while its performance provides the scalability and quick response times we need."

Alex Estrella, senior transportation planner and ICM functional project manager at SANDAG sees a clear benefit in using simulation software: "Modeling and simulation helps us to highlight key corridor strategies for congestion (Left) I-15 Express Lanes project (Above) Aimsun Online screenshot

management and to measure corridor benefits of planned investments. Preliminary results indicate that certain combinations of ICM strategies will allow us to achieve significant improvements in travel reliability, particularly when there is high demand and in cases of non-recurrent congestion, that is, congestion due to isolated incidents such as special events or accidents."

۲

It is clear that simulation software plays a key role in future-orientated traffic planning, offering all the advantages of fully optimized implementation, which translates into increased cost efficiency and safety and reduced environmental impact. Thompson comments: "If we can make these factors count in the US DoT's cost-benefit analysis of this project, we can demonstrate the potential for every large city to derive some benefit from what we are seeking to achieve here.' O

© | Contact

TSS +34 933 171 693 info@aimsun.com www.aimsun.com

082 Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com

AMSTERDAM RAI NTSR



### Subscribe to our e-newsletter via intertraffic.com

Intertraffic

Intertraffic e

### **Embedded ALPR solutions**

۲

Automatic license plate recognition (ALPR) is at the heart of today's intelligent transportation systems. From parking and access solutions to law enforcement, license plate information is electronically captured, processed, stored, and acted upon.

ITS is undoubtedly on the rise, and its benefits in combination with ALPR have been discovered by many. Unfortunately, ITS suffers from its initial ALPR success because of the traditional PC-based approach. Some of the typical downsides of PC-based ALPR systems are that they are not scalable, not plug-and-play and are not stable - as well as having bulky physical dimensions. Embedded ALPR systems have been specifically designed to address these weaknesses.

۲

Scalability is a powerful selling point for the new breed of embedded solutions. Traditional ALPR systems basically represent optical character recognition (OCR) software running on a computer. However, within the context of ITS, OCR is a demanding processing task due to the high accuracy requirements. This is why, for example, a police car's built-in computer – which is already used for communication, database access (license plate or criminal record information),



The new type of compact, embedded APLR systems are described as "ALPR in the palm of your hands"



on-scene witness statement storage, photo and video upload, and car control – often cannot handle additional ALPR software well. Embedded systems do not encounter this problem because they function as co-processors without stressing the existing computer. This means that it is possible to connect multiple systems without complications.

The plug-and-play issue is also a key advantage of embedded systems. A PC-based system consists of a combination of several parts: camera, interface board, computer, software, flash unit and additional hardware to facilitate wireless communication by means of GPRS/UMTS. All these parts need to be assembled correctly to form one smoothly operating system. Once assembled, a traditional system will do its job, but only for a certain period of time. At some point, things will start running less smoothly. Many people working in this area can testify to problems such as stuck operating systems, loose cables between different components,



### Need to know?

The new breed of license plate recognition technologies for various ITS applications

- Exploring the advantages of embedded ALPR systems over traditional PC-based systems
- Embedded ALPR offers 'ALPR in the palm of your hand'
- Systems are designed to meet the high performance requirements for ITS tasks
- The cost efficiencies that are now being achieved as a result of this new approach

issues with software and firmware updates, and so on. The solution is the embedded ALPR all-in-one system with all of the parts – individually designed to function together as one system – in one housing.

#### Easy to use and reliable

An all-in-one embedded ALPR system merely needs to be connected to a power supply. Once powered up, recognized license plates will automatically become available through the network. Typically this is a wireless connection to a database server, for example through UMTS.

Embedded systems are designed for stability regardless of changes in weather conditions and mechanical vibrations. PC-based systems placed beside the road for ITS purposes are always housed in dedicated containers to protect the computers from the negative effects of weather (temperature, humidity, rain). An all-in-one approach has no need for additional housing. Another major advantage is that embedded systems are

084 Traffic Technology International February/March 2011 www.TrafficTechnologyToday.com



mechanically more robust than traditional systems. Dedicated print assemblies combine camera, flash, processor, and communication functionality – all neatly integrated in one central electronic unit. Whereas traditional systems use different parts and often need costly, ruggedized computers too.

Embedded ALPR is often called 'ALPR in the palm of your hands'. This is in marked contrast to the traditional approach of 'ALPR filling up your entire trunk' – a point that's especially relevant when high-performance tasks are at stake, such as the scanning of parked cars aligned at 90°. A PC-based approach needs multiple computers to process the scanned data. Embedded systems also consume far less power, due to their compactness and design.

In summary, embedded ALPR has major advantages over PC-based ALPR. This is why ARVOO will continue to develop embedded solutions. Embedded ALPR will lead the ITS market onto a road paved with qualities such as: low power consumption, small size, stability and scalable performance. These all result in far greater cost efficiency. O

### 🙆 🛛 Contact

ARVOO Imaging Products +31 348 413 897 sales@arvoo.com www.arvoo.com



۲

#### bg@berngrush.com

The idea of metering road use using GPS-based telematics to determine time-/place-/distance-based use fees – ostensibly to replace the failing fuel tax and address congestion – has received a lot of government attention over the past two decades. Because government bureaucrats and technocrats predominantly think about sustainability of the transportation system, they generally view such a collection system as a critical and dedicated system. Too bad.

As recently as three years ago – two years before the ignominious collapse of its nationwide road-pricing plan – the Dutch started to play with the idea of adding a few extra features. These valueadded services (VAS) were seen mostly as sugar-coating to make the medicine a bit easier to swallow.

In my 'toon' above, on the right is the image-metaphor used in a presentation overviewing the German Toll Collect system at a Spring 2010 conference in Oslo (less than a year ago!). The slide title was revealing, 'Value-added services: only the cherry on the cake'.

Nothing I have written in the past eight years approaches the instant clarity of this accidental condemnation of the government view. Only a political cartoonist could match this. This view, necessitated by the need to replace

### **G** | **Grush** Hour

or augment fuel duties and manage demand, leaves nothing for the motorist to desire. Who wants the maraschino cherry if someone else gets the cake? It is this perception of the governments' intentions that makes road-use charging so unappealing – so unacceptable – to motorists.

In the June/July 2010 issue of *Traffic Technology International*, I predicted that US thinking in the matter of RUC would soon overtake EU thinking. That time is arriving sooner than I thought. In the Fall of 2010, a report was prepared for AASHTO by Paul Sorensen and some colleagues from The RAND Corporation. I am guessing that upward of 100 people had some input into this study. You can find the study online.<sup>[1]</sup>

A key stated purpose of the study upon which the report was based was to determine who should bake the American version of the cake – the federal government or the state governments? To Sorensen's credit, he included a third option he called "Foster[ing] a Market for In-Vehicle Travel Services (Market Framework)". Read section 6.2.3, p78 of the report at the URL below. Sorensen described a new approach, in which the paradigm of tax-centricity is replaced by one of service-centricity. This turns the assumed mandated-tax-with-some-bonusservices into a massive services market on whose coat-tails road-use fees can ride comparatively cheaply, if not free - and with much higher driver acceptance. The artist who created the Oslo conference slide might draw it as that shown on the left-hand side of my cartoon.

Big difference. If we bake the services cake right, we could gain acceptance, build a massive telematics industry, make cars safer, make trips more efficient, and much more. Maybe the Americans will get this right where the Europeans have led but (so far) failed to toll a single light-duty or commuter vehicle using GPS telematics.

<sup>[1]</sup> http://onlinepubs.trb.org/onlinepubs/ nchrp/nchrp\_wl61.pdf

If we bake the services cake right, we could gain acceptance, build a massive telematics industry, make cars safer, make trips more efficient, and much more

Bern Grush, principal, Bern Grush Associates, Canada

( )



SR 176 HOT lanes in Washington State provide toll-free express trips for buses, motorcycles, vanpools and carpools of two or more, while giving solo drivers the option to pay for a faster, more reliable trip

### Need to know?

### The issues surrounding the deployment of dynamic tolling schemes

- Explaining what the concept of dynamic tolling involves
- > The relationship between traffic flows and tolls and how to manage this
- The merits of using a simulation model to explore how a dynamically priced shceme would operate in the real world

۲

 The need to anticipate changes in traffic flows



### Assessment of dynamic tolling

Dynamic tolling is already in use in several toll road projects in the USA and has been proposed for others. The idea is appealing and simple: to actively use tolls to control the flow of traffic onto a toll road in order to maintain service levels on the road, usually defined in terms of speeds or traffic flows.

In practice, this means that traffic flows and speeds on the tolled road must be monitored, and if the speeds fall below a threshold – or flows exceed a pre-determined level – the tolls are increased to reduce the inflow, and restore service levels.

Figure 1 shows the concept – and also why it's a tricky

problem to handle technically. The flows are determined by the tolls, but the tolls are determined by the flows. This is a classic feedback system that conventional traffic models are not equipped to handle. But it is a situation that is common in control systems, and techniques do exist to model them. System dynamics, for instance, is a simulation technique grounded in feedback and system theory to examine how an algorithm could be developed to vary the tolls to achieve two interlocking objectives: to maintain service levels while maximizing revenues. It demonstrates some surprising results that are

important for designing a dynamic toll system.

### Simulating dynamic tolling

A model was built that can simulate the movement of vehicles along highway links in a network, with drivers making choices about routing based on costs and drive times. To keep matters simple, a test network was set up, featuring a flow of traffic arriving at the point where a decision is made about using the toll road or not, a toll gantry area, and two alternative routes to the destination - one via the tolled road, the other untolled. Figure 2 illustrates the network. The

tolled road was 10km long, modeled in small sections 250m long. The simulation passes traffic along these links, with speed-flow functions operating to vary speeds. There are three lanes on each link, and a freeflow speed of 100km/h. The alternative route takes longer to drive in free-flow conditions. It also has speed-flow functions operating on it so that speeds vary with flows. The time differential means that it is worth paying a toll, at least for some drivers, in order to gain the quicker drive time.

509

The simulation was initialized so that with a toll of US\$2.00, roughly half the

086 **Traffic Technology International** February/March 2011 www.TrafficTechnologyToday.com

ð



drivers arriving at the decision point would choose to pay.

We assume that drivers see a display board telling them the current toll they must pay to enter the road. This is the toll they will pay – it will not vary for them once they enter the road. Their decision is made based on a number of criteria, including the queues at the toll gates (in practice these are nearly always zero because we assumed electronic overhead gantries would be used), the toll, the drive time on the toll road, and the drive time on the alternative route. The model allows us to experiment with exactly what drive time we believe drivers respond to. It can be either the actual time, displayed on an electronic board perhaps, or a fixed time representing their expectations based on past experience.



۲











( )

Figure 4: The speed falls to the threshold level

The simulation was set up to model events over a period of three hours, working in time increments of one second. A profile of traffic arriving at the decision point was constructed that allowed a fairly rapid buildup over 30 minutes, then a constant arrival rate for two hours, and finally a ramp-down to zero over the final 30 minutes. The model is fast, completing a run in a few seconds. ۲

Several tolling algorithms were tested, the simplest and most direct being to monitor the speeds on the toll road, and once they fell below a benchmark speed (set at 80km/h) increase the tolls incrementally to reduce the in-flow. The magnitude of the toll increase depended on the size of the speed 'deficit', but once speeds rose above the benchmark the tolls were reduced back to the starting value of US\$2.00.

Figure 3 shows how this performs, plotting four variables from the model. The blue line represents the speed averaged over the length of the toll road. This is the speed used to

February/March 2011 Traffic Technology International 087



moderate the tolls. The target speed of 80km/h (the red line) does not change throughout the simulation. The green line represents the toll, while the flow of vehicles through the gantries onto the toll road is represented by the grey line.

The graph plots the first 30 minutes of the simulation, during which time the in-flow builds up, but nothing else changes as the congestion has not reached a level that generates congestion.

Figure 4 shows the next 18 minutes. The rate of in-flow has reached its maximum, but the number of vehicles on the toll road continues to rise and the speeds drop as a result of the congestion. At t=48 minutes the speed falls below the threshold level, which means the tolls can rise.

Figure 5 looks at the next few minutes. The higher tolls have generated a reduction in the in-flow, as intended, although the average speed continues to fall for some time until the reduced in-flow has its effect of reducing congestion. The speed bottoms out and starts to rise.

۲

However, as the speed rises, the system starts to reduce the toll. Eventually, the speed rises above 80km/h and the tolls are reduced back to US\$2.00. Unfortunately, this allows the in-flow to rise, and the process starts over again. The final plot shows what happens over the full three hours; speeds, tolls and in-flows gently oscillate until *t*=150 minutes, at which time the in-flow is reduced as background traffic ramps down, allowing the speeds to return to the free-flow level and the tolls settle back to US\$2.00.

#### What does this mean?

This oscillation occurs despite the fact that the rate at which traffic arrives at the point where drivers decide whether or not to use the road is constant; it is not due to fluctuations in the external demand levels.

In fact, it turns out that this pattern of oscillation is robust against many changes



۲





Figure 6: Speeds recover so the tolls are reduced



#### Figure 7: The result is oscillation

in policy and data values. It remains if the tolls are based on speeds over different sections of the road. It also remains whether drivers respond to actual drive times or a fixed drive time, and it remains if the algorithm takes into account more variables describing how the flows and speeds are changing on the toll road or the alternative route. Only the frequency and magnitude of the oscillation changes; in some cases it can be very severe indeed.

The explanation for this persistence is that the oscillation is in fact structural: the tolls are being used to fix the speed deficit after it has occurred, but any control system of this type – which reacts to conditions after the event – will have a tendency to oscillate. This is not an attractive property for toll roads, to put it mildly.

#### What can be done?

( )

There are solutions to this. The dynamic tolling method tested here is purely reactive, trying to fix the problem after it has happened, and the key is to anticipate what is going to happen and alter the tolls in advance to stop speeds falling.

The simplest way to do this is to use variable tolls, not dynamic. Variable tolls alter by time of day, with the tolls set using observed build-up patterns from the past, but not responding to real-time conditions.

A more sophisticated method is to predict what traffic is likely to arrive in the near future and adjust the tolls in advance. This requires short-term forecasting of arrival rates, maybe based on past experience, or on monitoring upstream traffic levels. The tolls are altered if predicted flows would cause conditions to fall below pre-set standards. Tests with our model show that this does indeed perform much better: the oscillation disappears, while the revenues generated are higher (typically 15% higher). This result holds even when we allow for the randomness of traffic (or, to put it another way, the forecasting model getting it wrong). The only downside is that it is still possible for speeds to drop below the threshold for periods if there are surges in traffic well above what is expected.

۲

#### To conclude

Dynamic tolling offers an attractive means of maintaining service levels on tolled roads. However, purely reactive tolling can be dangerous, as it tends to generate highly unstable conditions. Techniques designed to anticipate changes in flows are much more successful at maintaining service levels without becoming unstable. Moreover, they also generate more revenue. O



Steer Davies Gleave +44 20 7910 5542 john.swanson@sdgworld.net www.steerdaviesgleave.com



### intelligent Cities EXPO

۲

8-10 November 2011 CCH Congress Center Hamburg, Germany

### The only global exhibition dedicated to the development of truly 21<sup>st</sup> century connected and sustainable cities.

**(** 

Intelligent Cities Expo represents a unique opportunity to engage a wide range of senior city stakeholders from all over the world.

Intelligent Cities are made up of systems, technologies and solutions that talk to each other. Smart transportation and traffic systems are an essential part of this crucially holistic city vision.

Contact us immediately to reserve your space in the exhibition hall. Email **emma.stokes@intelligentcitiesexpo.com** or call **+44.1306.743 811** 

www.intelligentcitiesexpo.com

 $( \bullet )$ 



### 🕨 | Bulletin **Board**

### High-performance CCD cameras for ITS applications

۲

READER ENQUIRY NO. 510 Advanced digital camera technology expert, Point Grey, has announced the next generation of its

popular range of cameras that is targeted at the ITS market. The Grasshopper2 digital CCD cameras are an excellent choice for ITS applications that require high quality images in demanding traffic environments. Each Grasshopper2 GS2-GE unit incorporates a high-speed Gigabit Ethernet interface and progressive scan CCD technology, which enable accurate, high quality image capture of fast-moving vehicles. A broad range of built-in functionality makes these cameras ideally suited for a variety of applications, including traffic surveillance, vehicle identification, ALPR, speed enforcement and redlight enforcement.

The Grasshopper2 offers a choice of high-resolution, highsensitivity progressive scan Sony CCDs, including the



ICX274, a two megapixel sensor that runs at 30fps, and the ICX625, a five megapixel CCD that runs at 15fps. The compact industrial housing - which measures just 44 x 29 x 58mm in size - can be easily mounted in any environmental enclosure. An opto-isolated general purpose IO connector allows image exposure to be synchronized to a hardware trigger and can be used to control an external light source such as a flash. Additional features include: manual or

automatic control of imaging parameters such as exposure, gain and white balance; lowsmear imaging; programmable region of interest and binning video modes; and support for both raw and color-processed image data output.

To maximize image quality and performance, every Grasshopper2 GS2-GE camera is equipped with a 14-bit analogto-digital converter, 32MB frame buffer for image retransmission, and on-board temperature and power sensors to monitor camera status. Mechanical features include an industrystandard C-mount lens holder, protective optical window (monochrome models) or IR cut filter (color models) and RJ-45 connector with screw locks. Additionally, Point Grey's FlyCapture software development kit (SDK) included at no extra charge with each Grasshopper2 camera unit – provides a complete software application programming interface (API) for creating custom applications to acquire images and control the camera.

The FlyCapture SDK is compatible with Point Grey FireWire, USB 2.0 and GigE cameras using the same API, and includes support for 32and 64-bit Windows and Linux.

( )

Ontact
Point Grey

Point Grey +1 604 242 9937 sales@ptgrey.com www.ptgrey.com

### Radar-based detection solutions



۲

The end of 2010 saw a new business venture in the Australasian market for AGD Systems

UK. AGD has been a supplier to customers in Australasia for a number of years and increasing opportunities led the company to set up AGD Systems Pty Ltd in Sydney, Australia.

Bob Jarvis is heading up this new venture. Jarvis has worked for Tyco Electronics in this region for many years and brings considerable commercial experience to the new start-up. He sees exciting times ahead for AGD in Australia and New Zealand and is already talking to a large number of potential clients about the extensive AGD detection portfolio.

AGD Systems will be attending Traffex at the NEC in



(

Birmingham, UK to showcase its range of power-efficient products supported by Elexon codes for local deployment.

There are a number of new products on display at Traffex, one of which is the Medium Range Wireless Link, which can provide information wirelessly up to 500m in urban and interurban environments, offering advantages over costly underground ducting.

The AGD307 is a new compact, low power 24GHz radar family suitable for deployment worldwide. The smallest detector ever produced by the company, the AGD307 will offer flexibility of deployment for applications from junction control to sign and speed measurement applications. Models will include basic switched versions and also RS422 enabled communications for more demanding sign applications.

The AGD226 and AGD640 pedestrian on-crossing radar and curbside wait area detectors continue to be popular. Customers can combine pedestrian detection with ELV nearside signals from the AGD94x range for pedestrian crossing applications.



AGD Systems +61 2965 39934 robert.jarvis@agd-systems.com www.agd-systems.com

February/March 2011 Traffic Technology International 091 www.TrafficTechnologyToday.com

### Burning Question



### What advances do you predict in the road markings sector in order to enhance traffic safety?

"RSMA members are at the front-end of most major developments in enhancing road markings, a good example being the profiled marking such as Rainline, developed by Prismo seven or eight years ago, which radically changed thinking about how we dealt with road markings and their effectiveness at night. That's led the way in terms of other types of product with profiles or different constituent materials, the cost of beads, etc. Like most other industries that are heavily involved with public sector clients, everybody is holding their breath at the moment. It may well be that short-term innovation is a long-term casualty of public expenditure constraints because new products do tend to be that bit more expensive per meter. Clients may well end up relying more on existing technology, developed maybe two of three years ago that has a more competitive price. It's hard to identify where the next steps are going to come from. It may well be a highperformance, lower cost tape, or LAs might take the plunge and go for non-thermoplastic-based products that have a got a longer lifespan but have a higher unit cost at the outset. It's a fine balance to strike.

> George Lee chairman, Road Safety Markings Association, UK



(4)

"There are new optics being introduced pretty much every year to enhance safety performance. Many of the advances are from the EU, some, such as Prismo, from the UK. I'm always impressed with the pavement marking systems in Europe. The materials

used are for the most part good, long-term materials, they're durable. By far the most widely used product in the USA is still water-borne paint. Wet-night performance products could have a huge safety impact. But there's been a lot of discomfort with our specifications for measuring wet-night retroreflectivity; nobody seems to think it's a good method and that's caused a lot of problems here. We're working to develop a new test method through the ASTM process, but until we get that finalized and approved, I think right now that's hurting the push for wet-night markings. You guys have EN1436 and we're familiar with that through the work we're doing at ASTM, but we're trying to do what we think is best, to make sure it's consistent, it measures markings equitably regardless of what optics are on there, or what kind of structure or design the pavement marking features, and we're getting close.

> Paul Carlson systems marketing manager, Siemens UK

Readers are invited to answer the Burning Question for the April/May 2011 issue

There are many cooperative vehicle research projects, but how long will it be until such schemes are commercially viable, legally approved and actually deployed?

email answers to: l.smyth@ukipme.com

Tim Crabtree

**Graham Muspratt** 

"A traditional retroreflective road stud loses its

the light as it goes into the stud and out again as it reflects

group product marketing manager, Clearview Traffic, UK

'My school of thought is that when smart technology is combined with a logical approach,

safety. I think that's what you see with our LED markers,

which are based on Inductive Power Transfer technology

and we've got research to back it up. An Insurance Corporation of British

Columbia (ICBC) study of 3i Innovation's 6.3km delineation deployment

in Vancouver showed a 30% reduction in target accidents and the same

in overall accidents. The system was first installed in 2001 and has only

just been upgraded as part of a reseal program. As you might expect, the

cost savings associated with such accident reductions run into the many

millions of dollars. Another deployment that further states the case is

just 1.8 miles of delineation, the I-110 Tidal Flow epitomizes what we

close lanes accordingly - has the potential to reduce traffic jams and

collisions. A senior Caltrans director told me they simply couldn't have

afforded to do this with any other product - hard wiring doesn't last."

international business development, 3i Innovation, New Zealand

already in action on I-110 in Los Angeles. With around 800 markers over

can do with our product. The so-called SmartStud dynamic lane system

- which essentially gauges road conditions and traffic flow to open and

dividends will follow - particularly in terms of

back. Active studs, though, will perform better and longer, even under dirt

road conditions. White lining in a lot of areas is terrible, generally, unless LAs go to the extent of using a wet-night marking. As a driver, I would

rather more authorities used wet-night products as when combined with good quality studs, you get a dramatic safety benefit, but it comes down

to cost. Some may look at our active stud and think it seems expensive

compared with a traditional stud, which only lasts two years, whereas

cost of labor, the active stud comes out pretty much cost neutral. Plus

you've got other added benefits, such as 10 times greater visibility."

ours is designed to last eight to 10. So, by the time you've gone back twice in that period to replace traditional studs, put traffic management on, the

performance after around six months and after 18

months to two years, it's virtually dead and buried. They're also impacted by dirt and so forth twice: blocking

### Index to Advertisers | 🕕

3i Innovation	25
AGD Systems	26
Allied Vision Technologies	17
ARVOO Imaging Products	59
Comnet	61
DELTA Light & Optics	20
Econolite	15
Efkon	39
Fabema	26
Gardasoft	30

High Sierra Electronics	70
HTS (Hi-Tech Solutions)	30
Image Sensing Systems	48
Inro	29
Intertraffic India	83
Intertraffic Istanbul	83
IterisI	FC
ITS in Europe	.76
JAI	33
Jenoptik RobotO	BC

Kapsen Hanneeon	sport
Miovision	ST Ele
Olvia	Sward
Point Grey	Traffe
PTV	Traffi
Quercus	Trafic
Redflex IBC	TSS - 1
Intelligent Cities Expo	Syst
(Smarter Shows Ltd) 90	Vaisa
Sony Visual Imaging 3	Varia

Sport & Traffic Technologies ST Electronics	89
Swarco	4(
Traffex	73
Traffic Tech (Gulf)	89
Traficon	1
<b>TSS - Transport Simulation</b>	
Systems	53
Vaisala	25
Variable Message Signs Ltd	70

Traffic Technology International February/March 2011 092www.TrafficTechnologyToday.com

( )

Redflex will be exhibiting at **Traffex 2011** Stand C34

# Road Safety

۲



۲

### **REDFLEX TRAFFIC SYSTEMS PTY LTD**

Providing trusted end-to-end traffic enforcement solutions.

### **Redflex - Making a safer world**

Tragically over 3000 people die on our roads worldwide every single day. Redflex is committed to road safety and the reduction of this global road toll.

Redflex has developed world leading technology to produce a range of intelligent traffic enforcement products, making a safer world.

### **Redflex end-to-end solutions**

- Design
- Installation
- Enforcement
- Verification
- Processing
- Collection

Whether it's fixed or mobile technologies or a large or small enterprise back office, Redflex has the experience and expertise to offer a tailored solution that caters to your needs.

WORLDWIDE REDFLEX TRAFFIC SYSTEMS PTY LTD Tel: <sup>+</sup>613 9674 1800 Fax: <sup>+</sup>613 9690 0705 Web: www.redflex.com Email: sales@redflex.com.au





WWW.REDFLEX.COM

lacksquare

Visit us in Birmingham at TRAFFEX 29-31 March 2011, Booth B10

### We speak all languages!

Krupa, Manager Operations Traffic Service Providing, Germany

### **INTERNATIONAL COMPETENCE**

When in Rome, do as the Romans do - other countries, other manners, other requirements. Only tailormade solutions guarantee successful outcomes. Our products are reliably implemented in over 80 countries worldwide; from Australia to Canada, from deserts to the arctic circle and everywhere inbetween. As a specialist for traffic law enforcement, we offer our customers around the globe individual technical solutions for their local requirements.

 $( \bullet )$ 

lenoptik speaks all languages!

۲

Traffic safety with robot technology

### JENOPTIK I Traffic Solutions JENOPTIK Robot GmbH info.ts@jenoptik.com

www.jenoptik.com/ts

