

traffic

TECHNOLOGY INTERNATIONAL



October/November 2014

Red light debate

Do cameras improve safety or simply boost revenue?

Keep wireless working

Battle lines are drawn on sharing the critical DSRC wavelengths

WWW.TRAFFICTECHNOLOGYTODAY.COM

Built to last?

How to construct rural ITS that will survive and thrive in extreme conditions



News
US\$70m V2X test facility opens in Sweden; real-time traffic advances around the world; and more...

PLUS



Scott Belcher

The outgoing president of ITS America on the challenges in store for his successor



Traveler Information

Super-personalized route guidance systems of tomorrow that will make driving a bespoke experience



Gulf Traffic Preview

As the industry converges on Dubai, the exhibition director reveals the show highlights

Tireless eyes fighting crime: ANPR Mobile



- ▼ **Embedded license plate analysis**
(OCR on-board)
- ▼ **All in one:** monochrome - color sensors
and IR illuminator
- ▼ **Wi-fi data transmission** from the unit to the
pc / tablet
- ▼ SD memory card **up to 16 GByte**

www.tattile.com

 **Tattile**
Custom Vision Solutions



Cover story

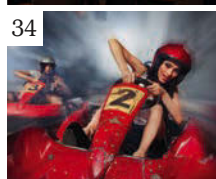
40 Fire and ice

Road management in rural locations is inherently difficult

Timothy Compston finds out how out-of-town transport authorities cope with extreme weather conditions

Features

- 04 **Reality check**
A new real-world proving ground in Sweden provides the ideal conditions for accurately testing V2X and connected-vehicle technologies
- 06 **Detection perfection**
The final look back into the archives for our 20th anniversary year examines the evolution of traffic enforcement technologies
- 10 **Time travel**
Real-time traffic information services are helping to fight congestion on the world's roads
- 14 **The battle for DSRC**
Tom Stone investigates the long-term prospects of DSRC for V2X and finds out whether sharing the 5.9GHz wavelength is a feasible option
- 22 **Around the world in new TOC ways**
Advanced technologies, flexibility and integration are important factors in the design of new traffic operations centers, reports Timothy Compston
- 28 **Where to next?**
The next generation of intelligent traveler information systems will provide much more than route guidance, as Max Glaskin discovers
- 34 **Running the reds**
David W Smith speaks to the industry experts debating the effectiveness of camera enforcement for red-light violations



48 United Arab Evolution

Our exclusive preview of December's Gulf Traffic Exhibition and Conference picks the highlights to keep an eye out for in Dubai

Interview

57 Scott Belcher

Tom Stone speaks to the president of ITS America about a successful World Congress and current industry challenges, as he prepares to leave the role

Regulars

12 City Slicker

As Dubai gets ready to host its region's biggest ITS exhibition of the year, our statistical spotlight homes in on the rapidly growing metropolis

65 J J Eden

A look at how individual tolling authorities in the USA can work together toward national interoperability

71 Larry Yermack

How can transportation agencies bridge the data gap between the public and private spheres?

75 Jim Misener

The journey toward safer mobility via connected vehicle technologies continues

80 Take the shortcuts

An instant index to the most important industry developments and the coverage you'll find in the pages of this magazine – and beyond!



Technology Profiles

- 60 Optimized traffic control and safety operations in Glasgow
Martin Wagner, **Eyevis**, Germany
- 62 Does machine vision require standards to meet ITS demands?
Jorgen Pedersen, **Allied Vision**, Germany
- 64 A new direction for traffic control room displays
Peter van Dijk, **Mitsubishi Electric Europe**, Netherlands
- 66 An insight into the future of enforcement
Arno Klamminger and Wolfgang Fleischer, **Kapsch**, Austria
- 68 Emerging trends in tolling and law enforcement operations
Marco Sinnema, **Q-Free**, Netherlands
- 70 More data makes for better management decisions
Brett Hansen, **High Sierra Electronics**, USA
- 72 Intelligent transportation for the Middle East
Husam Musharbash, **Traffic Tech**, Qatar
- 74 Using sensors to optimize image capture in traffic applications
Eric Ramsden, **Lumenera**, USA
- 76 Applying scientific algorithms to traffic data
Johannes Weinzerl, **c.c.com**, Austria

Editor's letter



My first ITS World Congress will live long in my memory. I had barely set foot in Detroit before being swept from session to stand to technical demonstration by a tide of infectious enthusiasm from all involved. If only the nightly journey under the Detroit River to our hotel in Windsor, Ontario, had been as reliably unimpeded. Unfortunately, despite border checkpoints bristling with every type of CCTV and machine-vision camera imaginable, ITS has still to solve the problem of ponderous, humorless customs checks. Indeed, if it ever does, a Nobel Peace Prize might be appropriate – but it's fairly certain no one is holding their breath for that particular accolade.

Perhaps, though, a more realistic prospect for international recognition may be the development of connected vehicle and autonomous driving technologies. Such advances have the potential to save so many lives (1.24 million a year at the last WHO count) that one of the attendees in Detroit could be a Nobel laureate of the future.

Indeed, it was out on the roads around the city that I had my most memorable experience of an extremely eventful week: a real-world demonstration of a fully autonomous driving system. Despite having read plenty about such systems, nothing could have prepared me for the feeling of awe as we zipped along a busy freeway, changing lanes, filtering off one interstate and onto another, indicating, braking and

accelerating, all without the driver touching the wheel or pedals. The speed at which the vehicle traveled and the amount of traffic the system was able to negotiate were perhaps the biggest surprises. But you don't have to take my word for it; check out my video from the back seat at traffictechnologytoday.com/driverless.

Freeway driving systems like this could be a reality in production cars within five years, and while a fully autonomous system is a much more distant prospect, vehicles of the near future will undoubtedly be packed with V2X capabilities. The groundwork for these systems is being laid now, however as I discovered when talking to experts while researching *The battle for DSRC* (p14), every advance in the increasingly crowded field of communications is hard-won and no one is giving any ground without a fight.

The international nature of the industry demonstrated by the gathering in Detroit is reflected in the pages of this issue as we travel from New Mexico to Iceland in search of technology in the most remote locations (*Fire and Ice*, p40); visit South Africa and Australia among others to check out the best new traffic control centers (*Around the world in new TOC ways*, p22); and stop off in Dubai, of course, to preview the Gulf Traffic Exhibition and Conference (p48). ITS has always been an international community, but increasingly (as Scott Belcher points out on p57) the world is watching. Aspiring Nobel prize winners take note.

Tom Stone
Editor



Editor
Tom Stone
tom.stone@ukipme.com

Deputy editor
Lauren Ansell
lauren.ansell@ukipme.com

Production editor
Alex Bradley
Chief sub-editor
Andrew Pickering
Deputy chief sub-editor
Nick Shepherd
Proofreaders
Aubrey Jacobs-Tyson,
Christine Velarde, Lynn Wright

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

Head of production and logistics
Ian Donovan
Deputy production manager
Lewis Hopkins
Production team
Carole Doran, Cassie Inns,
Frank Millard, Robyn Skalsky
Circulation
Adam Frost

Publication director
Mike Robinson
mike.robinson@ukipme.com
Sales manager
Godfrey Hooper
godfrey.hooper@ukipme.com
Sales manager
Jaspreet Rayat
jaspreet.rayat@ukipme.com
Australasia business manager
Chris Richardson
chris.richardson@ukipme.com

CEO
Tony Robinson
Managing director
Graham Johnson
Editorial director
Anthony James


Traffic Technology International
UKIP Media & Events Ltd, Abinger House,
Church Street, Dorking, Surrey RH4 1DF, UK
Tel: +44 1306 743744 • Fax: +44 1306 742525
Email: traffic@ukipme.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 (USPS 012-893) is published bi-monthly – in February, March, April, June, August, and October by UKIP Media & Events Ltd, Abinger House, Church Street, Dorking, Surrey, RH4 1DF, UK. Annual subscription price is US\$131. Airfreight and mailing in the USA by agent named Air Business Ltd, c/o Worldnet Shipping USA Inc, 195-11 146th Street, Jamaica, New York 11434. Periodicals postage paid at Jamaica, New York 11431.

US Postmaster: send address changes to Traffic Technology International, c/o Air Business Ltd, c/o Worldnet Shipping USA Inc, 195-11 146th Street, Jamaica, New York 11434. Subscription records are maintained at UKIP Media & Events Ltd, Abinger House, Church Street, Dorking, Surrey, RH4 1DF, UK.

Air Business is acting as our mailing agent.

published by **UKIP**


 Member of the Audit Bureau of Circulations

Average net circulation per issue for the period January 1-December 31, 2013 was 17,389
Annual subscription US\$131/£73
USPS Periodicals Registered Number 012-893

ISSN 1356-9252
Traffic Technology International
This publication is protected by copyright ©2014
Printed by William Gibbons, Willenhall, West Midlands, WV13 3XT, UK

Ahead of traffic



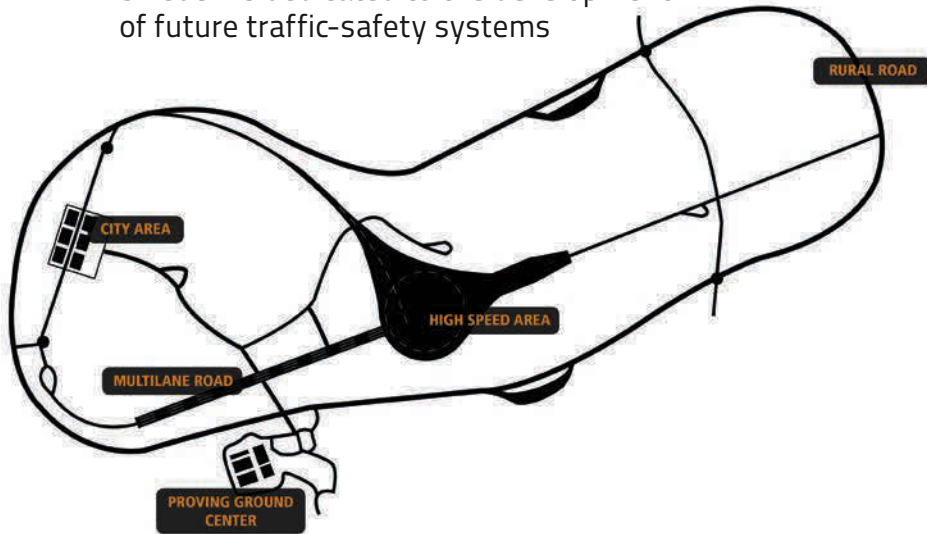
In the ITS camera race, AVT's low-light optimized CCD and CMOS sensors, high-speed shuttering, and wide field of view are unbeatable. And with remotely adjustable settings, such as white balance, gain, exposure, and triggering, our cameras are also the easiest to drive. Select from several customizable models with up to 29 megapixels of resolution. They're road tested and ready to take on your traffic applications today. In fact, the toughest challenge wins at www.AlliedVisionTec.com/AheadofTraffic.



SEEING IS BELIEVING

Reality check

A brand-new 'real-world' proving ground in Sweden is dedicated to the development of future traffic-safety systems



We all got a step closer to a crash-free future in August, when the world's first full-scale test environment for future road safety opened in the city of Borås, Sweden. AstaZero is a Skr500m (US\$70.1m) state-of-the-art proving ground that will promote the development of advanced traffic technologies including autonomous vehicles, in-car safety, V2X, next-generation communications and intelligent road-weather systems.

Asta stands for 'active safety test area', while 'zero' refers to the Swedish Parliament's famous Vision Zero campaign. The site is jointly owned by SP Technical Research Institute of Sweden and Chalmers University of Technology.

The Borås facility is unique in that it combines a variety of 'real-world' environments, making it possible for developers to test their advanced safety systems in a range of roadway situations, including busy city roads, multilane highways and crossroads. While Volvo, Autoliv, Scania and Test Site Sweden are some of the first companies to sign up to use AstaZero, the facility is open to anyone trialing road-safety systems.

"AstaZero will also be available for researchers and traffic experts who wish to improve the safety of pedestrians, cyclists

and other unprotected road users," says Pether Wallin, CEO of AstaZero. "This is an area of research that has previously taken a back seat."

Notably, AstaZero features a high-speed track called The Drop. The track includes a four-lane highway, which is 1km (0.6 miles) long including the acceleration section. Among other things, lane changes and different collision scenarios can be tested here.


The facility also has an urban environment made up of blocks. Featuring sub-areas, such as a town center with varying street widths and lanes, bus stops, sidewalks and bike lanes, this section is aimed at ascertaining how cars interact with their surrounding environment – buses, cyclists and pedestrians in particular.

Lastly, there is a 5.6km (3.5-mile) rural road, which includes various obstacles, such as animals, crossing the lanes. The road will largely be used for tests in driver behavior.

"The entire facility is connected, and in the future our cars will be too," says Wallin. "Vehicles will be able to communicate with each other, for example, to warn cars behind of slippery road surfaces. The fact is that people cause accidents, not slipperiness or fog. If we can eliminate the human factor, we can also eliminate accidents." ○

Country stars


Safety testing takes a walk on the wild side

 The rural road at AstaZero contains 10 points, both open and concealed, where objects appear in front of the vehicles. The area is specially designed for different tests of driver behavior and is well suited for the use of hidden or suddenly appearing obstacles. On the road, there will be two T-junctions and a crossroad with signage. The road also features bus stops in two locations.



Distraction tech

How the latest distracted-driver research is setting a new test agenda

 In September, Safer – the vehicle and traffic safety department at Chalmers University of Technology – revealed the results of a distracted-driving study based on video captured in the American Strategic Highway Research Program 2 (SHRP2). Analyzing footage of more than 3,000 drivers over a three-year period, the Safer team was able to determine to what extent distractions, such as cell phone use, contributed to rear-end collisions.


“We found out how distraction causes accidents,” says Trent Victor, professor and research director at Safer. “Rear-end collisions occur when the vehicle

1.2
million people
are killed globally in
traffic accidents each
year, according to
the UN

in front brakes just at the moment you take your eyes off the road.” Victor led the team that analyzed drivers’ eye-movements prior to accidents. According to Safer, active safety systems, such as collision warnings and automatic braking, have great potential to prevent this type of accident, or reduce the severity of the consequences.

Better roads for everyone

Vulnerable road users will also be considered at the AstaZero facility

 For Volvo, AstaZero facilitates important research that will lead to the development of next-generation safety technologies. “Testing under realistic circumstances is a prerequisite for developing our active safety systems,” says Anders Axelson of Volvo Cars Safety Centre. “The facility will play several important roles: not only will it help us meet our safety vision – developing cars that don’t crash – it will also help us further develop safety functions that will address non-motorists, such as pedestrians and cyclists.”

Volvo’s work at AstaZero will also include the development and testing of autonomous driving technology, as well as the advancement of intelligent systems that will be able to prevent inattentiveness and driver fatigue.



“If we can eliminate the human factor, we can also eliminate accidents

*Pether Wallin,
CEO, AstaZero*



Detection perfection

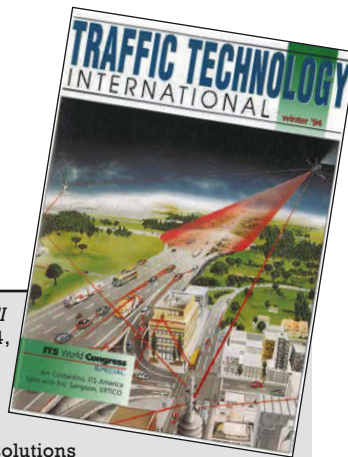
As our anniversary year draws to a close, **Lauren Ansell** takes a last look back through the archives, to reflect on how speed and red light enforcement technologies and strategies have developed over the past two decades

Winter 1994

Photo radar is now a firmly established technology in speed and red light enforcement... radar speed systems, however effective, are beginning to look 'old hat' alongside new technologies for the traffic enforcement authorities. Wide radar beam divergence over long distances remains a drawback to the accuracy of radar-based systems, and new technologies have emerged.

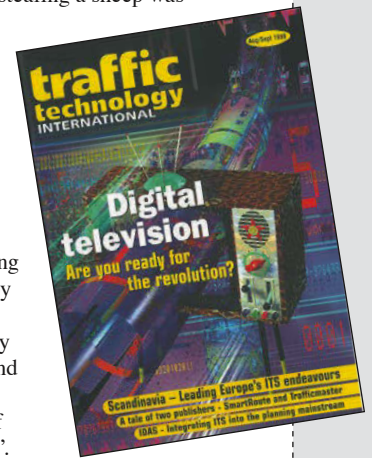


When *TTI* launched in 1994, radar-based technologies were already being trumped by laser-based solutions and the limitations of wet-film cameras were being highlighted by the introduction of digital alternatives. Remote monitoring was enabling a reduction of manpower and several companies were looking into combining LPR with their camera-based technologies to create more capable law enforcement solutions. These are all trends that continue today.



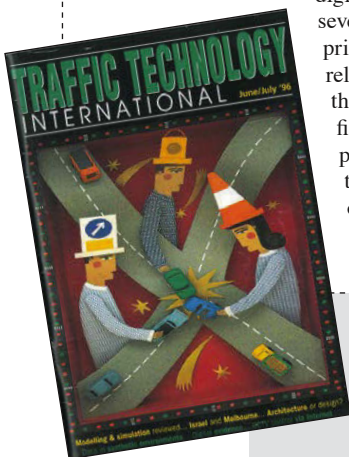
August/September 1999

We have an enforcement mechanism based on the process of catching the criminal and then punishing them. Unfortunately such a system has never worked effectively: even when the punishment for stealing a sheep was death by hanging, sheep were still stolen. However, at least there has always been an agreement within society in general that stealing is wrong, those who are fined for speeding tend to be greeted by their friends with "hard luck, it's a pity the police can't spend their time catching criminals instead of attacking motorists".



June/July 1996

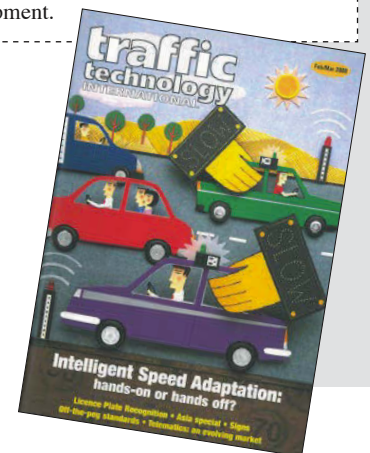
These cameras and speed traps are to benefit from the introduction of digital technology, in the form of cameras that record the image not onto photographic film or even video tape, but into a computer memory in a securely encrypted manner. As with the original cameras, the image is taken of a speeding car, and then stored. Unlike the photographic record, however, this digital version has several advantages, primarily that it could relieve the police of the task of collecting films. Instead, the pictures can be transmitted along ordinary telephone lines back to the police station.



By 1996, the benefits of digital cameras for enforcement purposes had become more obvious and DOTs were beginning to look into upgrading old wet-film systems. However, there were concerns about the reliability of digital evidence, which it was thought could be easily manipulated. This article by Neil Barrett, *Smile, you're on candid (digital) camera*, weighed up the benefits of digital enforcement against potential problems, and looked at how developers could prevent image manipulation. While that problem has long since been put to rest, prohibitive costs have meant that some cameras (notably many in London) are only just being upgraded from wet film. traffictechnologytoday.com/londoncameras

February/March 2000

There are two developments that suggest this problem [of enforcement] can be solved in the near future. First, governments are looking at installing electronic license plates in every car... the other development is floating car data (FCD). Every car will be able to identify itself (with an electronic license plate), and give information on where it is and what speed it is moving at, all through the FCD unit. For speeding control, no camera units are required, no film needs to be developed, and personnel do not have to sit outside and guard equipment.



Do we even need speed limits?



One of our regular contributors, of both articles and columns, over a dozen of our 20 years, is **Al Gullon**, a Canadian traffic safety researcher.

With his statistical studies supplemented by some 42,250 miles (68,000km) of roadway observations in Europe alone, his research has resulted in 11 SAE, FISITA and ITS papers being presented in venues around the world

From 2006-2008, you wrote a series of columns for us focusing on traffic safety. One of your recurring themes was the ineffectiveness of general speed limits at preventing crashes.

Do you think the opinions of policymakers on the safety value of speed limits have changed at all since you wrote these columns?

Unfortunately, no. The largest traffic safety tragedy the world has ever seen occurred in 1974 in the offices of the ministers for traffic safety in several European countries. Having put speed limits on their highways for energy conservation in October 1973, they then saw in 1974 the biggest fall in the fatality rate that had ever been seen.

They were so busy preening themselves in the mirror of public opinion that they never looked sideways. Had they done so, they would have seen that every European country, including those who had NOT imposed a speed limit, had the same big drop in fatalities! They then perpetuated this tragedy up to the present time. It is a truly massive tragedy because, with police resources misdirected by this stupidity – or ‘non-science’ – many thousands have died around the world who might have been saved by police being able to devote more resources to REAL causes of crashes, such as following too closely.

In January 2007 you mentioned situation-specific speed limits. These have become a reality in the UK through the Smart Motorways scheme and similar active traffic management schemes are being implemented around the world. In your opinion, are they a success?

These schemes address only congestion, not traffic safety. What I called 3S limits [situation-specific speed limits] have been installed at several locations on the autobahn since the early 1990s and are varied, by traffic controllers, according



In an article entitled *Who says crime doesn't pay?*, Peter Jesty explored why the threat of punishment is often not enough to make people obey the laws of the road. Explaining that modern roads and vehicles seem to be designed to encourage speeding, he questioned whether rules could be enforced through changes to road geometry or via in-car intelligent speed adaptation, or whether the only way to make drivers behave properly would be to threaten to use the full weight of the law. Despite tougher punishments for various violations being introduced over the past 15 years, the problems associated with law-breaking motorists continue today.



In this article, entitled *Know your limits*, Petra van Krugten and Mark Hoogenboom from Cap Gemini in the Netherlands highlight an early forerunner of connected vehicle technology. The vision was for FCD to provide authorities with information about every vehicle on the road. While the concepts detailed in the article were technically possible then, and still are today, we are yet to see the idea in practice. Vehicle to infrastructure technology may be about to change all that.

to weather, sight distance and observed traffic volume.

They, in fact, are only an electronic update on the 2SLs [specific speed limits] that are an integral part of the autobahn since at least the 1960s. That is, although not burdened by an overall limit, the autobahn has always had specific limits where, because of infrastructure or above-normal traffic volume, the road ahead is NOT the same as the road just traveled. AND, in contrast to the motorway limits in EVERY country, they are obeyed! In my case pre-obeyed. Whenever I see one of those 2SLs and check down, that's what's on my speedometer!

If speed enforcement is not the best way to improve traffic safety, what is?

Traffic safety authorities must abandon that ‘speed kills’ mantra and move to ‘mental distraction

kills’ ... or better, because shorter and more intriguing, ‘AMPS kills’.

The stats from 18 countries, and every inhabited continent, show a strong correlation between the ups and downs of the economy, and the rises and falls of the annual fatality rates per million kilometers. The only explanation for that correlation is the Absent-minded Professor Syndrome (AMPS) – with much time enjoying happy thoughts in the ups and much less time spent on negative thoughts in the downs. The latter don't linger. We push them out of our mind just in time to ‘see’ the impending crash.

This discovery means that it is not bad decisions by stupid drivers that cause crashes but ‘non-decisions’ by perfectly competent drivers. Thus, authorities must identify what drivers are not seeing at the crash black spots on their roadways and install low-frequency strobe lights to get their attention directed to the impending crash situation.

Contact: al@alsaces.ca



“Traffic safety authorities must abandon the ‘speed kills’ mantra and move to ‘mental distraction kills’

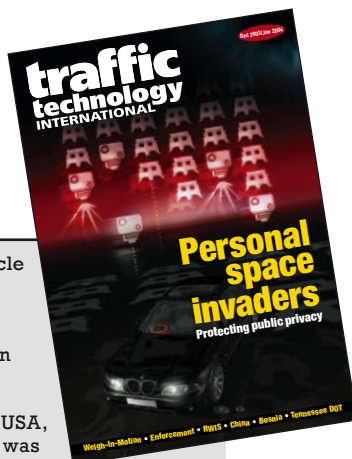


Dec 2003/Jan 2004

The red light camera hardware and field equipment should incorporate accurate vehicle detection capabilities, variable camera trigger control, and high-resolution, high-speed image capture devices. Camera technology has moved rapidly from wet film to digital capture and storage methods. Given the recent advances in digital technology and clear economics with respect to image handling and transfer, it would be difficult to make a reasonable case to support film camera systems at this point in time.



An article entitled *When red means go*, focuses on the implementation of red light enforcement systems in the USA, which in 2003, was only just beginning. The author argues that the right technology can enhance traditional, community-based policing methods and advocated the use of new digital technologies. Ten years later, attitudes toward this now widespread solution in the USA vary greatly, as described in David W Smith's article *Running the reds* on page 28.

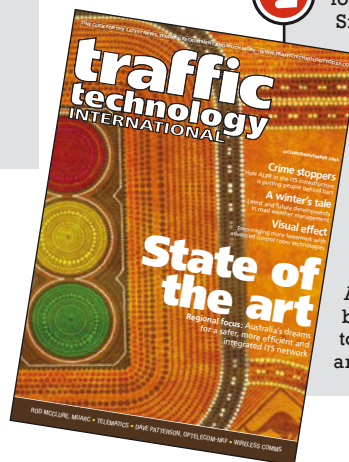


October/November 2009

Many police departments are using ALPR extensively – they just might not want you to know about it. In the UK, efforts are downplayed for various political and cultural reasons, including the ubiquitous 'privacy' agreement... Yet travel to the USA and you have cops in almost every state shouting from the rooftops about how great the technology is – with one public safety official even going so far as to describe it as “one of the greatest enforcement breakthroughs since DNA testing”.



In an article entitled *Crime wave*, former *TTI* deputy editor Louise Smyth revealed how, in some locations, enforcement was achieving a new level of sophistication via the integration of ALPR. Not only does the technology make traffic management and violation detection more efficient, it was also being used to help police fight crime – from stolen vehicles to drugs crimes, to homicides. As ITS has evolved, ALPR has been integrated into many of today's laser-based detection and enforcement solutions.



February/March 2007

A new adage has been heard circulating around the industry that a red light is just a suggestion. Such sayings often reflect an element of truth: with increasing frequency, motorists are failing to observe traffic signals. It's an uncanny commentary that we continually have to re-enforce the mandate to stop on red. Personal safety and property damage issues notwithstanding, this behavior is one factor that seems to fuel the market for emerging active and passive enforcement solutions.



Despite continual innovation in camera-based enforcement technologies, the struggle to improve driver behavior continued in 2007, as described in an article entitled *Impact analysis: signals for change*, by Lee J Nelson. He describes that while advances in automated intersection enforcement were providing law enforcement agencies with around-the-clock, all-weather monitoring, and photographic evidence of violations that helped with the prosecution of offenders, red light violations in the USA were still responsible for 260,000 crashes each year, of which 750 were fatal. According to the Insurance Institute of Highway Safety, this number is gradually falling, with the most recent figures estimating a total of 133,000 crashes and 683 people killed as a result of drivers running red lights at intersections in the USA.

June/July 2014

In the UK, the principal means by which to catch and prosecute speeders are fixed cameras, average time distance cameras, and police-operated mobile laser speed measurement devices or older generation radar devices. Other methods include signs that seek to educate and encourage compliance, such as vehicle-activated speed signs and Community Speed Watch schemes.



Earlier this year, Saul Wordsworth investigated the effectiveness of current enforcement solutions in his article *Caught in the act*. While he finds fixed cameras have proven to be most effective as a general deterrent, in most places, mobile radar guns are shown to impact driver behavior over a larger area. He also notes the potential of in-car technologies, particularly black-box recorders, which are emerging as an effective and cost-effective alternative to more traditional roadside equipment.



Intelligent Solutions for Traffic Surveillance



» **PoliScan^{speed}**

Fixed and mobile LIDAR speed enforcement capturing up to 3 times as many incidents as conventional systems

» **PoliScan^{seco}**

Next generation average speed enforcement

» **PoliScan^{redlight}**

Red light enforcement without in-road equipment such as loops and sensors, can also be combined with speed enforcement

» **PoliScan^{surveillance}**

Automatic license plate recognition with highest capture rates

» **TollChecker^{freeflow}**

World's first nationwide single gantry solution for multi-lane free-flow tolling – now in the fourth generation

www.vitronic.com




VITRONIC
machine vision people

Time travel

This month, **Lloyd Fuller** looks at the recent advances in real-time information that are changing the ways we use and manage our roads

Open roads


Live data makes journeys better in one of the world's most congested countries

 Drivers in Turkey can now get real-time traffic information, including estimates on how long delays will last and congestion forecasting that indicates whether a jam is growing or dispersing. The TomTom Traffic system provides precise information for highways, major roads and secondary roads using OpenLR location referencing. The company's latest Traffic Index ranks Istanbul second in the world for overall traffic congestion levels, with 62% of road networks in the city facing higher congestion levels during peak travel times.



Real-time results


More information leads to more efficient operation of the I-95 Corridor

 The I-95 Corridor Coalition is continuing to use Inrix's XD Traffic information system to streamline operations, pinpoint investments and deliver better traveler services. The system provides real-time and historical traffic information, as well as incident information for more than 64,370km (40,000 miles) of roads, ramps and interchanges. As part of its continued collaboration, Inrix will now also provide: 40% more real-time coverage (compared to TMC-based services), providing traffic speeds every 244m (800ft); extended data quality commitments beyond freeways to major arterials, delivering real-time traffic speeds that are accurate to within 16km/h (10mph); the XD Incidents system that correlates flow data with incident information to deliver better insight, including queue length and location, traffic speed and overall delay time.



Data down under

Australia expands its real-time traffic network


 Australia's RDS-TMC (Radio Data System - Traffic Message Channel) network coverage will be expanded by more than 80% and its real-time traffic service made available to more than 17.5 million Australian motorists following the deployment. Intelematics will add more than 45,000 square miles (72,500km²) to the SUNA RDS-TMC network by December 2014. There are 10 new broadcast areas included in the expansion, covering additional

Australian cities, major highways and arterial roads. The broadcast areas included in the new rollout are: Hobart, Darwin, Newcastle, Central Coast, Wollongong, Geelong, Ballarat, Bendigo, Sunshine Coast and Ipswich.



Access all areas

A low-cost solution could make up-to-date data sharing economically feasible on smaller roads

 Researchers from the University of Granada have designed a software solution that provides real-time data on traffic flow between cities. The highly reliable, low-cost method uses devices to monitor in-vehicle Bluetooth signals. Data is then processed using complex algorithms, and advanced computing and neuronal networks, with the aim of providing users with information and predictions on

the density and flow of traffic on any given route. Many systems currently used for data collection and road traffic information lack the capacity to identify specific vehicles, and are also costly, which restricts their use to main roads. This new system is being tested in the metropolitan areas of Granada and Seville, where 20 monitoring nodes have been installed. The gathered data generates a variety of statistics on vehicle use in these areas.



PREMIUM
IMAGE QUALITY

MULTI-STREAMING
AND MULTI-ENCODING

MJPEG, MPEG-4,
H.264 OPTIONS

IN TRAFFIC
TRUST
MATTERS.

WHO'S RELYING ON YOUR CAMERA CHOICE? Real people—you and your customers—are. That's why, at Basler, trust is as crucial to our business as our innovative technology.

You can trust in the reliability of Basler cameras—and Basler people. You can be confident of both high performance and fair pricing with every purchase. And you can rely on our industry insight to help you build your business. Visit baslerweb.com to learn how our passion translates into your profitability.

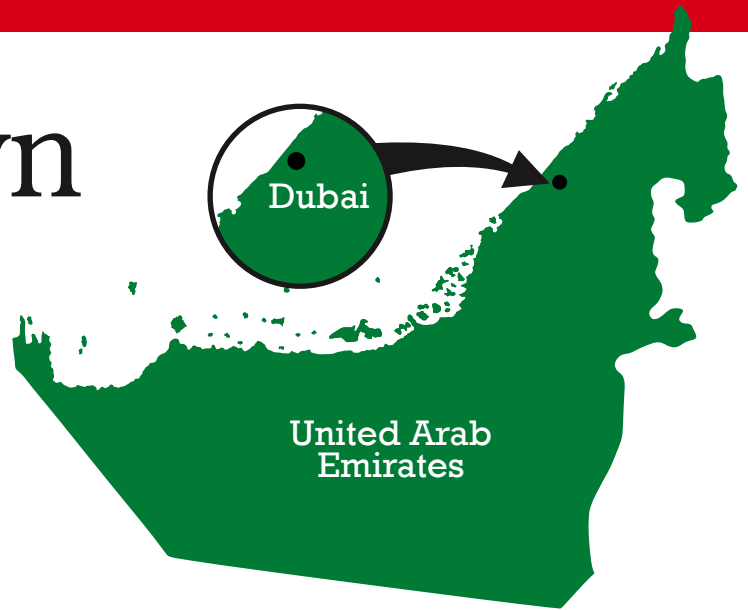
baslerweb.com/traffic

BASLER
the power of sight

Transition town

With its rapidly growing population and economy making Dubai the most congested city in the Middle East, the RTA is cracking down on violations and working on improving multimodal transportation

Infographics: Louise Adams



Dubai is one of seven states that comprise the United Arab Emirates (UAE)

Transportation in the UAE is regulated by the Roads and Transport Authority (RTA)

The Emirate of Dubai has a population of approximately

2,241,000

(Q1 2014)

(Source: Dubai Statistics Center)

31,615,000

passenger bus trips took place in the first quarter of 2014



160 people were killed on Emirates' roads in 2013, 45 of whom were pedestrians (123 were killed in 2012)

In 2013:

1,245,115 drivers were caught exceeding the speed limit

(Source: Dubai Police)



45,648 were caught not wearing a seatbelt

13,840

were caught running a red light



Daily commuters spend an average of

1hr 45mins

in road traffic



To help reduce congestion, Dubai opened its first toll road – named Salik, which means 'clear' – in July 2007



The Dubai Police's luxury supercars famously include a Lamborghini Aventador, a Ferrari FF and a McLaren 12C



Did you know? Jaywalkers in Dubai are subject to a fine of up to Dh200 (US\$55)

In December 2013,

1,264,315

vehicles were registered in Dubai



494,760

traffic offenses were recorded in the first two months of 2014. 308,690 (75%) of these were speeding violations

(Source: Dubai Traffic Police)



In 2013:

81,619,678

individual trips were made by

8,702 taxis in Dubai

(Source: RTA)



NORBIT

- explore more -

The Independent DSRC Supplier

NORBIT technology at its best –
Delivering performance, functionality and
compatibility to the world of CEN DSRC.



COVERING THE WORLD – UNCOVERING POSSIBILITIES

Explore more with NORBIT | www.norbit.com



The battle for DSRC

The connected vehicle world is set to rely on dedicated short-range communications (DSRC) for data exchange, but will this technology stand the test of time? And will sharing the critical 5.9GHz wavelength with other communications ever be a sensible option in the USA? As the Federal Communications Commission considers the arguments, **Tom Stone** surveys the battlefield

Illustrations: Mikhail Bakunovich

The latest World Health Organization figures put the total annual number of deaths in road traffic accidents at 1.24 million. If you are under the age of 44 and living in the USA, it's not heart disease, cancer or obesity that's most likely to cut your life short – it's a motor vehicle. While connected vehicles are touted as having multiple benefits, from reducing congestion to improving traffic and weather information, it's the promise of greater safety that is the biggest sell for governments. Indeed, safety must be the principle upon which every new advance in the field is built. One major accident could put the whole industry back years.

At the very core of connected vehicle technologies are the wireless communications and security codes upon which cars will be relying for decades to come. The government agencies, auto manufacturers and ITS engineers of today are the pioneers who are laying the tracks on which the transport systems of tomorrow will depend: it's important they are built to last.

So, why is the entire industry banking on dedicated short range communication (DSRC)? "It's a very reliable communication form, especially in the mobile environment," explains Sue Bai, senior engineer at Honda R&D Americas, and technical leader for Honda in the USDOT led auto-consortium, the Crash Avoidance Metrics Partnership (CAMP). "Regular wi-fi is not suited to the mobile environment when vehicles are moving at high speeds. The signal would constantly drop and require re-entering to the network, which would impact the safety applications. With DSRC, anyone in the vicinity can instantly join – and as soon as you leave the vicinity (around 400m), then you're no longer part of that network."

Another aspect that makes DSRC so suited to V2X applications is the speed at which it functions. "Once you're in, the broadcast rate is 10 times per second," says Bai. "Everyone is broadcasting and receiving from other vehicles. We've been testing this specifically since 2005. It was built for intelligent transportation use, and over 10 years of research, it has been validated as a very reliable communication system to provide 360° coverage of



(Above) **VTTI is connecting motorcycles as well as cars**

potential collision threats. LTE [long term evolution used by 4G cell phones] and some other technologies have not gone through this very rigid testing and validation." Indeed, Bai is confident that the tests have been stringent enough to secure DSRC as the standard for many years to come: "I don't see it becoming redundant in the near future. Just to verify that DSRC is a suitable technology took 10 years. So to have it widely deployed to show safety benefits, it's reasonable to suppose it will take another 10-15 years, based on previous USDOT statistics and modeling. After 20 or 30 years, there could be a better technology, but then the vehicles that are already on the road with the same technology would not be able to be updated. I sincerely hope that we have reached the point where we can stabilize the technology and move on to application development."

Jason JonMichael, national technology leader at HNTB, agrees: "Right now the focus is DSRC. A number of years ago we all got together – the community – with the Federal Highway Administration [FHWA], and came up with what we thought the Day One Use Cases would be... such as lane-departure warning and queue detection. DSRC has enough bandwidth and speed to handle all the Day One Use Cases associated with connected vehicles."

Under lock and public key?

Security for safety critical DSRC communications is handled by public key infrastructure (PKI). "We're pulling best practices from the internet and e-commerce, relating to using public keys and certificate authorities to secure the transmissions between vehicles," says JonMichael. This system ensures every safety-critical message sent has a certificate and signature attached to it. The message itself is not encrypted, so on the receiving end everyone can see the content, but to validate it the receiver has to verify the signature is genuine. They also need to check whether the sender has the right certificate to send not only the message

itself, but also to give certain commands it contains. In the V2V world, this means such transmissions could include quite specialized commands, such as whether the light bar on top of an emergency vehicle should be switched on. "If the light bar is being used, the certificate will say this car has the authority to set the light bar," says Bai. "So that would include only police cars or public service vehicles, not a regular passenger car."

Of course, to keep this system secure and running effectively, vehicles will need to have their onboard software regularly updated, and the current thinking is that there should be a way for this to happen automatically, rather than relying on traditional car servicing. "Some people never get their vehicle serviced properly," says JonMichael, "So there's obvious concern about that. There have to be parameters set, so if a vehicle is so many security updates behind, then it cannot authenticate into the system. That would mean they would be driving without some of those connected vehicle capabilities." Not ideal, perhaps, but it seems it may be a price worth paying in order to guarantee the security of the system.

The current and ongoing stage for V2X communications is the exhaustive testing of the 5.9GHz DSRC protocol and security to prove it is infallible. This testing has already moved into the real world through USDOT's Connected Vehicle Test Bed program. Centered on Ann Arbor, Michigan, the testbeds are sections of real highway, situated across the USA, that are equipped with roadside units (RSUs) that allow for testing of V2V and V2I technologies using 5.9 DSRC. The ultimate aim is to have 30,000 vehicles and more than 500 RSUs involved in the test.





It is testament to USDOT's commitment to this technology that all the sites receive federal funding and are available at no cost to the user. Moreover, no one is excluded from the club, providing they have a valid contribution to make. USDOT literature states, "Auto manufacturers, suppliers, technology developers, and even those that are interested in engineering as a hobby, are all encouraged to use the testbed to advance connected vehicle technology."

Nevertheless, one of the main groups involved in using the testbed facilities is, of course, auto manufacturers. And many of these are working in conjunction with USDOT to finalize the Security Certificate Management System (SCMS). It's all part of the USDOT's continuing commitment to improving safety in conjunction with the auto industry, which can be traced back to the formation of the Crash Avoidance Metrics Partnership (CAMP) in 1995. Initially, this was a simple

(Above) **DSRC-enabled roadside units connect vehicles to infrastructure**

partnership between Ford and General Motors, but now includes all the major international auto manufacturers, who are currently working together on the connected vehicles project.

The investment and passion is paying off. Raymond Resendes is the executive director of Virginia Tech Transportation Institute's (VTTI's) National Capital Region Division, which is responsible for the Northern Virginia Connected-vehicle Testbed. It has 43 RSUs, with plans to expand to around 70 by the end of the year. "We are part of the USDOT's affiliated testbed program," explains Resendes. "So we are in the process



Over 10 years of research, DSRC has been validated as a very reliable communication system to provide 360° coverage of potential collision threats

Sue Bai, senior engineer, Honda Americas, US/Honda technical leader for CAMP



of implementing the security solution that USDOT has developed and we're working with CAMP, testing the prototype security system that it is developing with the DOT. The pieces are really coming together nicely. The rule-making decision [National Highway Traffic Safety Administration (NHTSA) issued a V2V Advanced Notice of Proposed Rule Making (ANPRM) on August 18, 2014] has really made everyone in the public and private sector pay attention to this and everyone is trying to move quickly now to deploy an effective system."

Even so, several hurdles are still to be overcome before we reach a 'connected vehicle utopia'. "It's very challenging implementing what is essentially prototype equipment into a real-world environment," says Resendes. "The VDOT has really stepped up to implement this equipment in the middle of the active traffic management

(Left) **Onboard displays need to be clear and accurate**



BLIDS



NO MORE TRAFFIC JAMS.

THE REAL TIME TRAFFIC PREDICTION MODULE FROM BLIDS.

WWW.BLIDS.CC

Rule your traffic kingdom.



With IRD's ITS Solutions



HTMS/Traffic Safety Systems



Commercial Vehicle Enforcement/Operations



Traffic Data Collection Systems



Highway Toll Collection Systems



Border and Security Systems



Weigh-In-Motion (WIM) Scales & Sensors



Fleet Telematics



Service and Maintenance



INTERNATIONAL ROAD DYNAMICS INC.
www.irdinc.com | info@irdinc.com

Beware the data-jackers

As vehicles use more personal data, there's more to steal...

While current thinking is that public key infrastructure (PKI) creates a secure network for safety communications, connected vehicles still open up separate privacy issues when it comes to personal data.

Dave Miller, chief security officer at Covisint, a key IT partner to the automotive industry, points to the fact that you wouldn't leave your cell phone in a public place like a park bench or in a bar, then come back a few days later expecting it not to have been tampered with (even if there was a way to stop someone actually walking off with it). Yet we do exactly that with our cars, and that's increasingly going to become an issue.

"PKI means a hacker can't get into the system to create denial of service attacks," says HNTB's Jason JonMichael. "It doesn't solve privacy of personal data or someone hacking into a car and taking the data off a car."



"Your car at some point will have a significant amount of the same data that is currently on your cell phone. How do you secure it so there is no tampering with the onboard computer or its software?"

Today's new cars are already likely to include personal information, such as your home address in the satnav. As connected systems evolve, it's likely that all manner of sensitive passwords and even banking details could be stored in the dashboard. "A lot of car crime in the past was to do with stealing radios," says JonMichael. "Thieves of the future may be breaking into cars to steal data."



The pieces are really coming together nicely... everyone is trying to move quickly now to deploy an effective system

Raymond Resendes, executive director, VTTI National Capital Region Division



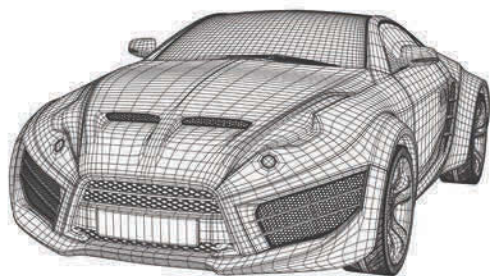
system it's already operating." And nothing is being taken for granted. Far from assuming that progress is always good, VTTI has the opportunity to investigate in which areas DSRC will comfortably out-perform more traditional methods of traffic management. "Virginia is implementing an 'old fashioned' active management system that will use infrastructure-based sensors," says Resendes. "At the same time, we will be implementing that same system using DSRC and our test fleet, so that we can actually do an active comparison of what works best on which type of system. As penetration levels and vehicle levels go up, they could actually start using that data to run the system."

Protecting 5.9 DSRC

While 2014 will undoubtedly be remembered as the year the USDOT really began to drive the V2V agenda forward in the USA, it remains to be seen whether it is also remembered as the year the Federal Communications Commission (FCC) shoved a stick in the spokes of progress. The year began on a positive note with Secretary Anthony Foxx's February 3 statement of intent to advance the connected vehicle agenda. This was formalized on August 18 with NHTSA's ANPRM and accompanying 300-page report, *Vehicle-to-Vehicle Communications: Readiness of V2V Technology For Application*.

However, this report also reminded the connected vehicle community of a growing fear: the FCC is currently considering "whether to allow 'Unlicensed National Information Infrastructure' devices... to operate in the same area of the wireless spectrum as V2V. Given that wi-fi use is growing exponentially, 'opening'





the 5.9GHz part of the spectrum could result in many more devices transmitting and receiving information on the same or similar frequencies..." It's an emotive subject.

"The wi-fi community is pushing for 5.9 DSRC to be opened up," explains Scott Belcher, president of ITS America. "It's companies like Comcast and Time Warner. There's a very real conflict. They would like access to the band right now. They think they can put it to use and think that we can work out a sharing protocol."

Indeed, Cisco's director of government affairs, Mary Brown, said earlier this year, "Cisco believes, given wi-fi's ability to listen, detect, and avoid, that the band can be robustly utilized by ITS and wi-fi, while ensuring safety of drivers and passengers."

JonMichael understands their argument, but remains unconvinced. "Someone like AT&T is faced with the issue of not enough spectrum and mounting customer needs," he says. "Their lobbyists are pushing hard at the federal level, saying that in order for us to keep up with demand, we need more spectrum. It's definitely something that we're concerned about and hopefully it won't happen. We're looking at ways of doing over-the-air secure flash updates to the chipsets in the onboard units in vehicles, through DSRC. It's one way we are using to showcase the importance of keeping 5.9 DSRC in the USA free and clear of other traffic."

"I am concerned about 5.9 DSRC," says Resendes "I haven't seen any data or testing yet that confirms we can share the spectrum. The USDOT has been working with the FCC on doing some testing, but hasn't released that information yet. So it's not clear to me that we're going to be able to do that."

Bai is hopeful that any muddying of the waters will be avoided for now. "I would say that the upcoming resolution will dictate that this channel can only be used for safety applications," she says, "and so each message on it is going to be extremely secure."

And JonMichael shares her optimism: "For the foreseeable future, 5.9 DSRC is the communication medium of choice for active

Vehicle-2-anything!

The possibilities of an increasingly connected world are almost endless

Development of connected technologies is stretching far beyond V2V and V2I. The newest research is going into V2X (the X standing for pretty much anything).

A key area of concern is pedestrian safety: more than 4,700 are killed and more than 70,000 injured in the USA annually. A DSRC-enabled smartphone could potentially connect with vehicles to give warnings of hazards, saving lives. Honda demonstrated one such setup at the 2014 ITS World Congress. "We used a regular smartphone," says Honda's Sue Bai. "The chipset was produced by Qualcomm. Firmware modifications were made to enable the chips to perform the DSRC protocol."

However, as soon as smartphones are brought into the equation, security

issues come to the fore. "We have some challenges because there's no control over that infrastructure," says HNTB's JonMichael. "I don't see crash avoidance as a reality with current technologies in mobile security. 4G might be used for this type of thing first, before a DSRC system."



Honda has also demonstrated V2Bicycle technology and even a Virtual Tow: where one car can be programmed to exactly follow another in an emergency situation. However, before any of that reaches production, Honda is hoping connected motorcycles will soon become a reality.

"We're keen not to leave motorcyclists out of the V2X equation," says Bai. "We've been talking with the USDOT about the potential of Honda leading the motorcycle program in the USA, but it's still in the initial discussion phase. The government is still focused on the V2V side of potential regulations. We are working with companies like Honda wireless and hope this V2V technology will benefit motorcycles and other vulnerable road users."




Wi-fi lobbyists are pushing hard saying that they need more spectrum. It's definitely something that we're concerned about and hopefully it won't happen

Jason JonMichael, national technology leader, HNTB



safety. You don't want run the risk of someone streaming the latest *Transformers* movie to cause you not to get a critical safety message! The ITS and safety community as a whole have all come out of the woodwork and there have been many, many petitions that were signed stating how bad sharing would be. The USDOT itself sent a position paper over to the FCC."

Indeed, perhaps the final word should be from one of the men at the center of the whole V2V project; Gregory Winfree, the USDOT's assistant secretary for research and technology, who told the ITS World Congress in Detroit, "Interference cannot be tolerated in critical safety communications."

The connected vehicle community has fired its big guns, and as this issue goes to press, it remains to be seen whether the FCC will raise the white flag. 

1) <http://www.nhtsa.gov/About+NHTSA/Press+Releases/NHTSA-issues-advanced-notice-of-proposed-rulemaking-on-V2V-communications>

ORTANA is Offering a New Line of Weather Station Solutions



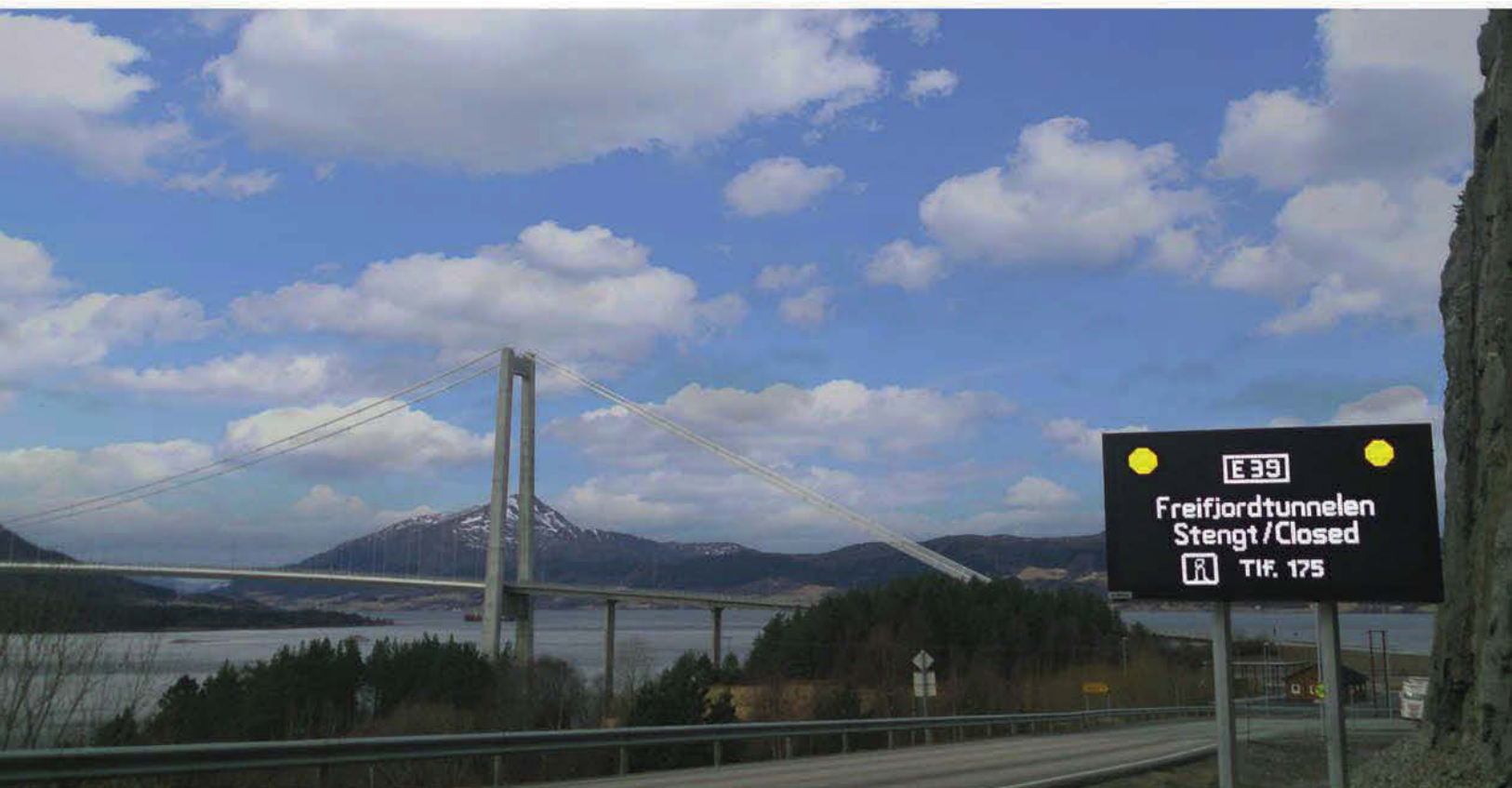
**WEATHER STATION
METEOS 101**



**VISIBILITY SENSOR
METEOS 151**



**ROAD SENSOR
METEOS 201**



Around the world in new TOC ways

Timothy Compston finds that the digital streamlining that has changed the face of traffic operations centers (TOCs) is more than just skin deep, with transportation agencies across the globe reporting major operational benefits

To a casual observer, a modern TOC can look more like NASA's Mission Control than a highway management center, with gleaming touchscreen consoles, high-resolution video walls and adjoining situation rooms as standard. The reality, of course, is that the serious work being done at these futuristic façades is much more prosaic: the technology is all focused on the everyday task of keeping cities moving. Right now there's a boom going on around the world in TOC architecture: from Arizona to Australia, new centers are being built and old ones upgraded, to keep pace with advances in hardware. A world tour reveals some incredibly innovative solutions...

Going digital

Our journey begins in the southwestern USA. Arizona Department of Transportation (ADOT) has transformed its TOC, first established in 1990, thanks to a US\$2.1m renovation. The project means the TOC, which had been soldiering on with outmoded and cumbersome analog equipment, can move up a gear and join the fast lane of digital traffic technology.

The ability of operators to work comfortably and efficiently was very much at the heart of ADOT's efforts, says Reza Karimvand, assistant state engineer at ADOT, and their feedback proved invaluable in shaping the final design: "The new curved monitor wall allows our operators to see all the video monitors at the same time." Interestingly, a curved wall wasn't always top of ADOT's shopping list: "Our original design actually included a flat monitor wall. When we asked operators about it, they pointed out the potential strain on their necks if they had to stretch to see some monitors so we changed the design."

Another alteration was to bring the individual 55in monitors closer together. "This not only makes it easier to see them, but to also combine them for larger images," says Karimvand. Ease of

The curved screen at Arizona DOT creates a more efficient, ergonomic working environment



maintenance and resilience was also factored in, he explains, so a small degree of space was retained between the monitors on the wall: "This allows us to replace a malfunctioning monitor in five minutes without shutting down the images displayed on the other monitors."

Even plans for the work stations themselves were revised as the project progressed: "We ended up using adjustable work stations to provide more comfort for operators during their eight-hour shifts," says Karimvand. "They can be raised or lowered to enable operators to work either standing or sitting." In addition, the number of monitors operators have at their work stations increased to eight, compared with six under the previous system.

Given the success of the renovation, ADOT has been keen to pass on the lessons learned to other DOTs: "We mailed a document to many agencies across the USA," says Karimvand. He says the biggest lesson from Arizona's experience is that you simply can't take the initial design as gospel: "Creating a design using evolving technologies is not like designing a bridge that will stand in place for decades."

Turnpike transformation

One of the DOTs that was able to learn from the upgrades in Arizona is over toward the eastern seaboard. Pennsylvania Turnpike Commission (PTC) has witnessed an almost fourfold increase in the space available to manage its traffic operations thanks to a new state-of-the-art operations center that went live in June 2012, according to Dan Bretzman, who manages the facility. Bretzman contrasts the current situation with what preceded it: "When I started in 2000 there were just eight consoles; we have now jumped to about 20 console positions."

Looking in more detail at the technology being applied in the center, ITS project manager Amber Reimnitz says the way video is handled today is a real game changer for PTC: "We have a large video wall using Barco. By having our camera feeds actually come into a VidSys system enables us to multicast and view up to 44 cameras at any given moment. There are



(Left) Pennsylvania Turnpike Commission's recently upgraded TOC keeps close track of the weather as well as the traffic situation



We realized we really needed one facility in Cape Town where we could bring the police and transport sides together in one core operations area

Francois Nell, Transport for Cape Town, South Africa



currently 67 cameras on our system, but thanks to multicasting an operator can bring up a camera on their console from anywhere on the system. This is a change from what they used to have where they were stuck with what was on the screen."

Keeping an eye on the weather is vital for PTC's operators, so a weather map of Pennsylvania is prominently displayed. In addition, local TV stations can be brought up if there is an incident. Another tool that is about to come on stream is a speed map. "We are receiving probe data and that will allow our operators to monitor congestion incidents and the backlog of congestion," says Reimnitz.

Metrics matter

Jumping across the Atlantic, the Middle East is the center of huge growth, which in turn is throwing up its own traffic management challenges. The Traffic Management Center (TMC) for Abu Dhabi, the capital city of the United Arab Emirates (UAE), has implemented an AED16m (US\$4.3m) renovation to enhance its capabilities. Part of the backdrop to the re-working of the TMC is to provide extra capacity to support a AED33m (US\$8.9m) project to monitor and enhance traffic flow at 125 intersections using the SCOOT system (Split Cycle Offset Optimization Technique).

Hamad Adel Al Afeefi, acting director of the traffic management and technology division at the DOT, considers that the TMC has an important role to play to support and manage events in Abu Dhabi, citing examples ranging from Formula 1 Grand Prix to Qasr Al Hosn Festival, in coordination with strategic partners and related government and private agencies. The TMC is essential, Hamad Adel Al Afeefi feels, to assist with the prior planning and traffic management during an event. Active steps that the TMC is well placed to take include: modifying signal timings, management



and dispatch of road service and recovery patrols; communicating information to the public through the m-Darb application and social media; and coordinating with partners like the Abu Dhabi Police and Abu Dhabi Municipality.

Breaking down the barriers

Heading into the southern hemisphere, South Africa is setting the pace in enhancing traffic control operations. By any measure, the R155m (US\$14m), 68,197ft² (6,338m²) TMC situated in Goodwood, Cape Town, South Africa, has been a remarkable undertaking. When it first opened in May 2010, to coincide with the soccer World Cup, it was promoted as the first integrated traffic, public transport, safety and security management center in South Africa and, crucially, one of the first of its kind anywhere in the world.

Francois Nell manages the facility for Transport for Cape Town and was project manager during the design and build phase: "By 2004, we realized we really needed one facility here in Cape Town where we could bring the Metro Police and the transport side together and create one core operations area. One of the decisions we made from the start was to push for a core operations area where the different stakeholders sit together in one shared space, breaking down the usual silos," says Nell. "Thankfully we managed to get buy-in from the various parties." In his eyes, the beauty of the project was bringing in areas as diverse as the city's engineering, transport and traffic engineering personnel, the city's Metro Police, the provincial traffic services and even the Transport Information Center, on the public transport side.

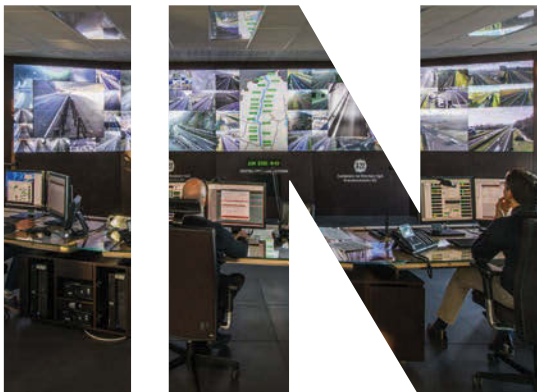
Not content to rest on his laurels, Nell is already busy with the design of the next phase of the TMC, which will start next February, with competition later in the year: "This will add another floor to



(Above and left) The extensive traffic management center in Cape Town, South Africa, was opened as part of transportation upgrades for the FIFA World Cup in 2010



Over 61000 mission critical displaywall installations.
See the bigger picture.



Where there is a need to monitor and control traffic information, Mitsubishi Electric is there.

Mitsubishi Electric display wall cubes are designed and built to meet the most demanding requirements. The Seventy Series LED cubes offer the highest performance in command and control room applications. Unique, air-cooled LED and long-life fans deliver a remarkable 100k hours of maintenance-free operation. With no expensive replacement lamps and excellent environmental credentials.

For the best command & control display solutions, look at the bigger picture — Mitsubishi Electric.

For more information on the full range of Mitsubishi display wall systems, please contact us now or visit:

www.mitsubishielectric-displaysolutions.com

CONTROL

www.mitsubishielectric-displaysolutions.com info@mitsubishielectric.nl

UK + 44 1707 278 684 | Middle East + 971 4 372 4720 | Germany + 49 2102 486 9250 | Spain & Italy + 34 935 653 118
France + 33 1 5568 5553 | Russia & CIS + 7 495 721 1043 | Benelux, Eastern Europe & Scandinavia + 31 297 282 461



Maximizing space

New technology has enabled Mississippi DOT to fit more in

The statewide Traffic Operations Center in Jackson, Mississippi, which originally opened about five years ago, has been extensively remodeled by Mississippi Department of Transportation (MDOT). A new video wall is made up of individual Christie MicroTiles. "These go together flush to the wall, which helped us to maximize the use of our limited space," explains ITS program manager Mike Stokes.

When the remodeling was being planned, nothing was left to

chance. "We even did a structural analysis to check the weight limit of the floor," remembers Stokes.

In the end, the only major issue MDOT faced was trying to keep the center operational while the refurb was happening. Thankfully, this process was simplified by the fact that the software used by MDOT is web-enabled. "We were able to simply move our operations to adjacent rooms and locations," says Stokes. "Also our statewide center is connected to our regional centers. This means

we can control all of our ITS devices from any one of the centers."

But the physical changes were not just confined to the impressive video wall. "We have new modular furniture, workstations, carpet and even paint," says Stokes, stressing that even the choice of color can make a difference to operator productivity. "We went for more earth-tone colors this time. When

traffic operations centers first started, people wanted them dark to see the video screens better, but the downside was that this made it difficult for operators to work." MDOT however was determined to take operator feedback into account. "We lightened up the colors and gave our operators more personal space," says Stokes.



the TMC and will result in internal layout changes to existing floors. The core operations area is also to increase in size with three more rows of seats." He says that when the original facility was designed, it was decided to adopt a hard outer structural shell, but a soft inner: "This means we can easily reconfigure offices and spaces based on our operational experience."

An evolutionary path in Darwin

A world away in Darwin, the capital of Australia's Northern Territory, a smaller-scale operation is underway, far removed from the multimillion dollar TMCs and TOCs spotlighted elsewhere. Brendan Joyce, senior project manager of traffic in the Department of Infrastructure, Northern Territory, shows what is possible with more limited resources.

The Northern Territory is a physically large area of more than half a million square miles – nearly twice the size of Texas – with a small population of roughly 230,000. "There are only two highways that come into the territory and they both end up

being the Stuart Highway stretching up to Darwin," says Joyce. "Even Darwin is quite small. There aren't many arterial roads, so we have quite high peak volumes."

A focal point at the traffic section's office, which is home to four people on the traffic side and five in a road operations group, says Joyce, is the video wall. This displays territory-wide information from traffic management systems like the general alarms of the SCATS (Sydney Coordinated Adaptive Traffic System), as well as CCTV camera feeds. Although the office only provides a daytime, work-day service, Joyce stresses that video staff are on call for 24/7 operations, should the need arise.

"When we started out, basically everything was just on desktop," says Joyce. "The next milestone was to put together a 'mini video wall'. This was constructed using four display units and a video card. That led us to want to invest in a proper video wall." Today there are eight wall-mounted monitors plus a video card to distribute desktop content to the video wall. "We use a high-spec PC for the video wall and certain applications," says Joyce.

Attention is now turning to the longer-term – and a graphical-based system to run a multitude of systems. "An example of this is Streams from Transmax, which is gaining traction in many of the road authorities in Australia. We use a number of discrete ITS elements, which all have individual operational applications, and we are starting to find it cumbersome. We are looking at adding not just ITS applications, but also things like our road reporting system, so all faults on the network are logged through the same system."

In conclusion, Joyce has some sage advice for smaller DOTs: "You have got to keep things simple. Complex systems are too hard to maintain and manage with available personnel and limited budgets. Use standard protocols for any communications technology you are looking to put in place and open source systems where you can."

(Below) The simple video wall at the Department of Infrastructure in Darwin, Australia, proves what can be achieved on a tight budget



Shaping the future

What becomes clear when contemplating the development and design of TOCs across the globe is the necessity for the latest technology to go hand-in-hand with the physical environment. Where the video wall is positioned, whether workstations can be adjusted, and the best way for operators to interact with their consoles, are sometimes just as important as what technology is used. With continued budgetary and management imperatives for further integration of systems, and for bringing a wider array of parties into TOCs to share costs and drive data exchange, it's also clear that the TOC revolution has only just begun. ○

VISUAL DISPLAY FOR CONTROL ROOMS

PERFECT VISUAL SOLUTIONS



DLP® Cube Series

eyevis EC Rear-Projection Cubes - The Widest Range on the Market

- Long-life LED projection technology
- Resolutions: XGA, SXGA, SXGA+, UXGA, Full HD, WUXGA and WQXGA
- Screen sizes from 50" to 100"
- Automatic colour and brightness control
- Ideal for 24/7 applications



eyevis Modular LCD Screens - The Slim Solution for Seamless Video Walls

- Screen sizes: 46" and 55"
- Full-HD resolution
- Gap active-to-active less than 4mm
- New versions with Direct-LED backlight



Video Wall Display Series



eyeLCD Series

eyevis eyeLCD Series - Professional Screens for any Application

- Full-HD LCD monitors from 42" to 90"
- High resolution monitors with Ultra-HD resolution from 31.5" to 85"
- Stable industrial design



eyevis netPIX Series - High-End Controllers for Video Walls

- Connectivity for any signal type
- Unlimited inputs and outputs
- Hardware decoding for IP video streams
- Perfectly compatible with eyevis display hardware and eyeCON® software



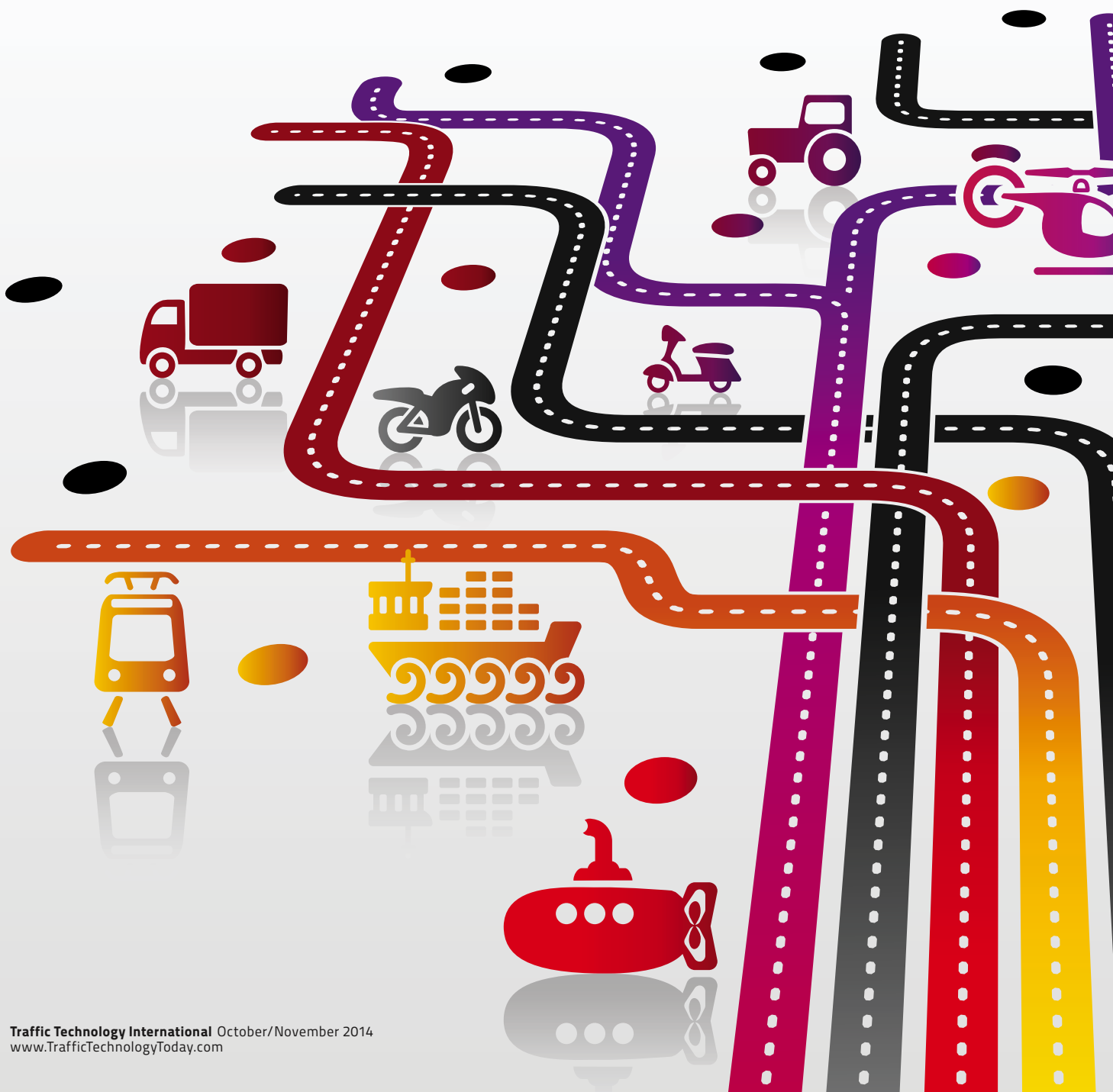

netPIX Graphics Controllers



Where to next?



What if your route guidance system not only told you how to reach your destination, but also which route you were going to enjoy most, what the weather would be like and if you'd actually be better off taking the train? **Max Glaskin** plots the path to a seamlessly connected future

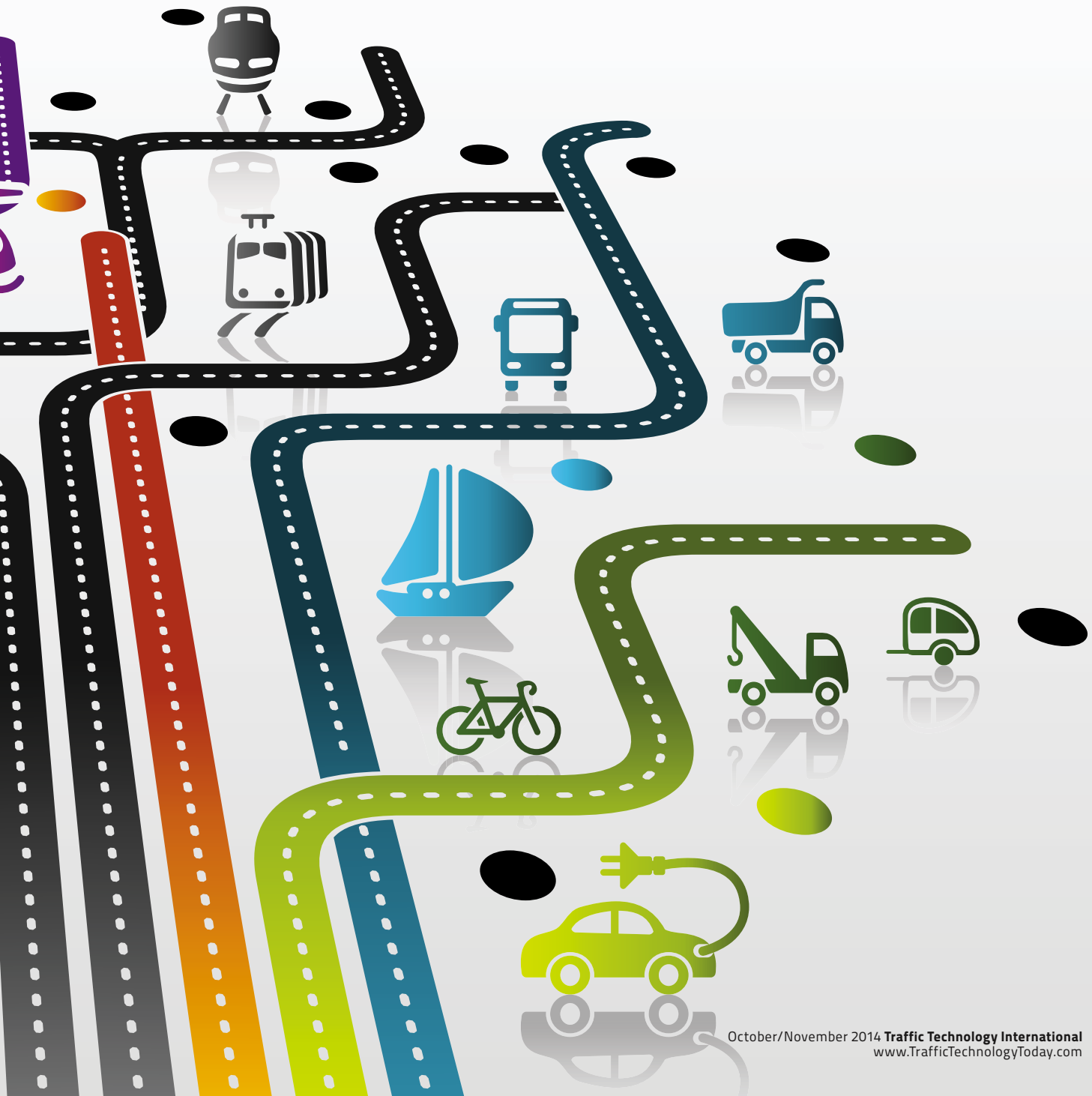


A revolution is underway in the landscape of traveler information systems. By the time it is over, predicted journey times and delays will seem like mere foothills, overshadowed by new peaks of hyper-local, hyper-mobile and hyper-personal services. Everyone interested in a journey will be able to find the routes that are not only the quickest, but also the safest, sunniest, most beautiful, least polluted, cheapest and, perhaps, with the fewest trucks. Drivers may even be told if it would be quicker for them to stop their car and use public transport.

The subterranean rumbles of change are coming from data acquirers, analyzers, network operators, transit authorities, vehicle makers, city councils, geeks and ordinary people on the move. The best traveler information should help road and transit operators

improve customer satisfaction without having to improve network infrastructure. This can save everyone money – as long as the information is useful to both the network operator and the majority of travelers. Making this happen can be tricky: it requires herding many unruly variables into the same field, but with advances in data acquisition, computing power and communications, it's getting easier.

At its simplest, traveler information tells you where you are – yet even this isn't as straightforward as it sounds. For example,





the managers of the fast-growing international destination of Dubai have been renaming the city streets, adding new signs and implementing digital address codes, so that visitors can find their location to an accuracy of one meter. Elsewhere, dynamic information can help cities maximize capacity on older streets – making spending on new roads unnecessary.

The big explosion, though, will be triggered by the sudden availability of subjective data, which will give travelers options that match many of their personal desires. Sure, it may be quick to take a freeway through an industrial zone, but wouldn't life be sweeter if the journey includes a picturesque village on a hilltop, even if it does add five minutes to the trip?

The trouble is that this kind of information has been difficult to acquire. One attempt to collect and rate some of these emotive responses is the Place Pulse project at MIT's Media Lab, which judges the beauty and safety of roads and neighborhoods. Similarly, researchers at Yahoo Labs are working on an app that can plot the most attractive route simply by analyzing pictures of the area that happen to exist already on photo-sharing sites. Criteria like these, along with air quality, noise pollution and low volumes of truck traffic, for example, could appear as filters to increase the personalization of next generation traveler information websites.

The main drive

Currently though, the primary objective of traveler information is to help plan journeys so as to avoid delays. "The current trend in roads strategy is to get as much value as possible out of the existing network. Providing timely and accurate information to road users is a key part of this," says Charlie Henderson, managing consultant at PA Consulting. "In England, the Highways Agency already collects and provides a large amount of data to the media and road users. While the Agency is responsible for only 2% by length of all roads in England, approximately one-third of all road journeys are on its network, so it is a key provider. However, the main data issue is at the local level. More than 150 local authorities look after local road networks and they collect information to different levels of granularity and provide in different formats."

Local authorities often don't have resources to improve their road networks, and while it's cheaper, collecting, analyzing and sharing information costs money, too. "The challenge is how to make best use of data that already exists in a form customers can use efficiently," says Henderson.

Understanding the purpose of journeys is fundamental and that information can be



Extreme solutions

Catastrophic events are driving change in Australia

With the city of Melbourne and the state of Victoria, Australia, severely disrupted by widespread fires in 2009, when 1,000 homes were destroyed and 173 people killed, followed by two years of flooding in 2010/2011, VicRoads is keen to get a traveler information system that steers customers around road closures.

"Traveler information is probably the most important tool we have," says Dean Zabrieszch, director of road operations at VicRoads. "With

more and more cars, I don't think we can eliminate congestion so we need to provide richer, better, quicker, more instant, more accessible travel information. If we can't solve the problems of delays, at least we've got to be able to tell our customers what the alternatives are, what the delay will be, and its cause."

Now Zabrieszch sees the main drive should be towards smarter technology to navigate round obstructions. "It's not easy because it's a dynamic environment and we want to avoid creating congestion elsewhere," he says. "Currently we have good maps and a very nimble database, but we want to go to the next step – how can we put our data together with a public transport website to give multimodal solutions?"

He hopes that by working with the likes of Here (formerly Navteq) and Intellimatics, the next-generation traveler information system will be available in two or three years.



Ranked first and second [in our survey] were expected delays and current travel times... drivers also wanted weather information, so we've added it with a tab on the online map

Bob Brydia, research scientist at Texas A&M Transportation Institute



gathered from the network users. Finding out what people need to know is increasingly important in the development of the next generation of traveler information systems. One of the most comprehensive surveys was led by Bob Brydia, research scientist at Texas A&M Transportation Institute, who was charged with finding out what information travelers wanted before and during their journeys on the I-35, as it undergoes extensive widening.

"We created an online survey for the public and asked them to rank the types of information they'd want to see on their personal devices and roadside message signs," says Brydia. "The survey had 750 responses. Ranked first and second were expected delays and current travel times between major points. Images from traffic cameras came last. They also wanted weather information, so we've added it with a tab on the online map page."



Taking the scenic route: soon your satnav will be a whole lot cleverer

Brydia didn't leave it there. He did follow up research in 2012 and 2013. "By and large, the information has a positive response of 85-90% and there are about 4,000 subscribers, a good figure for a largely rural transitional corridor," he says. The follow-up also revealed drivers wanted changes in the roadside message boards. "Instead of giving travel times to only a mile-marker or exit, they requested a town name," says Brydia.

With the aim of making the information accessible to all, Brydia decided not to publish it through an app for smartphones. Instead, it's on a website (i35-maps.tti.tamu.edu). "An app can be unwieldy so our single webpage is responsive to the device on which it's viewed," he says.

So I-35 drivers in Texas influence which information they get, but to what extent does such information influence their journey decisions? A survey of drivers in Minnesota, made for the Enterprise program, shows that knowledge of delays of 5-10 minutes prompts them to take an alternative route. In Washington state, they're more patient and re-route only for delays of 15-20 minutes.

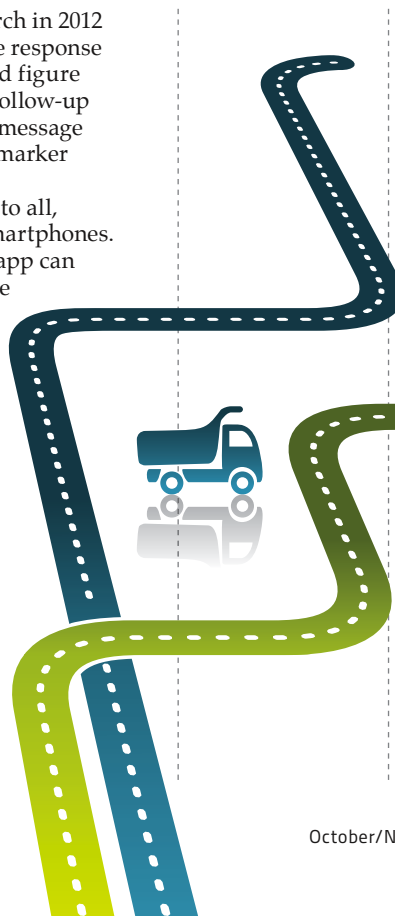
New thinking

User surveys like these, for designing next-generation traveler information, will tend to rank the quickest way from A to B highly, not only because it's the highest common denominator, but also because responders are unlikely to suggest data sets they've never been offered. For example, there are no journey planners with an option to calculate the

safest route, even though people are naturally concerned about personal safety. A recent study, published in the journal *Significance*, shows that if every car driver in the UK chose the safest route every journey, 124 road deaths could be avoided in a year.

Multimodal approach

The concept that travelers will stick to just one mode of transport for a journey is also crumbling as multimodal information becomes more available. The city of Stockholm, Sweden, is working toward giving travelers personalized information that instead of benefiting solely the individual, will help the whole city above and beyond improving traffic flow. It wants people to choose more environmentally friendly modes that require less energy and fossil fuel. It's one of the increasing number of multimodal approaches, where users are told about other modes for completing their journeys, whether they are by bus, tram, train, ride sharing, cycling or walking. The hope is that it will lead to more effective use of all of the city's transport options and place less pressure on the environment.





“They are trying to help people change their habits,” says Anna Kramers, a researcher at KTH Royal Institute of Technology’s Centre for Sustainable Communications, who has studied how a travel planner for sustainable cities should be designed. One of its foundations is to examine the purpose of the journey and, uniquely, the design offers a ‘no journey’ mode option, where the trip is made unnecessary by, for example, teleconferencing or a home shopping and delivery service.

Another difference is the idea that the traveler can check-in when they arrive at their destination to find out how other travelers have fared between the same start and end points. “They could, for example, get a message saying that other travelers who took another path with a different combination of travel modes arrived five minutes earlier, with a much lower energy use,” says Kramers.

“A Swedish startup company, Space-Time, has used the ideas to develop an application aimed for use in the new Stockholm Royal Seaport district,” says Kramers. Twelve thousand new homes will be built on the brownfield site and offices for 30,000 workers. Walking, cycling and public transport will dominate travel, and there will be fewer parking spaces than in the rest of the city, so a multimodal traveler information system will be essential.

“The problem is that people expect these apps to be free, but someone has to pay for their development and operation,” says Kramers, “Maybe if they are more personalized, that makes them more valuable and people will be prepared to pay for them.” She believes there is a need for a new business model for solutions such as these.

Kramers has plans to study how Stockholm’s congestion charge and public transport fares could be connected. By introducing dynamic pricing for different modes of travel, the traffic managers might be able to steer demand for transportation, which could lead to changes in people’s travel behavior.

Encouraging change

Next to the Stockholm Royal Seaport is the district of Kista, home to many of the city’s high-tech businesses, including the national headquarters of Ericsson, IBM and Microsoft. Conscious of increasing congestion and associated emissions, Sweden’s Innovation Agency has invested €360,000 (US\$475,000) in a competition for ITS solutions to improve commuting for the 70,000 people who work in the area. To facilitate it, the organizer has made available 40 different data sets relevant to traveler information and the 14 entries have since



Alternative routes

BMW i series: the first cars that tell you to take the train

The BMW i3 and i8 have the first in-car travel information service that is transmodal, meaning occupants can find out, in real time, if there is a quicker way to reach their destination than by driving. The electric cars use navigation provided by Inrix which, apart from providing real-time updates on traffic conditions, can give turn-by-turn directions to the nearest public transport alternative should it detect major delays for private vehicles. Currently the public transport database includes locations and departure schedules for bus and train stations in 17 countries. It also offers pedestrian routing in case the destination is within comfortable walking distance. The new feature indicates a shift among car

makers’ perceptions of their products – private vehicles are being perceived as just one way of being mobile and can’t always get occupants to their destination in the shortest time.



The city can incentivise the individual by offering them personalized rewards based on their mobility profile to change their travel behavior

Dr Marcel Bijlsma, director, Mobidot



been narrowed down to three finalists. The winning solution will be announced this autumn, to be commercialized and have the possibility of being rolled out across the entire city. It’ll soon be seen whether the winning traveler information system includes behavior-change functions.

The town of Enschede in the Netherlands is the first to offer an app specifically designed to gently nudge people to change their travel behavior, rather than simply giving them information on which to base a decision. “It works automatically in the background, tracking and tracing the journeys a person makes, to complete a mobility profile of the individual,” says Dr Marcel Bijlsma, co-founder and director at technology developer Mobidot. “Then the city can incentivise the individual by offering them personalized rewards based on their mobility profile to change their travel behavior.” The Mobidot app is a ‘white label’ product that can be built into other traveler information systems to make them not just hyper-local, but also hyper-personal.

But just how personal can most traveler information systems realistically get in the foreseeable future? And how closely will road traffic information become integrated with that of other modes? A lot depends on how much information the network operators are willing to gather and to share. Operators of high-volume highways, where altering the infrastructure is relatively expensive compared with sharing data, are more likely to find it cost effective. For cash-strapped authorities, though, it could be relatively costly, which may be why so few US transit operators make their data freely available to developers of websites and app developers. ○





HIGHWAY MONITORING & INCIDENT DETECTION



	<h2>HIGHWAYS</h2>		
<p>RADAR TRAFFIC DETECTORS</p>			

ENFORCEMENT TRAFFIC CONTROL LIGHTING CONTROL STRATEGIC DETECTION

AGD Systems Limited
 White Lion House, Gloucester Road
 Staverton, Cheltenham
 Gloucestershire, GL51 0TF, UK
T: +44 (0)1452 854212
E: sales@agd-systems.com
W: agd-systems.com





Running the reds

Can cameras stop reckless drivers running red lights? It's a question that's the subject of fierce debate in the USA. **David W Smith** gets both sides of the story and looks at other innovative ways of ensuring traffic-rule compliance at busy intersections





There have been long and sometimes bitter disagreements over the installation of red-light cameras at intersections in the USA. Both sides of the debate accuse their opponents of bias and self-interest. The pro-camera DOTs insist their detection methods greatly reduce accidents and violations. Their conviction receives support from camera operators and the conclusions of the many studies carried out by the Insurance Institute for Highway Safety (IIHS). Other DOTs, however, have abandoned cameras altogether. They say they have little effect. Firmly in the anti-camera camp, the National Motorists Association (NMA) dismisses all pro-camera studies from DOTs and lobbying groups as self-interested and worthless. It says camera programs are simply money-making scams. And so the debate rages on... Oscar Wilde's dictum that "The truth is rarely pure and never simple" could have been written for the US red-light camera debate.

The anti-camera movement has been gaining ground in recent years. NMA president Gary Biller points to recent high-profile cases that allege extensive corruption in the industry, with millions of dollars in bribes supposedly changing hands. Not

“

Drivers are not going on a kamikaze mission... [They run reds] either because their vision is impaired or there's a medical emergency

Gary Biller, National Motorists Association, USA



only that, he's keen to highlight the fact that, for the first time since red-light cameras were introduced in the 1980s, the number of communities deploying them has dropped. According to the IIHS, the number of state and local governments deploying red-light cameras fell 6% since the start of 2012, to 508 at the end of 2013.

California is the state that is leading the way in terms of abandoning cameras. So far, 68 cities and counties have ended their programs. A statistic that is all the more interesting due to the fact that not all areas gave the same reasons for discontinuing the practice. In Murrieta, the decision was based on a state legislature report of a 325% increase in rear-end collisions after cameras were installed. In Los Angeles, numerous reasons were cited: at one intersection, statistics showed an 80% increase in rear-end collisions, but there was also declining support from the courts. Violations were automatically sent to registered drivers, even though they may not have been driving the car. They were forced to protest their innocence and name the culprit. Judges also dismissed cases when pictures of drivers were blurry.



👉 | Light fantastic

In Florida, new traffic light design rules are reducing violations

Although the Florida Department of Transportation is not authorized by the State Legislature to have any red-light cameras, its municipalities and counties, as well as the Florida Department of Highway Safety and Motor Vehicles, do have authorization. To date, 677 permits have been issued for red-light cameras in Florida since 2010. Florida has introduced a series of measures aimed at reducing red-light running:

- Requiring one signal head per lane over the middle of the lane for three or more through-lanes.
- Requiring use of back plates on all signalized approaches, to improve visibility.



- Requiring use of even more visible yellow retro-reflective bordered back plates on all roadways with 45mph or greater posted speed.

- Banning diagonal span wire installations without a design exception.

- Increasing the perception/ reaction time in the Institute of Transportation Engineers'

formula from 1.0 seconds to 1.4 seconds for the yellow change interval.

- Mandating use of an all-red clearance interval with minimum 2 seconds to maximum 6 seconds.

- Installing enforcement lights at targeted signalized intersections to aid police in enforcement of red-light violations.

Life through the lens

Many states, however, persist with red-light cameras and deny claims of profiteering. The state of Pennsylvania, for example, cites an independent report claiming that its ARLE (Automated Red Light Enforcement) program reduced red-light running at operational intersections by 48% within 12 months of enforcement. The 2011 study also said that the total number of crashes declined by 24% at 10 ARLE intersections where three years of crash data were available. To date, the state has introduced cameras at 31 intersections, 28 of which are in Philadelphia.

Richard Kirkpatrick, PennDOT acting press secretary, attributed the success of Pennsylvania's program to the fact that it had been well-crafted to avoid the pitfalls that have been encountered by other states. "The vendors are paid a flat fee rather than a fee based on the number of violations, and the program cannot be used for surveillance purposes," he says. "Also, violations are associated with the vehicle rather than the driver. Most importantly, the millions of dollars collected in fines pay for safety-related enhancements to the transportation system, such as signal upgrades and improved signing."

Many studies by the IIHS provide further support for red-light cameras. Institute studies in Oxnard, California, and Fairfax, Virginia, reported reductions in red-light violation rates of about 40% after camera installations. A more recent Institute study in Arlington, Virginia, produced similar results.

Anne McCartt, senior vice president for research at IIHS, says, "In the Arlington study, violations occurring at least a half a second after the light turned red were 39% less likely than would have been expected if the cameras were not there. Violations occurring at least one second after were 48% less likely, and the odds of a violation

occurring at least 1.5 seconds into the red phase fell 86%."

McCartt says the Institute's review of international red-light camera studies concluded that cameras lowered violations by 40-50% and reduced injury crashes by 25-30%. She also pointed to the conclusions of the Cochrane Collaboration, an international public health organization, that reviewed 10 controlled studies of cameras. It concluded cameras give an estimated 13-29% reduction in all types of injury and a 24% reduction in the most serious right-angle injury crashes.

McCartt says some studies reported reduced front-into-side collisions, but an increase in rear-end crashes. A study sponsored by the FHWA of cameras in seven cities found right-angle crashes decreased by 25%, while rear-end collisions increased 15%.

However, she says that, seeing as rear-end crashes tend to be much less severe than front-into-side ones, the net effect is positive. In addition, she says that the review by the Cochrane Collaboration did not find a statistically significant change in rear-end crashes.

"We've found that in the USA, strongly enforced traffic laws work best. It was the

Taking the roundabout route

Why more imaginative road-building policies could be the best way to improve safety

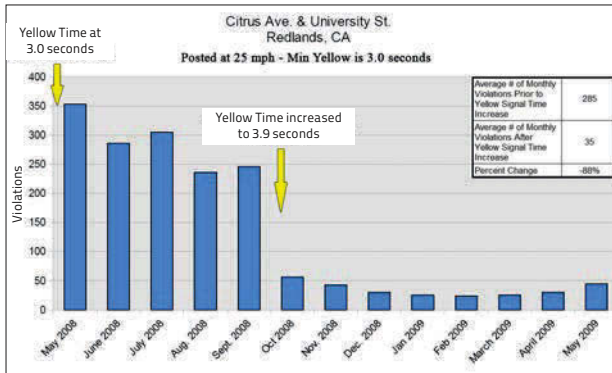
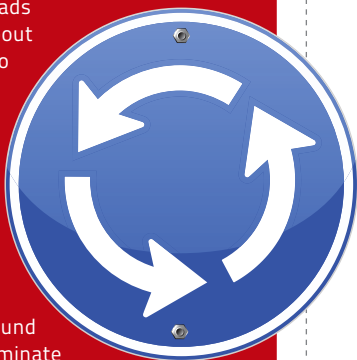
Roundabouts reduced injury crashes by 75% at intersections where stop signs or signals were previously used for traffic control, according to a study by the Insurance Institute for Highway Safety (IIHS). Studies by the IIHS and the Federal Highway Administration have shown that roundabouts typically achieve reductions of 37% in overall collisions, 75% in injury collisions, 90% in fatality collisions and 40% in pedestrian collisions.

There are several reasons why roundabouts help reduce the likelihood and severity of collisions:

Low travel speeds Drivers must slow down and yield to traffic before entering a roundabout. Speeds in the roundabout are typically between 15mph and 20mph. The few collisions that occur in roundabouts are typically minor and cause few injuries, since they occur at low speeds.

No light to beat Roundabouts are designed to promote a continuous, circular flow of traffic. Drivers need only yield to traffic before entering a roundabout; if there is no traffic in the roundabout, drivers are not required to stop. Because traffic is constantly flowing through the intersection, drivers do not have the incentive to speed up to try and 'beat the light', as they might at a traditional intersection.

One-way travel Roads entering a roundabout are gently curved to direct drivers into the intersection and help them travel counterclockwise (in the USA) around the roundabout. The curved roads and one-way travel around the roundabout eliminate the possibility for T-bone and head-on collisions.



Photographs: Wallerstock/Shutterstock



“ Longer yellow light times saw fewer violations, but when we added cameras we almost eliminated violations altogether

Anne McCartt, senior vice president for research at IIHS



same with seatbelts. Education didn't work with lots of drivers. The threat of apprehension and punishment is often needed. For me, it's a no-brainer that if you enforce red-light running fewer people will do it," she says. "We also found spillover effects, so violations tended to go down not just where the cameras were, but also at other signalized intersections."

Of course, the anti-camera movement is unimpressed with the IIHS studies. Jay Beeber, executive director of Safer Cities Los Angeles, which has had a strong influence on the course of red-light debates, says, "The IIHS is a lobbying group on behalf of the insurance industry, so can't claim to be independent. Whenever someone is ticketed they get license points and their insurance rates go up."

McCartt denies the IIHS is a lobby group and insists its research is independent and objective. "We are a non-profit research and communications organization, so we don't lobby. We are careful what we say about cameras and we don't take positions per se. But we do say the research supports the effectiveness of red-light cameras in reducing crashes and violations."

At the NMA, Gary Biller insists that the pro red-light camera argument is founded on a misunderstanding. He says the vast majority of serious accidents are caused by driver error, rather than deliberate decisions to run red lights, or 'chance it' as they are changing. "They are not going on a kamikaze mission to clear the intersection. It's either because their vision is impaired, or there's a medical emergency, or they are tired and distracted. Usually the serious roadside accidents occur two, three or four seconds into the

red, so the cameras can do nothing about that. The cameras are not dealing with the problem in useful ways," he says.

A question of timing

Jay Beeber says red-light running ceases to exist at well engineered intersections. "I've done several studies at intersections in California and increasing the yellow light by as little as 0.3 of a second reduces violations by 70-80%. If you set the yellow light at five seconds or more, it encompasses pretty much every driver," he says.

Support for Beeber's proposition comes from a 2004 Texas DOT study of police accident reports at 181 Texan intersections. The engineers noted that when the yellow interval duration is set one second longer than the Institute of Transportation Engineers' (ITE) standard formula specifies, violations decreased by 53% and crashes decreased by 40%. Meanwhile, if a second was removed from the standard ITE timing, violations jumped 110%. However, stretching yellow light times meets with some resistance from traffic engineers, who are under pressure to keep cities moving and so need lights to change quickly. "It's okay if they want to balance it so they have faster flowing traffic, but there will be more running of red lights and accidents. Just so long as they are conscious they are making that trade-off," says Beeber.

Beeber is also an opponent of ticketing for rolling right turns, arguing that they are unfairly punitive. "In the USA, you can turn right at an intersection – but only if you stop completely first. So what you get is some drivers slowing down to a crawl without coming to an absolute stop and then they get a US\$500 ticket. That's ridiculous for a slow turn that doesn't cause collisions. I did a study in LA that showed there was a one in 345,000 chance of a rolling right turn causing an accident. Yet, in LA, 75% of the tickets were for that, and in some cities it's as high as 90%. It's simply another revenue-generation device."

Another of Beeber's criticisms of the pro camera DOTs is that they assume that cameras are responsible for reductions in crashes and violations, but there could be other factors at play. He says that when a DOT introduces cameras, it often makes improvements to intersections at the same time, such as tweaking timings, or restriping roads. "The improvements are attributed to cameras,

(Top left) **Red-light enforcement cameras have become a common sight at intersections in the USA**
 (Above left) **Results from just one of the multiple studies that prove extending yellow-light times can help to reduce red-light violations**

but often collision rates were decreasing before the cameras were put in due to other factors," he says.

Alternative solutions

McCartt accepts re-engineering can help, although says it is not sufficient. "An IIHS study in Philadelphia of longer yellow light times saw fewer violations, but when we added cameras we almost eliminated violations altogether," she says.

The NMA supports several other measures to improve intersection safety, in addition to longer yellow lights. For example, it favors an all-red clearance interval. "Sometimes, even attentive drivers misjudge the time it takes to make it through an intersection. An all-red clearance interval reduces accidents," says Biller. Further NMA-supported measures include making traffic lights more visible and improving intersections by repainting, improving signs and providing advance-warning lights.

The IIHS has its own superior solution for intersections: roundabouts (see box, left). Although the Institute backs cameras, McCartt says roundabouts make much more sense. "They are safer, but unfortunately lots of DOTs don't think it's feasible in the near term to convert," she says.

Indeed, short of massive investment in rebuilding roads, traffic lights are here to stay. And while the safety debate will rage on, if DOTs want to bring red-light violators to justice, then cameras, blunt instrument though they may be, are the only viable solution. ○

Fire and ice

Timothy Compston investigates how rural ITS solutions across the globe are faring when confronted by sub-zero temperatures, damaging storm fronts, scorching climates and even volcanic activity

Illustration: Magic Torch

With DOTs around the world striving to enhance traveler information and rework dangerous accident hotspots, evermore creative ways are being found to deploy ITS. But, as technology pushes deeper into more remote locations and is exposed to more extreme conditions, greater logistical challenges – such as maintenance, and access to power and communications – must be overcome.

From the deserts of New Mexico to the snow-covered volcanoes of Iceland, engineers are developing innovative ways to not only protect their technology, but also to enable it to function more effectively. That said, DOTs don't always need to protect kit from extreme weather: there is the opportunity, in rural locations particularly, to take advantage of unimpeded access to renewables, such as wind or solar.

Kersen Naidoo, who manages ITS and tolling projects for SANRAL (the South African National Roads Agency Ltd) in KwaZulu Natal, believes that South Africa





Rural realities

Ray Starr from Minnesota DOT explains how some of the unique challenges associated with rural ITS can be overcome through innovation and collaboration



In rural areas, it can often be difficult to get utility power and alternative approaches are required. "Often when you are trying to get data, the cellular coverage isn't that good for system maintenance and monitoring," says Ray Starr, assistant state traffic engineer for ITS at Minnesota Department of Transportation (MnDOT). "If a device isn't working, it could be a while before you find out about it, whereas in a metro area you hear pretty quickly. The distances involved with rural areas also mean you might have a two-hour drive from your office to go out to fix something or to collect some logs."

So what is being done in Minnesota to keep the wheels of rural ITS solutions

“The detailed design effort to add solar included calculations to mount the panels vertically so that snow wouldn't cause problems

turning? The agency has looked at solar for some sites, but isn't completely convinced by the results – especially in the winter. "We try not to rely on solar for things that are critical because we have had some incidents where, after it snows, the solar panels don't put out power for a while," says Starr. "In a recent case, we had access to fiber communications, but we couldn't get power to run the cameras. The detailed design effort to add solar included

calculations to mount the panels vertically so that snow wouldn't cause problems."

MnDOT has also tried combining solar panels with wind turbines for more resilience in power generation, but it is still early days. "Wind and solar do complement each other well," confirms Starr. "If you get a stormy day and the sun isn't shining, there is often a good wind blowing."

In terms of communications infrastructure, Starr says there is often a trade-off in more



(Left) In South Africa high levels of solar radiation mean, in some areas, even large VMS can be operated without a traditional power source

is well placed to expand ITS capabilities beyond major urban centers as a result of its sunny climate and its communications partnerships. "Although most of our ITS deployments are on more trafficked roads, we have a not insignificant amount [15%] on national roads that pass through peri-urban and, to a lesser extent, rural areas."

Naidoo is enthusiastic about the potential for solar to address some of South Africa's rural ITS power gaps as the country is particularly well-served with this resource. "Most areas average more than 2,500 hours of sunshine per year and achieve solar radiation levels of 5.5kWh/m² per day," he explains. "The annual solar radiation average for South Africa is double that of Europe and 1.5 times that of the USA." Solar power is typically used for cameras, variable message signs and radar vehicle-detection units: "Of the three devices, it is used on variable message signs the least because the power load is much higher," says Naidoo.

In terms of communications, Naidoo believes that SANRAL is in a fortunate position. "Through various partnerships

with telecoms providers, we have access to over 4,500km of fiber-optic cable," he reveals. "A fair proportion of this infrastructure passes through less developed and rural areas that, in future, we could leverage this for communications."

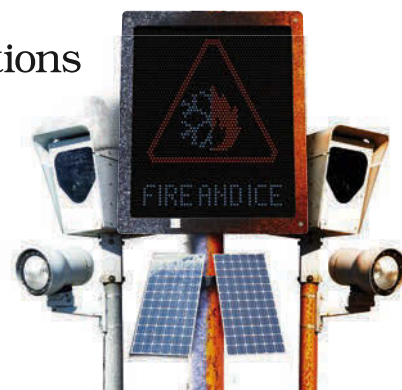
The land of fire

It's a different story in Iceland, where inclement weather regularly sweeps in off the Atlantic and the northern coastline skirts the Arctic Circle. Extreme weather challenges the country's ITS systems daily, and as if that wasn't enough, Iceland is also a hotbed of tectonic activity. The country is currently implementing measures to deal with an upsurge in volcanism on the island and ITS solutions are an integral part of the picture.

When Eyjafjallajökull erupted back in 2010, the resulting ash clouds grounded flights across a large swathe of northern and western Europe. "The eruption caused problems because it was close to our road system and there was no visibility in the local area," says Einar Pálsson, chief of technical development in the service department at the Icelandic Road Administration (ICERA). "Messages were displayed on our variable message signs but they weren't always where we needed them, so we put up temporary road signs and road blockers as well." ICERA's roadside cameras were also very much in the firing line during Eyjafjallajökull as the ash clouds sandblasted their housings, limiting the information they could offer. "You basically couldn't see very much, particularly with the prevailing wind," Pálsson recalls.

“We have selected options that allow for better management of our ITS devices in these conditions

Charles Remkes, NMDOT, USA





Clearwater 17 MILES
TRAVEL TIME 18 MIN

remote areas. "To get communications out to your site, you usually have to pay a monthly fee," he explains. "However, it might save you a long drive if you can monitor the site remotely or even reboot it if necessary." One route that is becoming increasingly popular with DOTs – and one that MnDOT is racing ahead with – is the sharing of communications infrastructure. Where it simply isn't possible to connect to its own fiber, MnDOT is investigating working with the state agency responsible for communications for schools, colleges and other entities. "This means we are able to make short runs to a college or a library or for communications through the state's network, rather than through leased lines," explains Starr.

(Above) MnDOT relies on horizontally mounted solar panels only for non-critical uses as heavy snow can inactivate them

To keep apprised of what was happening, ICERA deployed a special airplane equipped with infrared sensors and radar to see through the cloud cover. "This was very helpful during the Eyjafjallajökull eruption and is being used now to check on changes in the area of the Vatnajökull glacier," says Pálsson. ICERA is also able to tap into seismic and other monitoring data from the island's meteorological office, and works closely with the civil protection authorities, who take a coordinating role.

As this issue goes to press a low-level volcanic eruption is underway in Holuhraun, north of the Vatnajökull glacier. While so far air pollution (with sulphur dioxide) is the only major problem for the local population (on days this reaches high levels, people who feel discomfort are advised to stay indoors) experts predict the activity will continue until March next year – and it could develop further. "The area is now closed and no traffic is allowed in there," Pálsson says. "The distance [125 miles (200km)] to the shore from the glacier, means that if there was a major volcanic eruption under Vatnajökull, the water from ice melting would take 7 to 10 hours to reach the sea." One of the primary tasks for ICERA in such a scenario is to protect key bridges. "They are the most expensive part of our roads system," says Pálsson. "We would try to make weaknesses in the surrounding roads for floods to bypass the rivers and bridges."

Weathering the storm

Given its temperature range, weather conditions, varied terrain and low population density, New Mexico presents a testing workout for rural ITS solutions which, in some cases, may be situated in exposed locations. "We have to cope with pretty extreme temperature swings here in New Mexico," confirms Charles Remkes, manager of ITS operations at New Mexico Department of Transportation (NMDOT). "There is a place called Eagle Nest Lake where it drops down to -35°F (-37°C). At one point, that was the coldest temperature in the continental USA, including Alaska. For other areas I have seen temperatures soar above 115°F (46°C). It just depends on the time of year."

TRUVELO

"D-CAM"

- A digital camera platform for speed and red-light enforcement.
- Multiple speed measurement technologies available.
- Front or rear photography
- Static or mobile operation



D - CAM MR

For versatility and innovation visit the experts in "true velocity" at

Gulf Traffic
Stand G40
Dec 8 - 10th

or contact us below.
www.truvelouk.com
peter@truvelouk.com

+44 20 8847 4400

Do More with Less

ROAD WEATHER MANAGEMENT SOLUTIONS

**Rack Mount RWIS
Remote Processing Unit**



**IceSight
Non-Intrusive Road Surface Condition**



**Mobile IceSight
Road Surface Condition**



Passive Embedded



**Surface Sentinel
Surface Temperature**



ISO 9001:2008 Certified

All products are designed and manufactured in the United States at HSE's headquarters in CA.

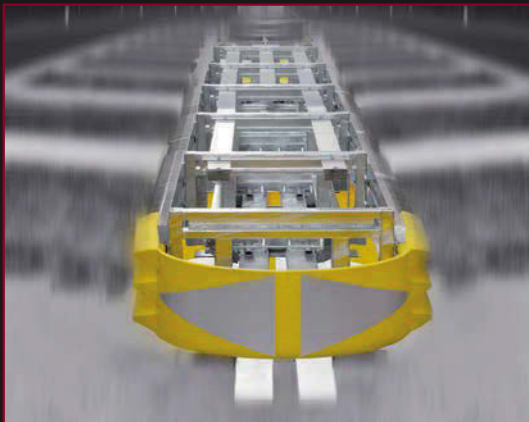


HIGH SIERRA ELECTRONICS, INC.
environmental monitoring solutions

800-275-2080 | sales@highsierraelectronics.com | www.highsierraelectronics.com



**SNOLINE
LEADERS IN INNOVATIVE SOLUTIONS THAT ARE DESIGNED TO IMPROVE AND ENHANCE ROADSIDE SAFETY.**



Snoline S.P.A. • Via F. Baracca 19/23 • 20056 Trezzo sull'Adda (MI) • Tel. +39.02909961 • Fax +39.0290996200 • www.snoline.com
Ulteriori informazioni sono a disposizione presso Snoline S.P.A. © Lindsay Transportation Solutions



By and large, Remkes reckons that the equipment New Mexico deploys is capable of handling these environmental extremes. “We have selected options that allow for better management of our ITS devices in these conditions,” he describes. “Our cameras are equipped with heating elements as well as wiper blades to deal with accumulations of snow, and where we have very high winds we have started to use concrete poles in lieu of metal poles.”

An added headache associated with strong winds in some New Mexico locations is the amount of dust. “This can interfere with the ventilation of equipment by clogging up filters, which may, in turn, lead to problems with heat sensors during the summer,” explains Remkes. “Overheated components inside produce a larger draw on power.” Given the implications for drivers on the roadway when dust storms hit, NMDOT has deployed advanced detection systems that look for the scattering of light caused by the presence of particulates in the air. The systems are tied to traveler information systems such as dynamic message signs, highway advisory radio systems (HARs), and web-based advisories to alert motorists to the presence of an intense dust storm. This early warning is critically important in New Mexico given the limited options for re-routing.

On the road to Amarillo

Heading east from New Mexico, the Amarillo District of the Texas Department of Transportation (TxDOT) serves one of the most rural parts of the state. Mike Fowler, a traffic engineer, reckons that it is “a unique spot” where Texas is concerned. “We get blizzards and sub-zero temperatures at certain times of the winter, but during the summer we will have temperatures that exceed 100°F [38°C],” he says. “We also get winds that exceed 80mph. In addition to the high winds, there is a phenomenon where there is a moderate wind of approximately 20mph that is almost continuous. This tends to create a vibration on our equipment that can turn it and even cause a build-up of static electricity.”

As a result of the conditions in Amarillo, all of the equipment deployed in the field has to be hardened to withstand testing temperatures and weather. “We put heater strips or a light bulb in our control cabinets to maintain a bit more temperature,” says Fowler. “We also have heaters in our cameras, but unfortunately these are not always adequate in blizzard-type conditions. Meanwhile, to check on the status of devices, TxDOT has access to software that enables troubleshooting from remote locations. For our cameras we have control of pan, tilt, and zoom, and we can turn the power off most of the time,” says Fowler, adding that this type of remote control is invaluable. “Getting out to



It’s not the weather that closes the roads; it’s the people who go out and get stuck or spin sideways and end up blocking the carriageway

Tracy Muno, TxDOT, USA

(Above left) A single road endures varied temperatures over the course of a year

(Above right) Roadside Weather Information Systems (RWIS) in Idaho can alert maintenance crews of extreme conditions

a rural area to physically check a device can be interesting or even impossible, depending on the weather.”

“In a bad storm, the traveling public coming to Amarillo need to know that the road is closed as far ahead as New Mexico, Colorado or Oklahoma,” adds Tracy Muno, another engineer for Amarillo District. It is imperative, he stresses, to give people the clearest possible picture of what the conditions are like. “Unfortunately, in our experience, it’s not the weather that closes the roads; it’s the people who go out and get stuck or spin sideways and end up blocking the carriageway,” says Muno. This is where he reckons ITS solutions really prove their worth. “We can pipe all the information gathered into a website to tell drivers that the road is actually closed 100 miles ahead and that they need to stay put. If they are actually out on the road, they can see warnings on our dynamic message signs.”

Crash-rate reductions

The ability to monitor the weather, especially in winter, and to respond accordingly, are key considerations for DOTs that are keen to deploy their resources to treat rural roads in a more intelligent and proactive way. As Bob Koeberlein, mobility services engineer at Idaho Transportation





Department, and his research team highlighted at the National Rural ITS Conference held in Branson, Missouri, there is growing evidence that such steps have a measurable impact on crash rates, as well as delivering all-important budget savings.

"We have been expanding our network of RWIS [Road Weather Information System] sites statewide," says Koeberlein. "The number of locations has grown markedly over the past four to five years, so we are now up to 106 sites [103 of which provide Winter Performance Reporting data] and we will soon increase that figure to 120."

Koeberlein is certainly happy about the way that the RWIS network is enabling Idaho DOT to do a better job of maintaining the state's roads. "We can treat roads more proactively now, rather than waiting for them to simply ice up and then trying to fight the ice and snow," he says. Idaho has also saved a considerable amount of money on road maintenance treatment, with winter maintenance costs reducing from US\$30m in 2011/2012 to US\$21.5m for 2013/2014. Having the RWIS sites in place also supports higher quality road condition traveler information. From his perspective, however, the real surprise has been the associated safety benefits, which have been even more pronounced than anyone was expecting. "For our research, we tried to isolate the group of new [RWIS] sites being built with 'before' and 'after' crash-rate comparisons for 33 areas," Koeberlein explains. "There has been a dramatic change in crash rates and traffic-related fatalities." Annual crashes dropped from 301 in 2010 to 147 by 2013 as more RWIS 33 sites came on-line.

Driving north

Installing RWIS stations is also reaping dividends in Alberta, Canada, a province that is home to more than four million people and covers a vast 400,000 square miles (1,000,000km²). "We can't put lots of infrastructure out there due to the lack of traffic density to justify it," says Allan Lo, ITS and traffic specialist at Alberta Transportation. "The weather also means our construction window is short compared with warmer climates."



Information exchange

Sharing data makes 511 weather information systems more versatile

Human input can prove invaluable when backed by a method of gathering, storing and sharing the information. This is something that the Wisconsin Traffic Operations and Safety Laboratory (TOPS Lab) brought to the fore when they discussed the Wisconsin 511 Winter Roads System and, specifically, a recent Management Interface Redesign at the 2014 National Rural ITS Conference.

"The main impetus for this project was that the

Wisconsin DOT was going to move over to a new 511 system by the end of May 2013," explains Steven T Parker, the principal investigator for the project and IT program manager at the TOPS Lab.

"The old system was like a 'black box,'" continues Parker. "Dispatchers would put the data in, it would go into 511 and that was the end of it. It was used for traveler information, but it was hard to get out historical data or to apply that for other purposes. The

new system is a separate TMDD (Traffic Management Dictionary Data) standard XML." Now, anyone can access the winter road-condition information and pull it into their system. "It is opened up to provide data in real time to other service providers," says Parker. "From a research point of view, we can use the same GIS that we use to locate lane closures, crashes and traffic volumes. We now have the capability to start looking at safety issues related to winter road conditions."



[Since installing RWIS] there has been a dramatic change in crash rates and traffic-related fatalities

Bob Koeberlein, Idaho Transportation Department, USA



(Above) GPS data from snowplows in Alberta, Canada, can be accessed by motorists using their 511 travel information service

RWIS, however, is proving its worth. "The sensors communicate back to a central hub, providing our maintenance contractor with information about ice and wind conditions," says Lo. "We also provide that information to our 511 traveler information system." So successful are RWIS stations that Lo expects the number of stations to reach about 130 over the next 18 months.

Lo is also excited about an associated development involving fixed automated spray technology (FAST). "We have installed this on two of our bridges," he says. "It's based on an RWIS station combined with a hydraulic station and spray disc that is embedded in the roadway. The system sprays de-icing liquid onto the surface of the road to stop ice forming. This is one step further on from the standard RWIS as it monitors actively and then does something about the situation."

Another interesting initiative, which is being geared up for a trial this winter, will involve connected snowplows. "Our 511 Alberta office is looking at using GPS to alert drivers to where snowplows are on the roadway," explains Steve Otto, director of highway operations at Alberta Transportation. "We are planning to roll this out in a test area in central Alberta."

Allan Lo adds that in order to facilitate this, all contractors who do maintenance work for the province have to have their snowplows equipped with a special locator box: "This gives us the positioning data we need," he explains.

In the next issue of *Traffic Technology International*, we will reporting on a snowplow system of this type currently in use in Michigan, which also helps to provide weather information, as well looking at other new ITS for coping with extreme conditions. ○



Road Weather Decision Maker – Meet iRWIS

Introducing iRWIS – more than a product, a best practice philosophy. iRWIS consists of intelligent roadside hardware (RWS200), making its own decisions, and sophisticated decision support software (RoadDSS™) that makes “making the call” easier and more accurate.

Learn more about how iRWIS can help you at www.vaisala.com/iRWIS



www.vaisala.com/iRWIS

VAISALA

LEARN MORE ABOUT OUR ADVERTISERS **NOW!**

Visit www.ukipme.com/info/tfm to request exclusive and rapid information about the latest technologies and services featured in this issue



FREE SERVICE!

www.ukipme.com/info/tfm

traffic
TECHNOLOGY INTERNATIONAL

United Arab Evolution

The 11th Gulf Traffic Exhibition and Conference will see global transportation industry leaders unite in Dubai, to share experiences and expertise, and discuss the future of traffic safety in the flourishing Gulf region

Fully recovered from the recent global economic crisis, the Gulf region is experiencing a period of tremendous growth. With an expanding population and a thriving economy, the need to improve the capacity and efficiency of the region's transportation network is urgent. The population surge has put a huge strain on land transportation all over the Middle East and the rapidly growing cities in the Gulf region are looking for new ways to cope with increasing volumes of traffic.

The increasing number of road users is not only putting pressure on the existing road network, it's also making safety a growing concern. "An increase in traffic is generally followed by an increase in accident rates," explains Richard Pavitt, Gulf Traffic's exhibition director. "With more vehicles on the roads, it is becoming increasingly difficult to decrease fatality statistics and to keep the main regional cities moving freely. This is one of the biggest challenges faced by Middle Eastern governance."

The Gulf region has recently committed to investing approximately US\$121.3bn in improving its land transportation infrastructure. Major road and bridge projects are already underway, or in the planning phase, in Dubai, Saudi Arabia, Qatar, Kuwait, Oman and Bahrain.

Complementing the growing number of new roads and associated infrastructure, the UAE is simultaneously investing heavily in multimodal

transportation. "This is probably the biggest visible trend at the moment, especially in the UAE," confirms Pavitt. "With the Dubai Metro recently celebrating five years in operation, numerous bus routes in action all over the country, a new tram service almost complete, innovative water taxi services, more metro lines planned and the pan-GCC Railway, public transportation has taken huge steps forward and this looks set to continue. Expo 2020 in Dubai, the FIFA 2022 World Cup in Qatar and the organic growth in the Middle East, has meant a continued reliance on cheap mass transit systems.

"It's very easy to forget that the UAE is only 43 years old," Pavitt adds. "When you consider the current landscape, it is incredible to see what has been achieved in such a short space of time. It will be exciting to see what happens in the future."

Global expertise

The 2014 Gulf Traffic Exhibition and Conference, which will take place December 8-10, 2014, at the Dubai International Exhibition Centre, will bring together leaders in the road, rail, public transport and parking industries from across the globe. The exhibition will feature a host of international suppliers showcasing new trends and technologies, offering industry insight and innovative solutions.

Fittingly, the 2014 conference program will focus on multimodality within cities, including





ENGINEERED SOLUTIONS WITHIN REACH

QATAR OFFICES

تقنيات المرور (الخليج) - قطر
TRAFFIC TECH (GULF) W.L.L.
 (+974) 44269000
 ttg@traffic-tech.com

مجمعات للأعمال المعدنية
SIGMA METAL INDUSTRIES
 (+974) 44600994
 smi@sigma-industries.com

شركة تجارة العقارات
MEGA E&M TRADING AND CONTRACTING L.L.C.
 (+974) 444162553
 mega@megaem.com

U.A.E.
 تقنيات المرور (الخليج) - أبو ظبي
TRAFFIC TECH (GULF) - ABU DHABI
 (+971) 3 767 4166
 ttg-ad@traffic-tech.com

JORDAN
 تقنيات المرور للشرق الأوسط
TRAFFIC TECH Middle East
 (+962 6) 464 6941 & 464 7326
 tme@traffic-tech.com

Atalaya' Micro

Imagsa Technologies is proud to share the launch of Atalaya' Micro V2: the most complete dual lane smart camera to face the ever-growing ITS challenges of tomorrow

All vehicles in two lanes

Real time analysis

ROADSIDE INSTALLABLE

ANPR SPEED CLASS in one box

Easy integration

10 usec precise GPS timestamp

Reflective and Non-reflective plates

HIGH DETECTION RATES

Any Speed Urban & highway

User friendly

Compact and light Sturdy and robust

270 fps Multi-exposure



“

ITS is the vital element for this movement: ‘network’ is key, and with network comes advanced technology

Richard Pavitt, exhibition director, Gulf Traffic

interconnectivity, mass transit systems integrating with traditional highways, advanced technologies and ways to keep the roads safe. The impressive line-up of conference speakers includes some well-known faces, as well as some important industry figures from emerging market countries. The bill includes Alan Bristow, director of road space management – surface transport, Transport for London (TfL); Eng Meitha Mohammed Bin Adai, CEO of Traffic & Roads Agency, Road and Transport Authority, UAE; Pieter Venter, CEO of the Global Road Safety Partnership; Sing Mong Kee, president of ITS Singapore, Land and Transport Authority, Singapore – among others.

The conference will feature successful projects from around the world – demonstrating how the right multimodal systems and management can create a safe, efficient and sustainable traffic environment. “ITS is the vital element for this movement: ‘network’ is key, and with network comes advanced technology,” says Pavitt. “Discussion will focus on all three transportation groups: private vehicles, vulnerable road users and public transport.”

Parking matters

This year, Gulf Traffic is also launching the region’s only parking-specific summit, which ties into the exhibition. This initiative is in response to the increasing global demand for parking and strong growth in the sector.

“The show grows each year and we have to innovate to keep up with what market demands,” Pavitt explains. “There are approximately seven billion people in the world, and that one in 10 has a car. That makes more than 70 million personal vehicles in the world. In the Middle East/North Africa region alone, 380 million people accommodate more than 38 million cars.”

With an estimated 30% of global traffic congestion occurring due to a lack of parking spaces, the parking management industry is forecast to grow from US\$4.19bn in 2013 to US\$7.43bn by 2018, to meet increasing demands. Gulf Traffic visitors will be able to discover more at the MENAPA (Middle East/North Africa Parking Association) Summit on December 10. The summit will

Dubai’s RTA is spending **US\$1.9bn** on transportation projects in 2014

Saudi Arabia has pledged **US\$26.9bn** to upgrade the country’s transport infrastructure

specifically focus on parking policy, projects, governance and technology within the Middle East/North Africa region.

Celebrating excellence

This year’s show also will feature the fourth Gulf Traffic Awards, on December 8. “The awards are presented at a gala dinner attended not only by the exhibitors, but also government transportation departments, consultants, contractors and other key figures in the global traffic and transport industry,” details Pavitt.

Awards will be presented in eight categories: the Green Initiative Award, the Parking Award, the ITS Project of the Year Award, the Product Innovation Award, the Road User Education Award, the Road Safety Achievement Award, the TRL Student of the Year Award, and the Personal Achievement for Road Safety Award.

“With the awards, we aim to celebrate excellence with a dose of competition and have some fun, too,” says Pavitt. “It’s a wonderful way of bringing the industry together and is always a great evening.” The future

award winners will be found among the 200 exhibitors in the exhibition hall, showcasing the latest road ITS solutions. There’s a preview of what some companies will exhibit in the next three pages.

“At Gulf Traffic, we get together to share knowledge, experiences and best practice from around the world,” says Pavitt.

“Road safety is a real concern in the Gulf region and it’s subject to continuous investment. If we can bring together, under one roof, the means to create better and safer roads, it can only be a good thing for Dubai, the UAE and the Gulf region as a whole.” ○



Picture-perfect ALPR technology

Tattile
Stand: E31

Why are the Middle East and North Africa regions investing in ITS?

The ITS market is growing rapidly in the Middle East and North Africa (MENA) as a result of the increasing volume of traffic and the requirements of some new transportation infrastructure. Huge



investments have already been made in this region and there will be more to come.

What will Tattile be showcasing at Gulf Traffic?

Visitors to our stand will be able to see and touch our complete range of ALPR cameras. We will also be on hand to guide them through the system capabilities and highlight the features targeted for the Middle East, such as our cameras that can clearly identify colors in license plates and the components that are designed to withstand temperatures above 65°C. We have also designed products that are protected from sand.

Will you reveal anything new at the show?

We will proudly unveil a mobile device that has a 2MP sensor embedded into it. It will be able to provide full HD images.

What trends are you noticing in your sector of the traffic industry?

We're currently witnessing an increasing demand for ALPR systems that provide for a high level of security – and, in particular, mobile solutions for the police and military. Authorities want flexibility – movable devices for temporary installation.

In addition, tolling is becoming an increasingly



popular way to fund road maintenance and construction. Tattile is working on a number of tolling projects at present.

*Massimiliano Cominelli,
key account manager*

In Qatar,
US\$17bn
worth of road projects
are in progress

Developments in VMS sustainability

Yaham Optoelectronics
Stand: D01

“ITS plays an important role in reducing congestion and optimizing traffic



management,” says Sean Chow, general manager of the traffic VMS division at Yaham. “As variable message signs (VMS) are one of the most explicit means of distributing transport

information to public, they are a form of ITS with good prospects for development.” Yaham is committed to delivering reliable, cutting-edge and energy-efficient products, and responsive services. For the traffic VMS, 60% of the screen is black in operation and Yaham's OT (Optical Tile) series module is designed to reduce energy consumption by 74.5%, compared with standard versions. Moreover, with a lens design based on optics theory, the luminance is four times higher than that of ordinary VMS with the same power consumption.

Yaham's VMS modules comply with the EN12966 standard and can operate



with a control system complying with NTCIP.

While Yaham's products are already in operation in more than 40 countries, the company attaches great importance to the Middle East and will be showing its latest products, including its VMS-OT series traffic signs, at Gulf Traffic 2014.

Weighty matters

Kistler

Stand: H40

What's in store for visitors to your stand?

We will present our weigh-in-motion equipment, covering traffic data collection, weight enforcement and weight-based toll collection. Visitors will see our Lineas WIM sensors, which are in use around the world. At this year's show, our new WIM datalogger will be launched for the Middle East.

What can you tell us about the new WIM datalogger?

It has been developed to interface Lineas WIM sensors and to provide highly accurate vehicle weight data. It can be easily integrated into any overall solution. The Lineas WIM datalogger is able to process a wide variety of traffic data. It offers a high weighing accuracy, with a wide measuring range, from low to high speed.

Why is it important to collect vehicle weight data?

Transportation departments need to understand traffic



loading in order to better design new roads and plan maintenance activities. There's also a need to detect overloaded vehicles to protect road infrastructure and increase traffic safety.

What are you currently working on?

We're focusing on automatic enforcement, where overloaded vehicles are detected and prosecuted automatically using WIM systems. We recently installed and certified a new-generation WIM system in the Czech Republic and are now waiting for deployment countrywide.

David Cornu, head of business field road and traffic

Kuwait is looking to invest some **US\$9bn** in road projects over the next two years



Transportation departments need to understand traffic loading in order to better design new roads and plan maintenance

David Cornu, head of business field road and traffic, Kistler

Enforcement for safety

Truvelo

Stand: G40

Truvelo, an established worldwide supplier of approved camera-based enforcement technology, has recently introduced a range of innovative 3D detection technologies into its D-Cam platform. "Applied to one common instrument base, applications include fixed, mobile and portable sites, thus giving one learning curve and training requirement for a host of solutions," says John Harris, Truvelo business development director. "Furthermore, updating and instrument modification

comes with minimal stress, downtime and cost."

Truvelo's D-Cam has already proved successful in Brazil, southern Africa and the UK. "It is still the only formally approved camera system to offer a single frontal image for speed enforcement," says Harris. "This includes the driver's face and the vehicle license plate, as well as combined secondary speed verification (SSV), which is now demanded by most specifiers. In fact, we have recently certified a single-site digital camera system that enforces both directions simultaneously with SSV."

Truvelo currently has 1,000 speed and red light surveillance and enforcement sites in the UK, approved under the strictest testing and certification process in the world.

Visitors to Gulf Traffic 2014 are invited to find out more about Truvelo's D-Cam safety systems at the company's stand. "Having greatly contributed to highway accident reduction in several countries, we now want to bring these benefits to the MENA region," says Harris.





Intelligent radar detection

AGD Systems
Stand: H28

“As private car ownership increases, many miles of new roads are built, and vast improvements are made to existing road networks. There is widespread acceptance that innovative ITS, such as above-ground intelligent radar detection systems, are essential in developing

a smoother, safer transport infrastructure in the Middle East,” says Oliver Bain, business development manager, AGD Systems. “The MENA region is specifically looking for high-tech, modern, efficient and sustainable solutions to address traffic safety, manage and control traffic flow, tackle congestion and ensure compliance with the rules of the road.”



AGD Systems will be showcasing its advanced FMCW intelligent radar detection systems at this year’s Gulf Traffic. The company’s state-of-the-art radar detection systems already play a key role in the UK Highways Agency’s HADECS3 system for managing traffic flow on the

country’s highway network. As a result of their success here, AGD’s enforcement radars have recently been accredited with UK Home Office Type Approval (HOTA) – the toughest standard in the world.

AGD’s 344 enforcement radar has also recently been deployed in the Snow Mountain Tunnel in Taiwan – the fifth-longest tunnel in the world – to ensure speed limit compliance.

Flexible enforcement

Jenoptik Traffic Solutions
Stand H30

While Jenoptik is well known for its expertise in sensor technologies, the Traffic Solutions division focuses on consulting, project planning, implementation and operation in the field of traffic safety.

“We will be showing visitors our ‘Flexibility for all’ modular system that enables road authorities to deploy core safety components in a wide variety of applications,” says Jenoptik’s Stefanie Stäglin. “A laser scanner or radar sensor is combined with the state-of-the-art SmartCamera IV in a MiniRack, which can easily be integrated to address a wide

variety of needs: stationary, in the new TraffiTower 2.0, in a vehicle, or in mobile applications using the TraffiTop or the TraffiBase container.” The MiniRack increases the number of possibilities, thereby ensuring greater efficiency and lower cost of ownership.

Modern speed enforcement systems need to be flexible to fit with new, flexible traffic regulations. “Our systems can be used for enforcement of restricted lanes, connection to a VMS, and enforcement of different speed limits based on class of vehicle, lane, time of day, and even a combination of these,” says Stäglin.



Multitasking smart cameras

Imagsa
Stand H38

What’s in store for visitors?

At our stand, visitors will find a full range of ITS video-based solutions, from speeding cameras, red light control, access control and section control, plus many other applications such as wrong-way detection and video-based classification. We’ll also be launching our new Atalaya Micro v2.0 at the show. It’s a great improvement on our initial version, with the ability to multi-task and carry out all of its functions with a high degree of accuracy.

What current industry trends are you noticing?

The most common request we get is to be able to perform several tasks at the same time. Multi-tasking traffic operations with just a few products is a growing trend.



Where have your solutions recently been adopted?

We are undertaking many new projects in India, China, Brazil, Poland and Saudi Arabia.

Why is the MENA region an important market?

The Middle East and North Africa are reference markets for many new solutions. These regions have a proactive approach to fixing ITS-related problems before they get out of hand.

Ferran Lisa Mingo, CEO

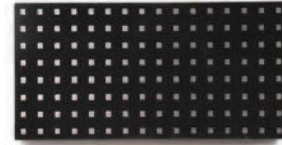
Oman and Bahrain are currently undertaking **US\$8bn** worth of transportation projects

OT Series The King of Traffic Sign—Saving Energy
P10/P16/P20/P25/P31.25

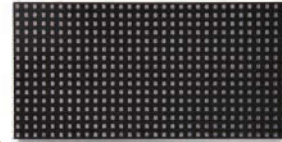
Variable Message Sign(VMS) is playing a more and more important role in modern intelligent transportation system. Yaham Optoelectronics as a **professional VMS module manufacturer** in Shenzhen, China, dedicates to developing and selling energy-saving traffic signs. OT(Optical Tile) series modules are known as the king of the traffic sign for its excellent energy-saving performance, which is a perfect choice for trailer VMS solution. All of these modules can operate with control system complying with NTCIP.

Application : Meet EN12966 Highest Optic Requirements:L3, C2, B6, R2

- VMS can be used on roadways to give travelers information about special events.
- Such signs warn of traffic congestion, accidents, incidents, roadwork zones, or speed limits on aspecific highway segment.
- VMS can also be used within parking guidance and information systems to guide drivers to available car parking spaces in urban areas.

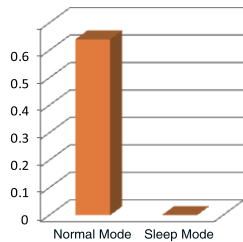


OT 20, the best seller of our VMS modules and has been applied in over 40 countries.



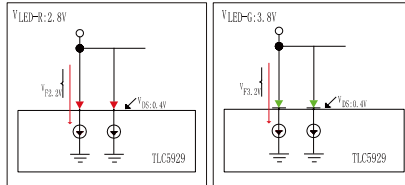
OT10, the highest density optical design VMS module in the world up to now.

Sleeping Mode

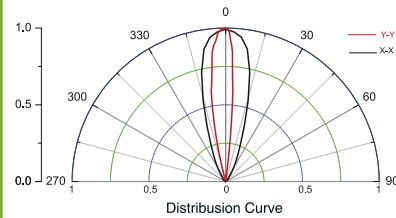


Dual Voltage Supplier on LED

Separate LED drive for Red and green respectively with voltage divider



Second Optical



Traffic Technology International
FREE APP now available!



GO TO THE APP STORE **NOW** TO
DOWNLOAD THE APP FOR YOUR TABLET



RECEIVE THE
LATEST ISSUE
WEEKS BEFORE
THE HARD COPY
IS AVAILABLE

READ
ANYWHERE,
WITHOUT
WI-FI!

DOWNLOAD NOW!

PLUS

THE LATEST NEWS & FREE MAGAZINE ARCHIVE



Detect and identify.

Get Better. With Kistler.

960-129e-10.14



Kistler Weigh-in-Motion Equipment

Detect and identify any traffic violators with the durable and accurate Kistler Lineas WIM Sensors.

www.kistler.com

KISTLER
measure. analyze. innovate.

In his last interview as president of ITS America, **Scott Belcher** reflects on a successful World Congress and identifies the key challenges for his successor

Interviewed by Tom Stone



Six years on from *TTI's* last interview with Scott Belcher, when he was just a year into his new role as ITS America president, we catch up with him again as his tenure draws to a close. His Washington DC office, just across the street from the US Department of Transportation, is normally an excellent tactical location for the president of ITS America: in close proximity to the policy drivers at the DOT and the decision makers on Capitol Hill. But back in September, Washington wasn't the center of the action for once, it was Detroit, as ITS America played host to the rest of the world at the 21st World Congress. Looking back, Belcher is immensely proud of his swansong, and as he prepares for his new role as CEO of the Telecommunications Industry Association, he's able to reflect on a job well done.

"One of the real highlights of Detroit was the fact that we made both national and international news," he says. "For me that was very important because it means we are having a discussion with the public and we're educating the public about what the opportunities are. And that's critical to developing and maintaining the support that's necessary to move forward."

One of the keys to sparking media interest was the practical demonstrations on Belle Isle and around Detroit, which provided fantastic photo opportunities for news crews. "One of my favorites was the attenuator truck," says Belcher, referring to the vehicle that moves behind highway workforces to protect them. "It was fully autonomous and responded to hand gestures, so workers don't have to get in and out of it. They can wave it along from the side of the road and stay out of harm's way. For me that's really valuable, as it's something that can drive safety right away."

On a more detailed policy level, Belcher points to the high-profile keynote speakers as another media draw. "Mary Barra talking about the leadership role GM is going to take in both connected and autonomous vehicles was very significant. We haven't

had an automotive manufacturer talking about moving forward that aggressively before. It's important if we're going to make the connected vehicle program successful in a short timeframe. I'm pretty sure that you'll soon see Ford, Toyota and Honda also making announcements, because they need to remain competitive.

"Also, having Lowell McAdam, the CEO of Verizon, there showed the evolving ecosystem that we are dealing with: it's not just our legacy players, it's now the ICT players, the telecoms players, the Silicon Valley players. And then you had Bill Ford saying we need to think about transportation and be smart about the vehicles and opportunities we create."

Far from leaving ITS behind, Belcher fully anticipates being able to forge fresh alliances between his old associates

Cooperation between ITS America, auto manufacturers and telecoms operators will grow because it's the right thing to do



happen naturally. If you start procuring and designing the RSUs [road-side units] in bulk, you can really drive the cost down dramatically. So as cities or regions start to upgrade their infrastructure, they can probably do it relatively inexpensively."

He's also hopeful that the private sector will become increasingly involved in the technology that will enable their products to function more effectively, a process that he could facilitate in his new role. "Right now with connected vehicles in the USA, we're focused on safety as opposed to mobility and I think the mobility applications are going to be what create the business opportunities. So big companies like Cisco, Verizon or IBM, or really interesting start-up companies, are going to figure something out that will make the deal worth it. They will fund the infrastructure because they'll need it."

| A day in the life

Belcher's successor can look forward to a busy schedule. From dawn till dusk, he's promoting and pushing forward advanced traffic management systems. "Today I got in at about 7:00am," he says. "My first main job was to speak to you. Then I'll be up on Capitol Hill for a couple of hours. We have a legislative roundtable, so we have

a member of the House transportation and infrastructure committee who will be talking to our members, and so we'll entertain her. And then I'll go over to the USDOT this afternoon - I've got a couple of meetings over there. And then I've got a dinner this evening. That's the kind of typical day if I'm in town. But I'm often traveling."



(Above left and right) **The Emergency Response Day at the ITS World Congress drew huge media interest** (Left) **Emergency services got the chance to test out their latest kit** (Far left) **Students were challenged to build their own vehicles in the exhibition hall**

and new ones as he moves into the telecommunications industry. "I think the cooperation between ITS America, auto manufacturers and telecoms operators will grow because it's the right thing to do and because there's not really a choice. Much of the movement forward with automobiles is all about connectivity, whether it's to the cloud, with other applications, connected vehicles or autonomous vehicles. All of these things are based on our ability to make cars part of the broader network. I think it's fascinating that some automobile manufacturers are aligning themselves with Apple and some with Android - maybe in the future you will pick your car based on the platform it serves."

Challenging times

Of course, as the ITS industry grows, the challenges it faces will become larger, too. Looking to the future, Belcher sets out some of the obstacles the new president of ITS America will have to help the industry overcome. "There are issues of privacy, security and liability," he says. "This is regardless of whether you're talking about connected vehicles or autonomous vehicles. Or if you're talking about making more data available in other ways. The more data you

make available, or the more access points you have, the greater the security issues that you have to manage."

But to get the data out there in the first place, the equipment will, of course, have to be built and financed. One of the biggest challenges for Belcher's yet-to-be-named successor will be funding. "Funds are declining," says Belcher. "That makes things difficult. While there will be some early adopters who will continue to move forward with technology, there are many states, many cities, many counties and many transit organizations in the USA that are not sufficiently sophisticated, or that don't have the internal capacity, or that don't have the wherewithal to consider technology - they don't have the funding. What we're starting to see in the USA is that many states, cities and counties are passing their own legislation to increase taxes and to increase funding to support transportation."

With automobile manufacturers increasingly involved in ITS, onboard systems have taken some of the cost burden off public bodies. However, there is a growing need for new roadside equipment, and infrastructure is one of the biggest funding problems. Nevertheless, Belcher is optimistic: "Some of it will

ITS comes of age

Whoever takes over from Belcher will be taking charge of the organization at one of the most exciting times in its history. "ITS America will continue to work with the DOTs and the transportation industry on moving connected vehicles forward," says Belcher. "Part of the job will be to really serve the early adopters: cities, states and regions that want to take risks.

"Another priority will be to continue to promote and serve the shared use, or sharing economy. I think the companies that are offering car-share and ride-share and bike-share schemes, and giving people better transportation options, are really part of the future and ITS America will be part of that. Data is also going to be critically important, too. We are just at the beginning stages of figuring out how to use it in the transportation space and so that's an area where ITS America can help."

It's a pretty packed agenda, but Belcher is bullish about prospects. "One of the successes of Detroit was that the North American automobile industry wanted to remind the world it's still one of the centers of research and technology. The industry also wanted to show Silicon Valley that they want to be leading this space." Indeed with the USA set to be the first and only place in the world to require connected vehicle technology, it does appear that ITS will soon come of age, and ITS America could be throwing the party.

As he begins to tidy his desk and wind down his role, Belcher is nevertheless hoping for an invitation back. "I'm looking forward to continuing to work with ITS America to strengthen collaboration between the transportation, automotive and telecommunication industries," he says. It's not farewell to Scott, but *au revoir*. ◯



High-Performance IMAGING SOLUTIONS for Your Transportation Needs



USB 3.0, USB 2.0, GigE

LUMENERA TRANSPORTATION CAMERAS

Lumenera offers a wide range of cameras specifically designed for advanced transportation systems. Choose from over 1,250 off the shelf board-level and enclosed cameras. Tailor our flexible products to meet your specific needs, or fully customise your own product to fit your design requirements.

Automated Tolling • Safety • Monitoring • LPR • Speed / Red Light / HOT Enforcement • Parking Access



MEET US AT VISION

Stuttgart | November 4-6, 2014 | Hall 1-F, Stand 79

Contact us today to determine how you can benefit from Lumenera's high-performance cameras.

www.lumenera.com



Optimized traffic control and safety operations in Glasgow

This year has been an exciting one for Glasgow, Scotland's largest city. In addition to hosting the Commonwealth Games in July, the city – the fourth largest in the UK – hosted three 60,000-capacity open-air concerts during BBC Radio 1's Big Weekend, and is also home to the 20th MTV Europe Music Awards (EMA) in November.

How does the city's infrastructure cope with the influx of thousands of visitors to its major events, in addition to more than 600,000 residents? It is certainly helped by the new, multimillion-pound Glasgow Operations Centre (GOC).

The facility brings together teams from Community Safety Glasgow's (CSG) CCTV operation, and Traffcom – the Glasgow City Council team that monitors the city's road network, including traffic lights and cameras.

"This facility houses our city's entire network of traffic cameras and public-space CCTV," said Gordon Matheson, the leader of Glasgow City Council, at the center's opening in February 2014. "It will enable us to keep the city running and keep people safe. Having both teams working together and operating under the same roof provides access to more information and more intelligence, and quicker identification of incidents on our roads. Glasgow will be open for business during the Games, but it will not be business as usual, and the opening of this center shows we're getting ready."

More than one million tickets were sold for the Games, so the timing of the GOC was crucial.

Higher efficiency

One of the most interesting aspects of this installation is

how it brings together the different strands of CCTV, the emergency services, traffic management and environmental control.

"A key element in the operation center was to bring together various agencies and partners under one roof, all working in a more seamless approach, both from a traffic management and public safety point of view," says Kalim Uddin, the GOC operations manager, who was involved in the project from the start.

With the facilities now pooled, CSG and Traffcom have joint access to the city's entire network of CCTV and traffic cameras. The council has found that the majority of Traffcom cameras (86%) are trained on areas previously not covered by CSG. Similarly, 32% of CSG's cameras now benefit Traffcom operations.

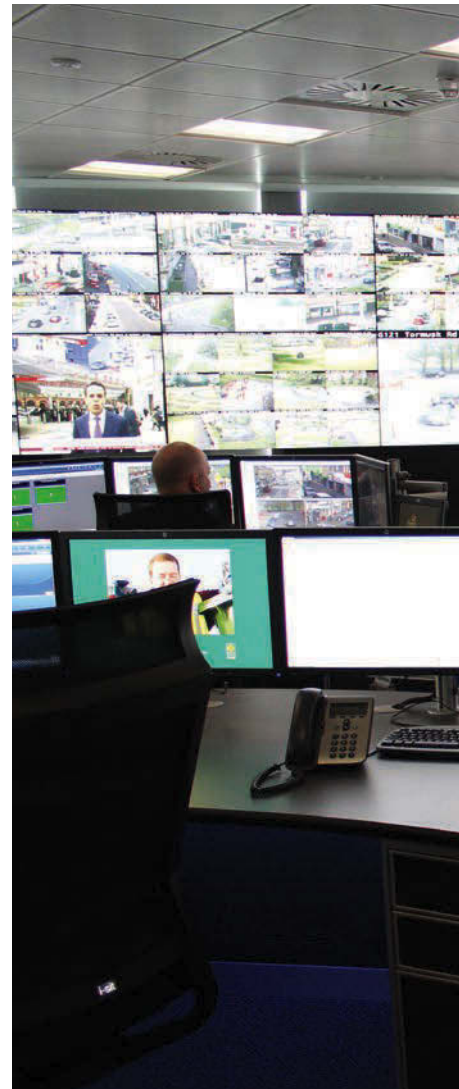
The GOC is an ongoing project that will be extended gradually. Phase one was implemented in April 2014, after only six weeks of operation. Phase two will mark the installation of upgrades to new digital cameras, new interactive mapping systems, traffic system upgrades and video analytics. Staff at CSG believe the true benefits of the center, in terms of reducing crime and anti-social behavior, will be seen in the next phases of the project, once the new technology upgrades have been integrated.

"The new technology will give us vastly improved capabilities in the way we monitor crime," says Phil Walker, managing director of Community Safety Glasgow. "Also, from a traffic point of view, it has given us wider access to cameras and assets, which helps us reduce accidents, congestion and bottlenecks. Live

Need to know

Advanced display technologies improve surveillance at Glasgow Operations Centre

- In January 2013, Glasgow won a Future Cities competition, beating 30 other UK cities to win £24m (US\$39m) of funding
- Glasgow City Council demonstrated its ability to integrate transport, communications and other infrastructure to improve the city's economy and quality of life, and reduce environmental impact better than anywhere else in Britain. The GOC is a part of that program



(Above) Eyevis NetPix graphics controllers and NetPix IPD32 IP decoder boards

images, live monitoring and live incident management will help us become more proactive rather than reactive. We look forward to the continued development of the operations center in order to fully benefit from the superior functionality of the new systems."

Flexible installation

The GOC is home to 85 Eyevis 55in displays (in a range of



(Left) The GSC's video wall provides a detailed view of the city

screwed to the wall. Every video wall in the installation sits on specially modified peerless carts.

The difficulty was that the entire video wall wasn't high enough to be completely visible when the operator is seated. SSUK had to detach the top section of the bracket from the back of the cart and get it duplicated in a fabrication store; it was then welded back onto the cart to make it 2ft taller.

The real muscle of the operation is handled next door to the GOC in the server room, where 11 Eyevis Netpix 4800 series video-wall controllers, incorporating 65 daisy-chained IPD32 decoders, sit in racks. Each one is capable of managing 32 D1 (720x576 resolution) IP streams, which gives the GOC the ability to handle up to 2,100 feeds at once.

This technology enables Glasgow to approach major events with confidence. "For the Commonwealth Games, we required a CCTV control room that is a leader in its class in terms of what it can provide," adds Walker. "Glasgow was going to be in the limelight, so we wanted the operations center to reflect the city in terms of where it's been and where it's going. The operations center technology is a big part of that." ○

different video-wall configurations) and 11 video-wall controllers, which show live streams from 440 CCTV cameras currently deployed around the city center.

Eyevis UK was one of the video-wall manufacturers involved with the project consultant, IBI, at the outset of the project more than two years ago. The initial discussions between the manufacturer

and the consultant centered on how they could build a control room that could handle thousands of IP streams.

"When the client came to us originally and we started the design and planning work, the building plans only had space for one 19in rack unit," recalls Alex Adleigh, sales director from integrator SSUK. "However, a suitable environmentally controlled

equipment room was created to house the required multiple 19in racks."

Additionally, the architecture of the new control center had to be considered. The GOC is housed in a modern office building, built in 2012. This had ramifications for the video-wall installation because the level of the building that houses the GOC has glass walls, which meant the screens couldn't be



Free reader inquiry service

Eyevis inquiry no. 501
To learn more about this advertiser, please visit: www.ukipme.com/info/tfm

Does machine vision require standards to meet ITS demands?

In recent years, the number of ITS cameras being deployed worldwide has increased exponentially – a trend that will only continue. There are several reasons why the use of ITS cameras has seen phenomenal growth, including reduced unit costs, better ALPR applications, an investment in tolling and other ITS applications, and to accommodate ever-present security concerns.

There has also been a realization by DOTs that a single camera enables operators to physically view road and traffic conditions, rather than relying on outdated sensors, and often proprietary software.

A new standard

What does machine vision offer DOTs that conventional sensors have not delivered? Many currently available sensor technologies require in-road installation, or installation on custom-made infrastructure. A number of current sensor technologies also require careful initial calibration and regular recalibration in order to provide accurate and reliable data. Unfortunately, many of these technologies also have relatively low mean time between failures (MTBF), requiring expensive maintenance contracts with vendors to remain operational. In an increasingly difficult economic environment, these have been difficult to justify.

As an example, in some places in North America it is estimated that fewer than 60% of loops are operational, resulting in some DOTs either abandoning this technology, or scaling back on its reimplementation. On the other hand, DOTs can expect greater than 99% out-of-the-box operational performance with machine vision. Once the

Machine vision is used for a variety of ITS applications, such as congestion monitoring (right) and tolling (opposite)



systems are set up, many quality machine vision vendors will guarantee at least five years' MTBF. Couple this with constantly descending prices and increased functionality, and it becomes clear why machine vision is fast becoming the de facto standard for many ITS applications.

There is another factor that is also increasing the implementation of machine vision technology: a single camera coupled with increasingly comprehensive software can be used for multiple purposes. For example, tolling cameras already provide real-time ALPR information about every car passing a toll gantry; these same cameras can also provide CCTV footage in the event of an incident.

Essentially, machine vision provides a quality of data that could become the catalyst for change in how data can be

Need to know

Standardization could result in optimized functionality for traffic applications

- > Tolling cameras can also identify wrong-way running, debris in the thoroughfare and, when combined with a back-office solution, can also provide average speed over distance and volume information
- > This data can then be used in advanced traffic management systems (ATMS) to feed other systems, such as variable speed limits, lane control systems and even diversion assistance

filtered to provide information. This data can, in turn, be processed to provide actionable intelligence to operators, managers and drivers.

Limits on progress

Are DOTs able to maximize this potential, and if not, why not? The ITS world has traditionally been delivered by a small number of system integrators, delivering mainly proprietary technologies. Although some technology sectors have embraced standards and standardization, within the ITS sector these have generally been slow in being developed and even slower in being delivered. One positive example is NTCIP (National Transport Communications for ITS Protocol), which has widely been adopted by most ITS vendors. However, perhaps less successful has been the TMDD (Transport Management Data



Dictionary) standard. Although many organizations are suggesting that they are TMDD compliant, most of them are only implementing the exposed elements of the standard, meaning that they have limited, if any, opportunity to integrate with other purported TMDD standardized systems.

Unfortunately, in the world of ICM (integrated corridor management) and Smart Cities, where data has to be shared between a number of disparate systems, this can – and potentially will – become a major limiting factor for how integrated systems may become harmonized to form a smarter environment.

As the use of machine vision technology in commercial ITS applications has become more commonplace, it is now essential to introduce standards to better protect DOTs, and enable the flexibility that they require

to better control both capability and costs.

This requirement is similar to that which was observed during the PC revolution in the 1980s, when it became commonplace for home-computer users to self-assemble PCs from parts obtained from a number of suppliers, only to find that some parts were simply incompatible with others. Over time, this has led to a much more modularized and standardized approach to not only the major PC components, but also to PC peripherals.

The importance of standardization

Although data standardization has become commonplace for ITS and IP cameras in general, using H.264 compression or MPEG 4, we must also start to assess standards for peripheral devices that need to be used in harmony with machine vision

technology, such as light arrays, infrared light units and flash units. These units require pre-triggering and triggering impulses directly from the camera, and need to be configured to ensure that units are fully synchronized with not only the camera frame rate, but also the ITS controller.

It is proposed that a standards-based approach for ITS machine vision applications is not entirely dissimilar to that which we experienced in the 1980s, and would substantially assist not only the DOTs but also peripheral manufacturers and camera manufacturers, providing an opportunity to maximize capability within this industry, and offering a win-win for all those involved. In theory, this could also simplify firmware, enabling easier and potentially automated set-up as new cameras are installed into an existing environment.

A call to action

Allied Vision Technologies is proposing that an all-inclusive forum be set up to aid the development of standards aimed at delivering platform-based technologies, in order to provide optimized solutions integration opportunities for DOTs. The objective is to set up a secure forum where requirements can be freely discussed, along with opportunities and limitations, to develop a set of standards not only fit for today, but also flexible enough to adapt to the changing needs of our industry, and provide solutions that meet the market needs. ○

@ Free reader inquiry service

Allied Vision inquiry no. 502
To learn more about this advertiser, please visit: www.ukipme.com/info/tfm

A new direction for traffic control room displays

In ITS circles, the decreasing cost of IP-connected devices, such as cameras, has generally been welcomed as a step forward. But while the lower cost of deployment has made enhanced data acquisition more practical, it has created a knock-on effect by increasing demands on control room infrastructure and operators. Systems engineers often find it challenging to balance the technical capabilities of their display systems with cost.

Until recently, the display choices for control room designers were fairly limited. At the high end of the scale, DLP-based rear-projection display walls deliver graphics, video and other data sources in pin-sharp resolution across a seamless display surface measuring many meters across; and at the other end, LCD panels are used singly or in groups. The former are more typically found in purpose-built control rooms, where 24-hour operation is a necessity; the latter, in more compact surroundings, often intended for non-continuous usage, such as crisis suites.

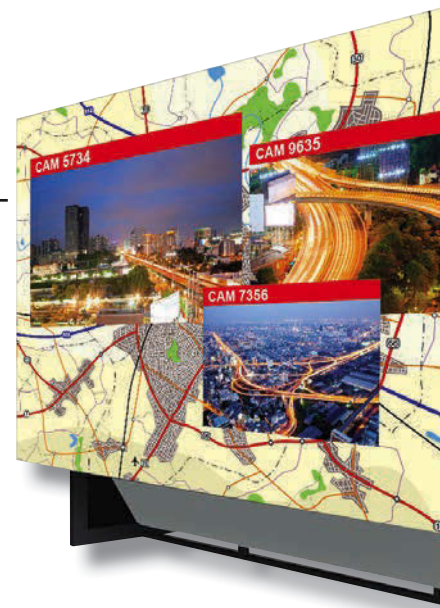
Happy mediums

One of the challenges faced in recent years by display manufacturers has been to try and bridge the performance gap between the high-end solution and more cost-effective approaches where the highest specification performance may not be required. A good example is the development of LCD displays, which has reduced the bezel size to just a few millimeters, enabling multiscreen displays to be created that mimic the effect of a conventional control room screen. The latest generation of LCD panels designed for this purpose offer many advantages.



New technology is bridging the gap between DLP (above) and LCD (left) control room displays

(Above right) **Mitsubishi's new slim DLP projection cube**



particularly where content runs across the gaps – a problem that will inevitably arise as more data sources are added.

Simplicity is key

The most recent developments have been toward a practical, true 24/7 seamless display alternative to LCD. At Mitsubishi Electric this has resulted in a new product line, known colloquially as the 'slim cube'. This slim version of the company's existing DLP projection cube range is designed to fit into spaces – and budgets – where conventional cubes would be impractical.

DLP cubes are optimized to display high-resolution graphics, such as those found in SCADA-type industrial process management or telecoms. In these types of graphics-based applications, screen geometry and linearity between displays are extremely important. In contrast, most traffic content displayed is CCTV, which is a lot more tolerant of minor differences in geometry between screens. By simplifying the screen adjustments in its slim cube, Mitsubishi has been able to shave a large amount off the cost – replacing the precision

Need to know

Recent developments offer an attractive alternative to complex display technologies

- While the DLP-based solution is unquestionably the technically superior one, its sophistication carries a substantial price tag with it
- LCD is a good choice from a financial perspective, but its technical limitations can often be exceeded by the demands of 21st century ITS

The Mitsubishi products, for example, feature long-life LED backlighting and much of the same advanced circuitry used in its high-end DLP screens. LCD panels are much slimmer than their DLP counterparts, which makes them useful for smaller spaces. But perhaps the biggest advantage is the cost: LCD is a far cheaper alternative to the high-specification DLP displays.

However, LCD screens are susceptible to 'image sticking' (similar to the screen burn effects seen in plasma and CRT displays), meaning that displaying static graphics for long periods of time is not recommended. Even though those screen bezels are now just a few millimeters, the black edges between the displays can prove distracting for operators,



six-axis mechanical mechanism with an electronic alternative. Likewise, by replacing the optional input cards found in its high-end systems with standard inputs and simplifying the LED projection system, there is a more appropriate balance between performance and cost. The result is a high-performance alternative to LCD for low- to mid-range projects.

Mitsubishi's answer to the increasing demands placed on control room displays is actually to simplify them rather than add more complexity. Fine-tuning the performance to match the specific requirements of ITS goes a long way to improving both operational efficiency and, as seamless displays are inherently more versatile, the long-term viability of control room facilities. As most engineers would agree, the best solution to any problem is usually the simplest one. ○



Free reader inquiry service

Mitsubishi Electric inquiry no. 503

To learn more about this advertiser, please visit: www.ukipme.com/info/tfm



james.eden@aecom.com

The transport industry has evolved since the first toll was paid and the gatekeeper turned the pike. Since that time, we have all grown independently in terms of business rules, technology and methods. Now that customers and political leaders have demanded that we build an integrated system, we'll all need to adapt and change what we do to make it all work together. We can approach this in numerous ways, but one thing we must do is look at what the future will demand.

Five years ago, most politicians didn't care about tolling or interoperability. Now, we have federal mandates and premature announcements that have pressured agencies into short-sighted agreements. Will we achieve national interoperability? And by what means? **Regional interoperability through a peer-to-peer network:** Efforts in this category have been initiated by E-ZPass, which is looking to lower its membership fees to attract the rest of the USA into its functional regional system. The southern region is working to establish an 'E-ZPass of the South' that could become another peer-to-peer network.

Regional interoperable systems will work, but as we have seen, these can be cumbersome to manage. Agreements are negotiated peer-to-peer and generally, one agency carries the cost of operating and maintaining the hub. Thus, dues are assessed in some manner to cover this

cost load. In the end, peer-to-peer networks are more costly and difficult to maintain and operate technically. **Local interoperability through a local HUB:** The HUB interoperability solution also offers a sign-up approach and furthermore offers the greatest flexibility, as technology and business rules change, and services are added.

National interoperability through the ATI Central HUB: There is also the national HUB developed by 50 US toll agency members. The ATI HUB is now ready to go, having gone through a public procurement and selection process. This system matches both license plate and transponder accounts between member agencies. The ATI HUB has integrated settlement capabilities using a major bank with a zero-sum account. Costs for this agency-owned system will be divided up among ATI HUB members. Transponders built in to vehicles and a central DMV lookup are also on the horizon.

IBTTA's driving support for national interoperability: The IBTTA Interoperability Committee has made amazing progress thanks, in part, to Tim Riley and his Business Rules Committee, for developing what could become an industry standard. But compromise is still needed in areas such as class on tag, guaranteed tolls and governance.

Tom Knucky's Tag and Reader Group has also accomplished something no one thought possible. They have shortlisted three technologies for further evaluation. But compromise is again needed. Who pays for the testing? What should it cover? How much is it to test from end to end?

This year has seen several answers to national interoperability surface. Some will enable interoperability today, but all will involve the ability to compromise and the willingness to collaborate. Everyone has to develop a common vision of the future to foresee what customers will want in 3, 5 or 10 years, but at the same time not waiting for the perfect solution.

This year has seen several answers to national interoperability surface... all will involve the ability to compromise and the willingness to collaborate

James Eden, director of tolling, Aecom, USA

An insight into the future of enforcement

As electronic toll collection (ETC)-based road user charging (RUC) schemes have increased in size and complexity to the point where they can now cover all roads and all vehicle types within a country or region, the monolithic nature of electronic back office systems has been challenged not so much by the existing technology's ability to cope, as by procurers' desire to mitigate risk by using multiple suppliers. That has led to major procurements over the past few years that have required technology developers and manufacturers to be prepared to break into their own complete solutions and supply only a part of an overall scheme, such as transaction handling, enforcement, or the roadside and in-vehicle technologies that facilitate electronic transactions.

France's Ecotaxe scheme provides an example of a recent procurement where several often-competing companies have been obliged to enable their systems to work with each other. Kapsch is one of several technology suppliers to Ecotaxe, which perhaps sets something of a trend with its multiple-sourcing procurement strategy. Furthermore, moves toward pan-European Union (EU) interoperability and the establishment of a European Electronic Toll Service (EETS) mean that future systems suppliers cannot presume to have a monopoly and must get used to having their previously complete and discrete solutions procured and used in a piecemeal fashion.

Piece by piece

All this has led Kapsch to develop a new, modular back office approach, which includes all the necessary elements of



RUC, but also means they can be separated out into the individual functions. These can then be supplied in combinations to suit customers' wishes. It also means that functions such as enforcement can be delivered as discrete packages. It is enabling the company, regarded by many solely as an RUC system supplier, to think of itself for the first time as an enforcement specialist.

There are other developments that are provoking change. These are outside the back office but are still related to the interest in countrywide RUC schemes, which by their nature look to carry out enforcement before a vehicle crosses a national boundary and revenues owed are lost.

In a national, all-roads-and-vehicles RUC scheme that uses ETC, mobile enforcement is employed. Data from vehicles' dedicated short-range communication (DSRC)

Need to know

Technological and legislative convergence could result in holistic enforcement strategies

- Kapsch Back Office is a comprehensive enforcement 'engine' that will support the vast majority of, if not all, enforcement applications
- These include toll enforcement; red light, spot and section speed control; and WIM and commercial vehicle identification/validation
- It also offers surveillance functionalities intended to increase public security
- Kapsch Back Office will accept metadata in any format, but will store it in a single, usable form

onboard units (OBUs) are read and compared with information held by the back office, and mismatches are dealt with accordingly. More recently, Kapsch has developed a vehicle-based enforcement solution that uses automatic license plate recognition (ALPR) to provide an at-the-roadside capability. The enforcement vehicle effectively acts as a mobile gantry and ALPR data is passed between the vehicle and the back office for processing in real time, enabling on-the-spot payment for missed tolls.

Further removed from the RUC systems manufacturers' influences, EU-inspired projects such as EUCARIS (the European CAR and driving license Information System) and its follow-ons/related projects, as well as safety initiatives such as eCall, are also providing a spur.

Cross-border cooperation

The sharing across several national borders of vehicle and



(Opposite) Mobile enforcement unit with integrated intelligence
(Left and inset) Kapsch's Back Office software works with modern IT and communications infrastructure

driver licensing information is a great potential facilitator of large-scale enforcement schemes. These can be tied to RUC, and Kapsch has an established record of being very successful at capturing potentially lost tolling revenues. Looking more broadly, however, the experience of operating in South Africa – where Kapsch provides managed tolling services – has proved to be enlightening. There, if a vehicle is stopped for a toll violation, then all other aspects of ownership and entitlement to drive are checked. This includes the driver's credentials, vehicle roadworthiness documents, road tax and so on.

The South African experience demonstrates how a major tolling provider is already expanding upon enforcement operations related solely to RUC. In terms of delivering a similar service elsewhere, such as in the EU, a lot depends on the right legislation being in place and on whether customers – principally public-sector organizations – are comfortable with the idea of handing over the running of

such services to a private-sector provider. With both of these criteria satisfied, however, real-world operations could follow really rather quickly.

Expanding the concept and the proposition even further, consideration has to be given to convergence. The tolling and ITS sectors have been edging ever closer to each other over the past few years as a consequence of natural progressions within both technology development (where, for instance, we are seeing the use of common technologies such as IP-based communications and, therefore, common skill sets) and procurement (where agencies have been looking to procure complete ITS solutions that combine a financing, revenue-generating or demand-management capability with transport network management capabilities).

Behind the scenes

In Kapsch's case, convergence has led to some highly targeted acquisitions. It has also resulted in the setting up of a new business unit. Kapsch Back Office, the product that underpins the enforcement offering, takes an unusual 'back office to front edge' approach that leans on the company's RUC heritage. It is technology-agnostic in terms of what can be used at the front end and, as has been demonstrated by the South African deployment, can be used to trigger mobile units and deliver a real-time enforcement capability.

In many instances, however, the existing infrastructure used for RUC can also be re-employed to enforce against offenses related to safety and traffic management. It is perfectly possible to use a scheme's

existing tolling gantries with its DSRC OBU and ALPR technologies to provide section-based speed control, for instance. There is no need to overlay additional, specialized enforcement technology.

Partnering with an RUC provider for enforcement brings major advantages in terms of diversity. Dynamic vehicle classification, including dimensions and weight, can be allied with commercial vehicle operation (CVO) applications as well as access control and 'classic' enforcement applications such as speed and red light monitoring. All of this can be done in a manner that enables seamless integration with traffic management systems from the same portfolio.

However, access across national boundaries to other countries' vehicle registers and databases will be a real game-changer. RUC providers are at a real advantage here. EETS may have had a troubled gestation but there is the political will at the European level to see it through and, in the meantime, there are a growing number of regional EETS-type agreements that are already well placed to take advantage of RUC/enforcement convergence. Kapsch's involvement in RUC places it in the vanguard of international managed services for enforcement as the concept gains recognition and acceptance, and there is a sound supporting business model that combines RUC, CVO and management of civil offenses. ○



Free reader inquiry service

Kapsch inquiry no. 504
To learn more about this advertiser, please visit: www.ukipme.com/info/tfm

Emerging trends in tolling and law enforcement operations

The scope of purchasing video identification as a service is increasing – from OCR modules with guaranteed recognition performance, to hosted video processing, possibly even encompassing manual handling. In the latter, requests for proposals need to express only the required identification performance in terms of throughput and accuracy. In effect, the technology supplier becomes a service provider, signing up to the quality attributes at hand, and arranging the automation and manual handling.

From a technological perspective, the supplier is responsible for setting up the modules required to meet the agreed quality attributes. From a commercial perspective, cost is shifted from capital expenses toward operational expenses. This means that commercially and technologically, the operator, integrator or agency can attribute development cost and risk toward its video identification supplier.

However, with this comes a new challenge. How can the supplier demonstrate that it is meeting the agreed service level agreement (SLA)? Formal audits are typically expensive and in cases where there are deviations from the requirements, it may lead to disputes about input video quality versus the accuracy of the engine.

To fully control the process and be prepared for auditing of its quality, a large part of the service concerns monitoring: providing instruments and automatic reports to measure and tune the process.

Market value

Depending on the scope, new risks in ownership, privacy and security may arise in service-

based cooperation, particularly when services are hosted in the cloud. Despite these concerns, there is a trend in all markets toward the encapsulation of video processing and sourcing it as a service.

This is particularly visible in the road-user charging and law enforcement sectors, where the continuous delivery of identification performance is key to operation. Non-optimal automation results in a dramatic increase in operational cost for manual verification. Similarly, errors in the process lead to extra cost in resolving billing complaints. Finally, leakage caused by false rejects is a major concern in tolling, as it directly results in loss of revenue.

Setting up and maintaining reliable and accurate OCR modules is a costly process, with costs that are difficult to control internally. Therefore, the integrators and agencies depend

Need to know

The adoption of video identification as a service reduces the risks for a toll operator

- Q-Free mainly delivers video and transaction-processing hosted services
- In North America and Europe, video identification is usually delivered as a processing service
- In the process toward market adoption, smaller agencies tend to implement hosted services first, followed by larger agencies



on the OCR to deliver this performance.

Guaranteed performance

Often companies purchase OCR licenses that require the supplier to sign up to recognition performance. The corresponding agreements include definitions of required automation and maximum permitted error rates, and how they will be measured. Through maintenance and measurement, the contracting supplier ensures fulfillment of the agreed specification. This is delivered through ALPR, fingerprinting software modules and business rules,

as well as maintenance and support, with software updates.

As the integrator is responsible for integration into his infrastructure, SLAs on performance will not only cover the recognition in terms of correct rate and error rate, they also prescribe the maximum and average processing time required. This is needed because the integrator is responsible for sourcing the hardware and the integration in his own workflow processing structure.

Even when the software is delivered as machine licenses, the finances often encompass operational expenses, which



(Left) Q-Free provides WVDOH with the tools to support traffic management, incident detection and video processing

responsibility of Q-Free. Based on processing data and regular probes, the company ensures that automatics stay above 97% with an error rate below 0.01%.

Processing options

To address the risk of integration, the identification service may also be delivered as a license on using a processing server. Whereas deployment and arranging hardware is the responsibility of the integrator, the content of the server and its internal architecture is provided by the technology supplier. Within the processing server, multiple ALPR engines may reside, fingerprinting may be incorporated and business rules weave the components together.

With respect to throughput, the responsibility for the supplier is limited to providing the instruments for scalability. SLAs are therefore expressed in terms of throughput of specific hardware infrastructure. Commercially, the processing server is still dealt with the same way as the single libraries. Explicitly expressing maintenance is important, but there may still be a capex component in the contract.

This is the typical strategy of large tolling agencies. Although the benefit of acquiring video identification as a service is recognized, they like to keep control of the hardware. The integrator typically establishes a local cloud and uses it to deploy the processing server.

To eliminate the risk of hardware and scalability

may vary based on the quality of services delivered. In the end, the service component breaks down into usage of the license and maintaining the license to ensure continuous performance.

Examples of guaranteed performance are typically found in tolling and law enforcement applications. Q-Free, for instance, delivers Intrada Synergy for section control on the A2 and A4 highways in the Netherlands. And whereas partner Gatsometer is responsible for the overall project, arranging the Intrada ALPR modules for identification with sufficient accuracy is the



(Left) Plates in New York and Maryland have the same LLLDDD syntax but Q-Free technology can detect the subtle font differences

With the latest developments in encryption and security, privacy and ownership aspects in agreements can actually be enforced. The same holds with possible delays caused by the transfer of images over the internet. Integrators and customers accept that these delays do not outweigh the benefit of risk reduction. The target location only needs to arrange an internet connection with sufficient bandwidth.

altogether, processing servers for image handling are also offered as hosted services. The supplier is responsible for availability and scaling the hardware and software toward meeting the traffic volumes at hand. Geographically and conceptually, there is still variation over the actual location of the hardware. The processing servers can be installed locally or hosted remotely. The latter can be affected by concerns about privacy, when handling the sensitive information dealt with in tolling and law enforcement systems. Therefore security in transportation, processing and (temporary) storage is essential for implementation.

Although a local cloud is currently the preferred option in tolling, there is a movement toward accepting more remote processing and handling. This is different in parking and mobile applications, which directly benefit from continuous availability, independent from actual location.

Agreements for hosted services cover the minimum level of automation and the required throughput of the system. Such systems are increasingly hosted in the cloud.

Full operation

For the Miami-Dade Expressway (MDX) in Florida, Q-Free has taken this even further. Following the trend of a growing scope of responsibility, the company handles video passages, from the point of receiving the license plate images, to identification of all billable transactions. Q-Free set up the video processing as well as the operations to accomplish this full identification.

SLAs for full operation services encompass maximum error rate, maximum leakage, availability, and the time to identification. Note that automation rate is outside the scope of such contracts, as this should not be visible to the operator as long as throughput requirements are met. ○



Free reader inquiry service

Q-Free inquiry no. 505
To learn more about this advertiser, please visit: www.ukipme.com/info/tfm

More data makes for better management decisions

As the level of service for maintaining roadways increases, so do the costs. Winter road maintenance currently accounts for roughly 20% of state DOT maintenance budgets in the USA; each year, state and local agencies spend more than US\$2.3bn on snow and ice control operations.¹ Agencies are finding new ways to optimize road maintenance practices. Over the past few years, many new technologies have been developed to improve the efficiency of road maintenance operations. One of the more recent solutions is mobile road condition reporting.

Mobile weather stations can be used by winter maintenance personnel to optimize salt usage and thereby reduce the cost of maintaining the roadway. Data from mobile weather sensors can also be used in post-storm analysis and performance measure indexes.

Traditionally, Road Weather Information Systems (RWIS) are deployed at strategic locations along the roadway to provide information about the atmosphere and road. These RWIS sites remain a vital tool for road maintenance practices; however, this data can be



(Above) **The Model 5435 Mobile IceSight remote surface condition sensor**
(Left) **Mobile IceSight testing in Minnesota**

supplemented by mobile weather stations. By utilizing fleet vehicles, such as pickup trucks, plows, buses and highway patrol, we can fill in the gaps in data along the roadway.

An intelligent solution

High Sierra Electronics addresses the winter road weather community's needs for mobile road monitoring



Need to know

Road weather sensors can improve the efficiency of roadway maintenance operations

- Road weather sensors provide real-time surface and atmospheric data when/where it is needed
- The sensors integrate into an existing RWIS network to fill in gaps between fixed stations. They also integrate into existing AVL and MDSS, with an open-architecture data output
- They provide flexible mounting solutions with small form factor and a 3-15ft measurement range

with the Model 5435 Mobile IceSight and the Model 5436 Mobile Surface Sentinel.

The Mobile IceSight sensor uses the same laser technology as the fixed IceSight sensor, which has been in use since 2007. The unit is mounted on a vehicle and provides the user with surface condition (dry, damp, wet, slush, snow or ice), surface grip or friction coefficient, surface temperature, ambient temperature, relative humidity and dew point.

The Mobile Surface Sentinel is a lower cost unit and provides the user with surface temperature, air temperature and relative humidity.

All data from the sensors is provided to the vehicle operator in real time with an in-cab display unit. The Mobile IceSight uses wi-fi to send data to any smart device with a standard web browser. The Mobile Surface Sentinel has a dedicated display.

Data can also be sent to central visualization software when connected to HSE's 5437

(Left) **The Model 5436 Mobile Surface Sentinel surface temperature sensor**

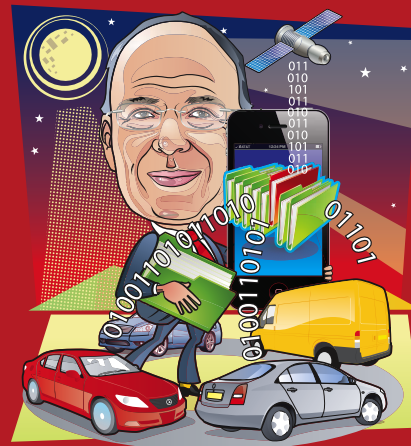


(Top) The Mobile IceSight dash display
(Above) Glance visualization software to display mobile weather data

mobile processing unit (MPU). The MPU sends data via its integrated cellular modem and uses smart data-push rules to limit data charges. The Mobile IceSight sensor also easily integrates into existing automated vehicle locator (AVL) systems.

A combination of these mobile sensors on fleet vehicles can increase productivity and reduce maintenance costs, as information is provided in real time. Mobile road weather sensors are one more tool in the DOT's toolbox, to get the information needed to make efficient decisions regarding roadway maintenance. ○

1) Highway Statistics Publications, Highway Finance Tables SF-4C and LGF-2, (1997 to 2005)



lyermack@gmail.com

The technological gap between what is available and what is used by public agencies is currently wider than at any time in my career, and that goes back quite a way. I can recall about 25 years ago standing on the Verrazano Bridge deck, mid-span, on a Friday afternoon. I had a cell phone the size of a brick to my ear and I was talking about getting some documents to my home the next day. Communication of data was not instant and we relied on first-generation cellular and overnight delivery services. I knew as I spoke on that phone that our lives were to be altered in ways that I could barely grasp. However, the point that I want to make here is that both public agencies and companies had the same access to technology.

That is not the same today, and let's be clear, the public agencies have not been able to keep up. There is a laundry list of why, which includes public procurement cycle times, public salary structures, difficulty recruiting the best technical people, and so on. I don't think that we can fix all or even some of these problems easily or quickly. Rather we need to adapt to the technical environment in which we live so that the latest advances can be applied in the public sector.

Lets talk for a moment about the 'what'. App developers are able to take public data feeds, enhance them and offer a service to the public in a few days of development time. Cheers to the agencies for making travel time – and schedule in the case of transit – data available easily and freely to developers. The downside is that publicly provided websites often provide less information and functionality than the privately provided ones.

How can agencies deal with this gap? They can hire developers and try to stay abreast of the field, but this is not going to work because the most talented developers turn out app after app in different industries and are uninterested in a life of public service. Deny the developers the data stream? That would be a disservice to the public and a Luddite approach to the current environment.

Let me suggest a third way, a way to fully engage with state-of-the-art technology and to at the same time fulfill the public mission of the transportation agencies. Provide the data free of charge to app developers, as many forward-thinking agencies already do, and require that the developers, then do not make the data stream that they offer, proprietary.

Secondly, see how to incorporate other data that the app offers back into the public agency website or app. If the agencies can't get ahead of, or even keep up with developers, they should find a way to incorporate their innovations into the public offerings. Here is a way forward that is a win-win.

The publicly provided websites often provide less information and functionality than the privately provided ones

Larry Yermack, Wendover Consult, USA



Free reader inquiry service

High Sierra Electronics
inquiry no. 506
To learn more about this advertiser, please visit: www.ukipme.com/info/tfm

Intelligent transportation for the Middle East

Inspired by the requirement to provide better transportation infrastructure in time for the FIFA 2022 World Cup, Qatar is leading the way in ITS development in the Middle East. Indeed, Qatar's Public Works Authority is currently investing US\$1bn in 32 multimillion-dollar, five-year projects covering more than 1,000km (620 miles) of roads.

Husam Musharbash, CEO of Traffic Tech, one of Qatar's leading ITS firms, believes this systematic approach is unique in the Middle East. "Qatar has developed ambitious plans for ITS architecture and standards for the whole country," he says. "Other parts of the Middle East are doing bits and pieces, but they are not planning the entire process and setting standards for the work before it begins."

Many contractors from Europe, Canada, Australia, the USA, Japan and Korea have applied for prequalification to bid on the lucrative contracts, but Musharbash believes that Traffic Tech's local advantages place it in a strong position. Since he founded the company in Amman, Jordan, 29 years ago, it has grown to become a one-stop shop for traffic solutions in the Middle East. Traffic Tech also has offices in Jordan and the UAE.

(Above center)

The modern traffic control room in Doha

(Above right) **EVPS equipment for the Doha project**
(Right) **Husam Musharbash, CEO of Traffic Tech**



Need to know

Local knowledge and ITS expertise will combine to accelerate growth in Qatar

- > Traffic Tech's Salwa Truck Weigh Stations project won the Infrastructure Project for Improving Road Safety Award at the 2011 Gulf Traffic Conference in Dubai
- > The company's Central Traffic Management System project won the Innovation in Transport Traffic Management Award at the 2009 Gulf Traffic event

"We are the only company in the region with a singular focus on ITS and we have a big advantage being headquartered in Qatar," says Musharbash. "Although dozens of foreign companies are working here, the scale of our local resources means we're able to fast-track the work, which is the name of the game with these projects. We expect to be awarded some of the work, but we've also been contacted by rival companies keen to subcontract work to us."

Proven success

Traffic Tech's reputation as a major ITS supplier was sealed this year when two of its systems jointly won the 'Most Innovative ITS Implementation' award at the 2014 ITS and Road Safety Awards. Both projects highlighted the company's capacity to deliver highly technical solutions in record time. The contracts were earned in 2013, but they were fast-tracked and the systems became fully operational in early 2014.

The first project, the Duhail over-height vehicle detection system (OVDS), includes variable message signs, CCTV surveillance, control room equipment and integration with Doha's SCATS urban traffic control system.

The second award winner was the first phase of the Doha

Emergency Vehicle Preemption System (EVPS) project, for which Traffic Tech installed equipment at 25 intersections and five roundabouts, as well as preemption transmitters on 30 emergency vehicles. Traffic Tech is bidding to complete the larger second phase, which will add 50 more intersections.

Future prospects

Despite the company's ongoing success, Musharbash says that working on Qatar's plans will take Traffic Tech's knowledge of ITS to the next level.

"By the time the ITS systems are installed across Qatar, we'll have even greater expertise," he explains. "We'll have developed superior knowledge of systems integration, as well as the assembly and manufacturing of ITS equipment. "Qatar will be our major focus for the next few years as there's so much work here, but the lessons we learn will eventually benefit other regions in the Middle East, many of which have been at war and will begin rebuilding their transport infrastructure." ○



Free reader inquiry service

Traffic Tech inquiry no. **507**
To learn more about this advertiser, please visit: www.ukipme.com/info/ttfm

The Leading Traffic & Transport Event in the Middle East



Register online for fast-track entry!
gulfttraffic.com/tti

- > 850+ new and innovative international products
- > Dedicated conference tracks focusing on road safety, multimodal transport and parking design/management
- > Free-to-attend seminar sessions on the latest technological advancements
- > Awards ceremony recognising and rewarding the best in the industry

Supported by



Knowledge Partner



Organised by



Using sensors to optimize image capture in traffic applications

With dynamic imaging conditions, design restrictions and local laws heavily impacting the way that traffic imaging systems can be designed and deployed, ITS companies are continually looking for ways to improve their technologies in order provide the best possible hit rate. Environmental conditions, for example, can impact the ability of a system to capture details in a field of view (FOV) in varying day/night conditions. It is essential that traffic and tolling systems can capture detailed images of fast-moving objects while dealing with reflections from vehicle components as the sun moves through the sky.

Twice as effective

One scenario that requires a solution beyond standard imaging is red light enforcement at night. How can authorities

Need to know

The accuracy of ITS can be improved using enhanced imaging technology

- Lumenera's Lt225 and Lt445 cameras enable high-resolution, high-speed imaging
- The Lt225 has a resolution of 2048x1024 and outputs 170fps. Halving the resolution doubles the frame rate to 340fps
- The Lt425 starts with a 2048x2048 frame size and 90fps at full resolution, with the same proportional increase in frame rate when sub-windowed



effectively capture an image of the vehicle license plate and also the face of the driver? As many license plates have strong reflective properties, the intensity of the camera flash needs to be scaled back, or timing adjusted, to ensure the details of the plate can be recognized.

However, if the camera exposure is lowered to avoid saturation and blooming, it usually results in there not being enough dynamic range to capture the face of the driver in the vehicle. The dynamic range of the sensors is limited by the depth of the pixel well capacity and the noise floor. However, there are a limited number

of sensors available that can support dual-gain amplifier configurations in the camera architecture. These enable the dynamic range to be increased up to 70dB.

Beyond this, other technologies, such as high dynamic range (HDR), can be used. HDR increases the level of detail in an image by capturing multiple pictures at different exposures or gain levels and combining them to produce an image representative of a broader tonal range. However, when capturing multiple images of moving objects, it can be a challenge to avoid ghosting.

In cases where the motion does not exceed the capabilities

of the processing software, de-ghosting algorithms can be applied to the image stack to align the objects and create a final image without any blur. Depending on the application requirements, one might require anything from two to 10 images to create an ideal HDR image, but restrictions for frame rate and exposure will likely keep the count low. One also has to consider the amount of processing power required to effectively merge the images.

Sensor sensibility

In situations where HDR might not be effective for high-speed imaging, an alternative sensor-based technology can improve



jmisener@gmail.com

I am writing this column shortly after the USDOT released its Advanced Notice of Public Rulemaking (ANPRM) for vehicle-to-vehicle (V2V) technologies. Perhaps it's the blush of excitement and the fact that I – and a host of others – have been working with V2V safety technologies since we were young. During the waning days of the National Automated Highway System Consortium (NAHSC), I participated in a workshop in Washington DC that hypothesized 'cooperative systems' – cars that communicate with one another and to roadside infrastructure wirelessly. This was to usher the larger vision of automated systems. Sound familiar? This was in the spring of 1998.

In the USA, research in this area has literally and figuratively taken the long and winding road. The program that replaced the NAHSC was the Intelligent Vehicle Initiative, which ushered in research, government guidance and nowadays deployment of advanced driver assistance systems (ADAS) in North America. As a parallel development, in 1999 the Federal Communications Commission issued a dedicated short-range communication (DSRC) Report and Order, allocating 75 MHz of free licensed spectrum, primarily for transportation safety applications, or the very V2V ANPRM we can read today.

Fast-forward through a blur of more recent developments, starting with the thousands of research reports, papers, small-scale experiments and standardization activities, and culminating with the Ann Arbor Safety Pilot. The promise of safety fueled this journey and we stand today at the threshold of contemplating mandatory use of one DSRC channel to broadcast what is termed a Basic Safety Message (BSM). The BSM is akin to a 'super sensor', providing standardized broadcast movement information for a couple hundred (or more) meters of every DSRC-equipped vehicle. Voila! Trajectory traces of any vehicle that could cause harm float in the airwaves. Very useful. Very life-saving.

Where do we go from here? Well, the ANPRM will be commented on, and rest assured there will be many comments: safety advocates will comment; privacy advocates will comment; self-driving car advocates will comment; those who advocate spectrum sharing or other uses of the DSRC channels will comment. More research will be conducted and standards will further congeal; armed with these inputs, the USDOT may issue a Notice of Public Rulemaking (NPRM). Then the cycle will repeat, but with more urgency and more intensity. Then there could be a rule, maybe in the form of a Federal Motor Vehicle Safety Standard (FMVSS), or basically that sought-after mandate.

For me, at that time, the long and winding road will have reached an end. That odyssey since the NAHSC days and those visions elucidated in 1998 – a veritable half of many careers – will have finally spawned many successful and safe journeys taken by our driving public.

We stand today at the threshold of contemplating mandatory use of one DSRC channel to broadcast what is termed a Basic Safety Message (BSM)

Jim Misener, transportation and technology consultant, USA

(Left) Advanced sensor technologies optimize ITS in challenging situations and HDR increases the level of detail in an image



the sensitivity of cameras in low-light conditions. This involves a sparse color array filter being applied to the sensors. These solutions add transparent pixels to the standard red, green and blue pixels traditionally used for color capture. The sensors with sparse filter patterns substantially increase light sensitivity. Another benefit of using image sensors with this design is that they permit end users to use faster shutter speeds to reduce motion blur when capturing moving objects.

As new imaging technologies and techniques are developed, it is important for camera manufacturers to stay at the forefront of innovation. This way, solutions providers can leverage new cameras and technology to provide higher dynamic range, higher speed, higher resolution and improved image quality, all while minimizing costs. ○



Free reader inquiry service

Lumenera inquiry no. 508
To learn more about this advertiser, please visit: www.ukipme.com/info/tfm

Applying scientific algorithms to traffic data

Detailed traffic data collection and analysis are an important part of modern traffic management. In the DACH region of Europe, the BLIDS Mobility Solution from Austria-based c.c.com has been in use for this purpose for five years. During this time, more than 1,000 of the company's sensors have been installed on highways and in urban areas.

The suite of supporting software for these sensors has already reached a mature level, and a new module has recently been developed. The vehicle travel prediction module has been designed to predict the build-up of traffic congestion, as well as its depletion.

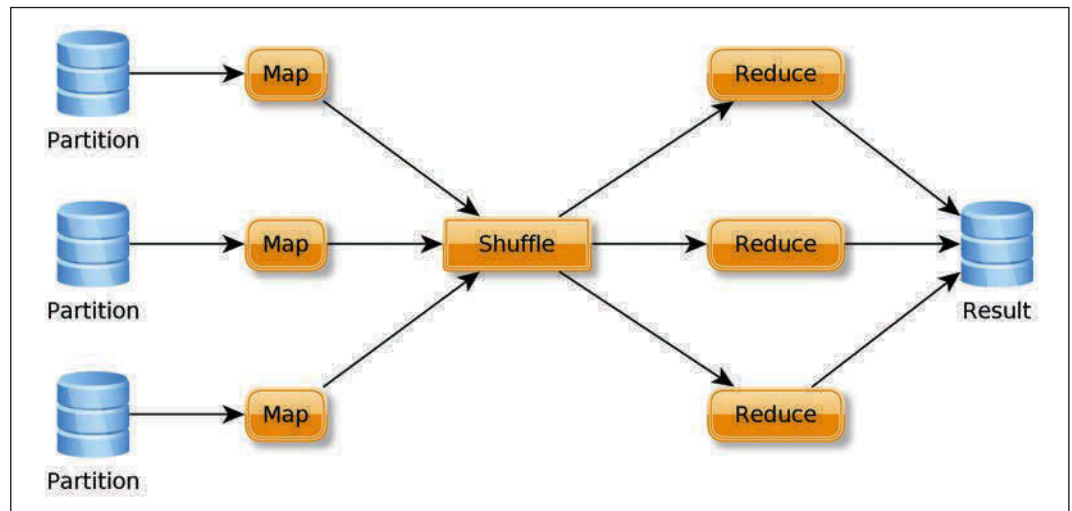
Travel time prediction, which is indispensable for traffic guidance, has become a key focus for researchers in this field. At present, travel time prediction is mainly short term, and the methods used include an artificial neural network, the Kalman filter algorithm and support vector regression (SVR). However, these methods have some shortcomings, such as high computation complexity and a slow convergence rate.

Together with leading Austrian transportation researchers, c.c.com decided to develop a solution that would exploit the learning ability of multiple kernel learning regression (MKLR) in non-linear prediction processing.

Evaluation for accuracy

The test site was a highly volatile city highway segment along the A23 in Vienna. The training data was collected between January 2013 and April 2013, and the test data between May and June 2013.

The first method tested was SVR, which, in fact, can perform well for reoccurring traffic



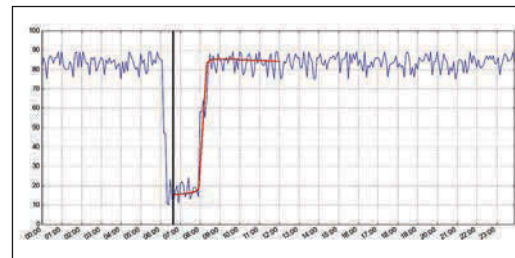
Need to know

Advanced software analytics can be used to predict traffic behavior and vehicle travel times

- > The method for vehicle travel time prediction using MKLR comprises the following steps: (1) preprocessing historical data; (2) selecting the appropriate kernel function, training the historical data and performing analysis; and (3) predicting the vehicle travel time based on the trained model

patterns (such as the morning peak), but fails to do so for sudden traffic incidents.

The second method tested was MKLR, which comprises the current vehicle velocity/density and a pattern recognition algorithm for historical data. This combination results in a useful model, which can predict both reoccurring



(Above) System for processing traffic data
(Left) Dispersion of traffic after an incident

traffic patterns and sudden traffic incidents.

The results showed that the MKLR method for predicting vehicle travel time is more accurate than the SVR method. The results also illustrated the feasibility and effectiveness of the MKLR method.

Data delivery

The biggest challenge associated with transferring evaluation results into real-world traffic systems is computational stream processing capabilities. However, with the BLIDS system, which is based on highly specialized NoSQL-databases, it was possible to create a travel time prediction module for the BLIDS Mobility Solution in a relatively short amount of time.

The BLIDS software suite now provides a complete set of traffic management support tools. The aggregation of data is in near real time as a result of the solution's stream-processing architecture, and with a series of modules, such as data webservice, an online data portal, traffic information data storage and the new vehicle travel time prediction module, it remains a very competitive solution in the area of Bluetooth-based traffic data collection and analysis. ○

 **Free reader inquiry service**

c.c.com inquiry no. 509
To learn more about this advertiser, please visit: www.ukipme.com/info/tfm

LEARN MORE ABOUT OUR ADVERTISERS **NOW!**



FREE SERVICE!

Visit www.ukipme.com/info/tfm to request exclusive and rapid information about the latest technologies and services featured in this issue

www.ukipme.com/info/tfm

traffic
TECHNOLOGYINTERNATIONAL

Intertraffic Worldwide events
the world's leading trade fairs for **infrastructure**,
traffic management, **safety** and **parking**

Upcoming events:

Intertraffic
CHINA



31 MAR - 2 APR
2015

- Ideal platform to explore the Chinese market
- 3,566 visitors from 57 countries
- 133 exhibitors from 9 countries
- Close collaboration with ITS China
- Dedicated conference programme
- High profile visiting audience

Co-organised by

TTEC

INTEX
Shanghai

Intertraffic
ISTANBUL



27.28.29 MAY
2015

- Gateway to Eurasia and the Gulf region
- 5,200+ visiting professionals from 79 countries
- 200 exhibitors from 30 countries
- Supported by the Ministry of Transport and Communication, General Directorate of Highways and Istanbul Metropolitan Municipality

Co-organised by

UBM | NTSR
UBM NTSR FUAR VE GÖSTERİ HİZMETLERİ A.Ş.

Istanbul
Expo Center

Organised by


AMSTERDAM RAI


Intertraffic® com

traffic

TECHNOLOGY INTERNATIONAL



17,389*

Readers from **100+** countries

abc

*ABC audited circulation, average net figure, Jan-Dec 2013

Gulf Traffic
Exhibition - Conference - Awards

DUBAI

GULF TRAFFIC 2014
TTI IN DUBAI!

This issue of *Traffic Technology International* will be distributed at Gulf Traffic 2014, taking place at the Dubai International Convention and Exhibition Centre, December 8-10, 2014

LATEST SUBSCRIBERS INCLUDE...

- Chris Francis, senior transportation specialist, Florida Department of Transportation (FDOT)
- Matthew Leyson, manager, department of planning, transport and infrastructure, South Australia
- James Poole, highway operations specialist, Alberta Transportation, Canada
- James Marshall, transport planner, Transport for London, UK
- Thomas Montgomery, technical expert, Ford Motor Company
- Yahaya Zurkanain, engineer, Malaysian Highway Authority
- Bjørn Nielsen, mobility planner, City of Copenhagen
- Kokila Arora, transport planner, Central Institute of Road Transport, India

SUBSCRIBE AT:
www.ukipme.com/recard/traffic.php

Next issue...

- Could your VMS be hacked? We check the security updates
- The snowplows that can be used to give weather reports
- How smart LED lighting is improving efficiency and safety
- Who needs maps when your car can make its own?
- How the latest machine vision gives a 360° traffic picture
- Connekt's Nico Anten talks smart mobility in the Netherlands

CONTACT OUR SALES TEAM TO BE INVOLVED:

Mike Robinson, publication director: mike.robinson@ukipme.com
Website: www.TrafficTechnologyToday.com

Index to Advertisers

AGD Systems Ltd,	33	Lumenera Corporation	59
Allied Vision Technologies Inc.....	3	Mitsubishi Electric Europe	25
Basler AG	11	Norbit Group AS.....	13
c.c.com GmbH	18	Ortana Elektronik AS.....	21
eyevis GmbH	27	Q-Free ASA.....	Inside Back Cover
Gulf Traffic – informa exhibitions.....	73	Tattile Srl	Inside Front Cover
High Sierra Electronics Inc.....	44	Traffic Tech (Gulf) W.L.L.	50
Imagsa Technologies SA.....	50	Traffic Technology International Online Reader Inquiry Service	47, 77
International Road Dynamics Inc.....	18	Truvelo (UK) Ltd.....	43
Intertraffic	78	Vaisala Inc.....	47
Jenoptik Robot GmbH	Outside Back Cover	Vitronic Dr.-Ing Stein.....	9
Kistler Instrumente AG	56	YAHAM Optoelectronics Co Ltd.....	55
Lindsay Corporation.....	44		

Take the shortcuts

Pushed for time? All you need is this page: a roundup of key industry statements from the last two months, and where to find out more...



"We have to be passionate advocates for safety technologies like V2V... and ultimately, fully autonomous driving. No other suite of technologies offers so much potential for good"

Mary Barra, General Motors CEO, speaking at the ITS World Congress

Read a full transcript of Barra's speech at tinyurl.com/marybarra and analysis from Scott Belcher in this issue

Page 57



"The technology is imperative for the development of self-driving cars, which will be able to automatically steer and brake to avoid collision with any object in any situation"

Anders Almevad, project manager for the Non-Hit Car Project at Volvo, which locates collision-free escape routes in case of emergency

Find out more at TrafficTechnologyToday.com/volvo



"I am concerned about 5.9 DSRC. I haven't seen any data or testing yet that confirms we can share the spectrum"

Ray Resendes, executive director of VTTI's National Capital Region Division

Page 14

"We are committed to delivering a 40% reduction in the number of KSIs by 2020"

Ben Plowden, director of strategy and planning at TfL, on upgrading London's enforcement camera network



Read more at TrafficTechnologyToday.com/londoncameras



"If we can bring together, under one roof, the means to create better and safer roads, it can only be a good thing for Dubai, the UAE and the Gulf region as a whole"

Richard Pavitt, Gulf Traffic's exhibition director

Page 48

GLOBAL REACH LOCAL PRESENCE

Q-Free - the single-source ITS expert for all ITS needs

Q-Free offers a complete range of products, solutions and professional services based on the most advanced and cost effective technologies.

- **Cooperative ITS**
- **Electronic Registration Identification**
- **Enforcement**
- **Road User Charging**
- **Traffic Management**



LEADING THE WAY

For more information visit us at:
www.q-free.com • [Twitter@QFreeASA](https://twitter.com/QFreeASA)

Traffic Solutions



Systems and services based on
expertise in enforcement technology

Flexibility for all your traffic safety needs

Jenoptik Traffic Solutions offers technological and service-oriented solutions that efficiently increase traffic safety throughout the world. We place great importance on making our systems as flexible as possible to suit your diverse and changing traffic safety needs.

That is why we have now developed a completely new solution that allows for the flexible use of a laser scanner or radar sensor plus camera system in all stationary and mobile applications. It can easily be applied in a TraffiTower 2.0, in a vehicle or on a tripod or container. This one-system approach provides you with the highest possible flexibility, cost efficiency and handling ease.

Discover our innovative approach, superior technology and extensive expertise in traffic solutions!

JENOPTIK | Traffic Solutions
info.ts@jenoptik.com
www.jenoptik.com/ts

Traffic safety with **robot** technology

OPTICAL SYSTEMS
LASERS & MATERIAL PROCESSING
INDUSTRIAL METROLOGY
TRAFFIC SOLUTIONS
DEFENSE & CIVIL SYSTEMS

