READ ALL ABOUT IT...

From tolling and enforcement to journey-time monitoring and crime-fighting, **Louise Smyth** finds out why license plate recognition technology is making headlines in the ITS arena

Illustration courtesy of Tim Ellis

With a wry nod to the fact that no matter how tough times are, innovation in the ALPR sector must not be allowed to flounder, Lawson Noble exclaims: "I wasn't aware that terrorism was suffering a recession!" CitySync's CTO freely admits that 2009 was challenging for the company, getting off to a fairly slow start in particular, although he's pleased to report that the UK ALPR specialist has just ended its financial year with a 35% increase in revenues, with sales coming from all four of its main sectors – ITS, law enforcement, security and parking.

A trend toward more hardware components in CitySync's sales has necessitated expansion, with the recent move to a new headquarters in Welwyn Garden City, Hertfordshire. "It is a 17,000ft^2 office/warehouse and workshop complex," he reveals. "The space gives us a dedicated partner training area, a large seminar room for product launches and meetings, and an all-weather IR camera test area. There is also a drive-in area for police vehicle fitting and servicing."

It's not only the UK where CitySync is noting the need for expansion. The company recently added a new technician to its US team in Houston, where Noble notes that "sales activity is defying the market conditions", as evidenced by the ever-increasing trend for red-light cameras.

In terms of product news, CitySync has seen huge demand for its Fox-i intelligent ALPR system, a product that incorporates two high-definition cameras, GPS positioning and a 3G modem. "Installations include Heathrow Airport and several police forces," he says. "But we have had one problem – we couldn't make them fast enough! So, we've now increased manufacturing and testing resources to match this demand."
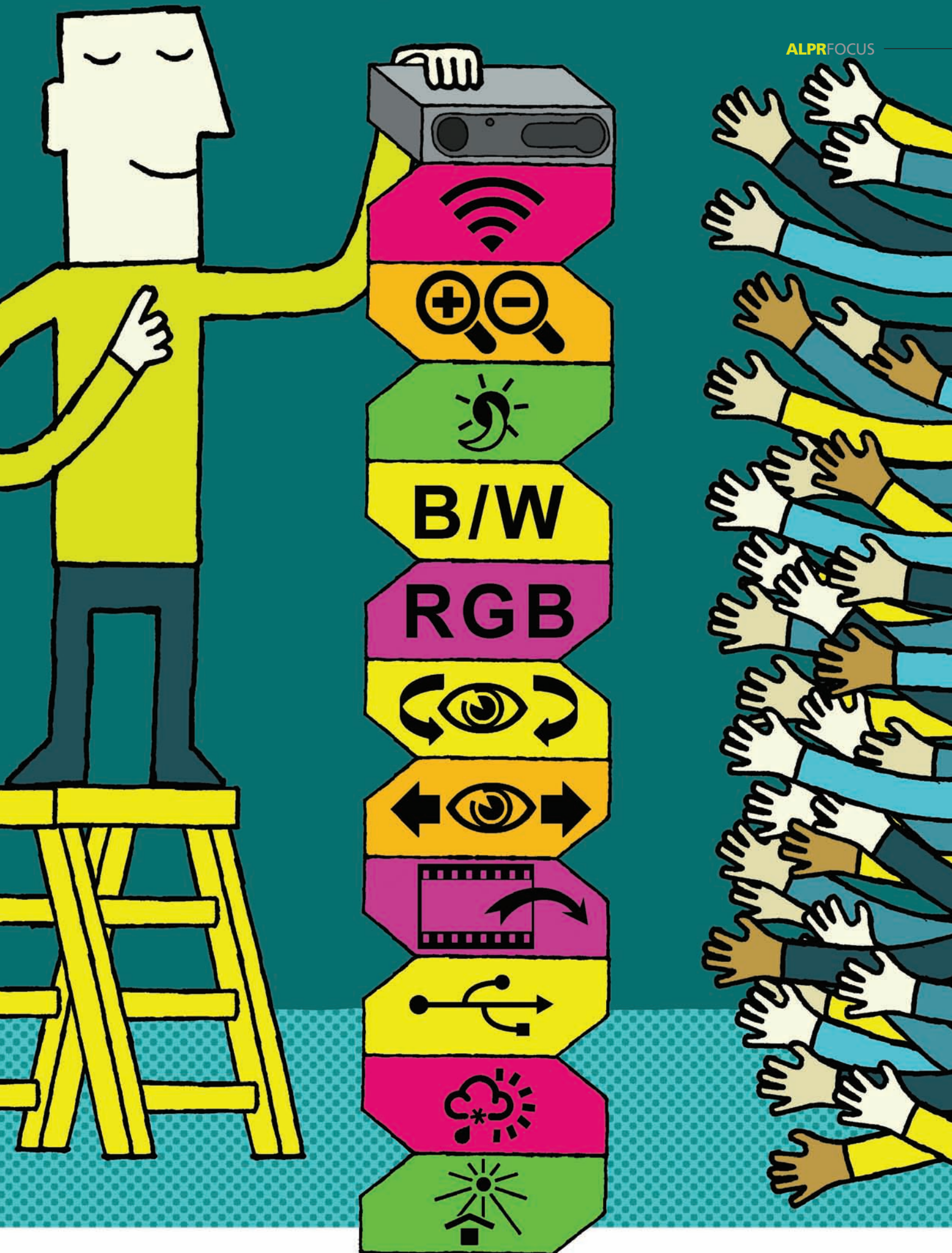
As *Traffic Technology International* goes to press, a prototype for a new addition to the Fox range is being created, the 'Hot-Fox' – a thermodynamically efficient ALPR camera suitable for extreme environments such as those encountered in the Middle East. Technical evolutions are also occurring on the software side, as Noble outlines: "New advanced OCR techniques have been added to better handle the more difficult types of plates from Florida and California. We have also just launched a new color recognition module, which is being used in Italy for a counter-terrorism application. It's also being deployed in the UAE with the new Fox Hybrid camera, which uses both infrared and white light illumination to detect the color of the plate, even during the night."

A SYSTEM TO GRAB YOU

It seems that the UK, the birthplace of license plate recognition, remains a thriving hub of the industry, as demonstrated with news from another key player in the field, NDI Recognition Systems (RS). NDI-RS (whose parent company, the Dacoll Group, is well known in the technology sector) was formed in December 2008 when NDI acquired Appian Technology and its Talon software engine. Quickly becoming a presence in the UK LPR marketplace, the company primarily sells into the law enforcement and police markets, as well as commercial sectors.

In January 2010, NDI-RS launched the V220 – a mobile

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ALPR camera used mostly for vehicle-based deployments. Installed on top of a surveillance vehicle, it can also be discreetly mounted within for covert applications. The company's Adrian Cadd is keen to highlight the significance of this launch: "What sets the V220 apart from other offerings is that it uses zoomable lenses. There's always been a belief that vehicle-based ALPR requires fixed focal length lenses, but our zoomable lens allows operators to zoom in and out and set the camera specific to an individual site's requirements. This means that the end-user can now park up and move the camera on a motorized pan-and-tilt unit, whereas before they would have had to move the actual car to the correct angle and capture distance."

Cadd also points out another advance that NDI-RS has incorporated within the V220: "We've added a high-quality day/night camera module to enable optimal sensitivity during all light and weather conditions. The downside to color cameras has always been
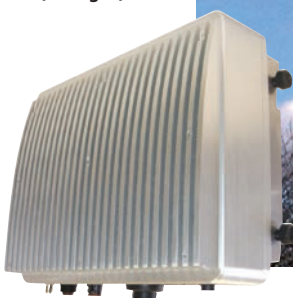
that no matter how great they are during the day, you can't see anything at night. So the V220 has been designed to switch to a black and white 'night mode' during periods of low light to maintain its high image quality."

NDI-RS also recently launched a product called Scorpion, a pole-mountable ALPR processor described as a ruggedized PC loaded with LPR software. It takes a camera or video feed from any fixed-site cameras, performs all of the processing at the roadside and then wirelessly sends the data to the enforcement agency's own back-office servers. So what are the advantages of this approach? "Cameras have often been installed on a column with data sent straight back to an office via a fiber transmission. The cost of sending that data was huge – digging up the road, putting fiber in, and so on. Then there was a move to locate ALPR PCs at the roadside, but these frequently got broken into and there were security issues associated with where they were situated.

When mounted onto a pole next to the camera, the unit is out of harm's way. Our systems use 3G (HSDPA), GPRS or Wi-Fi to send data at a fraction of the previous cost. Each of the Scorpion devices can run two dual cameras simultaneously."

Tailoring entire solutions from camera to software engine is what Cadd regards as NDI's unique selling point: "A number of companies in the ALPR sphere are actively marketing solutions, but I'd say up to 80% of these are just resellers – buying in a software engine, adding cost and simply re-badging it. We own all our software products (everything from the OCR engine to a back-office suite), all of the applications that go into a police vehicle, anything that sits by the side of road and all the connectivity. We design and manufacture our own cameras. Then we prove the high standards of our systems by getting accredited by respected industry bodies, including the UK's National Police Improvement Agency."

Talon is based on neural network technology as opposed to OCR (right); the Scorpion processor unit (below); and PIPS' ALPR unit (far right)

This complete systems approach enables NDI-RS to respond to market demands in innovative ways, highlighted perfectly with a new development called the TGX-200. "This is a frame grabber-type device to enable ALPR to be used on laptops more proactively," Cadd reveals. "You would ordinarily get a laptop and use a USB frame grabber, so you'd have a single plug into the laptop and could run one camera in it. We've designed a frame-grabbing device that still uses one USB port, but we can run four separate video feeds into it. So a pair of dual cameras or four separate cameras will run through one USB port, which increases the usability of a laptop. It's a small product for quite a niche market but it'll make a huge difference to those users."

COLOR COORDINATION

It is not only the UK, of course, where technical evolution is occurring. In the USA, a number of vendors are increasing their offerings. The Tennessee-based Perceptics is one example of an organization that's responding to the needs of customers, and the company's Tom Hayes outlines its latest launch: "We've developed an Arabic color version of our license plate reader for use in the Middle East and other foreign markets," he says. "This is not just a color photo – we actually use the color of the license plate as one of the inputs for the OCR.

"This capability initially came about following a customer request, but using color is something we are now looking at offering on a global basis further down the line. Clearly there is more value in using it within international markets rather than the USA. In the Middle East, color is an important part of a plate's identification, which is not the case in the USA."

Perceptics is reading Arabic characters with this new system, using software developed in-house. This is something that many vendors have explored, but failed to attain high enough read rates. The company doesn't make public its claims regarding accuracy on Arabic characters but it does say that the new color system achieves 95% accuracy in plate read as well as state or country of origin identification.

Of course, even 95% leaves room for progress, particularly when it comes to the security-focused applications likely to be deployed in areas such as the Middle East (and indeed at land borders, where Perceptics has many contracts), and Hayes explains that the company dedicates itself to continual improvement: "We don't just sell these systems and run," he asserts. "We work closely with our customers to go through databases of plates that have passed through our LPR points and make sure that any new plates issued by countries are recognized and captured – it's an ongoing process to manage and improve the accuracy."

Unlike many products on the market, Perceptics ALPR systems don't use infrared technology – instead the systems are equipped with stroboscopic illuminators, which Hayes believes is a strong selling point: "We can read both reflective and non-reflective plates, whereas infrared systems struggle to read non-reflective plates. To get the high levels of accuracy required – not only for security applications but for anything in the enforcement field – you need to be able to read all the types of plates that are out on your roads."

Perceptics is hoping to become more involved in new markets, to take some of the experience it has gleaned in borders and security and make the move into areas such as tolling. "We're developing a concept for handheld LPR for law enforcement," he reveals. "We've also just gone through a successful test project using our systems in a gantry-type installation for a toll road. We're entering a couple of new markets in 2010."

Perceptics' LPR system automatically captures, identifies and records the alphanumeric code, state/province of origin, and country of origin

"We work closely with customers to go through databases of plates that have passed through our LPR points and make sure that any new plates issued by countries are recognized and captured"

Small, but perfectly formed

Noting the opportunity for in-vehicle computer expert Microbus to expand its product range and start offering fixed and mobile ALPR cameras, a new division, Microbus AV (Advanced Video) was established. Steve Walker now heads up this division. "Offering the Rapier range of cameras was a natural adjunct to what Microbus was already involved in," he says. The company has today supplied technology into around 90% of the police vehicles using ALPR in the UK.

"One of the founding principles is that we don't sell direct to end customers – we work with OEMs and systems integrators and are completely independent. We don't have, for example, our own LPR software. This allows us to supply our hardware to many different companies and bring the best out of their total solutions. We try to make our cameras as open-interface as possible to allow the software developers to get the best out of them very quickly, and integrate them into other systems."

Microbus has an in-house team that designs and manufactures its cameras, with any additional components (such as camera modules) being bought in. Its most recent product launch is a new addition to the Rapier range of in-car equipment. The Rapier 25 Mono is less than 100mm wide, and houses a remote-controlled 10x optical zoom ALPR camera with integral pulse IR illumination, with a range of up to 25m. The Rapier 25 Dual version, meanwhile, has a secondary 10x optical zoom overview color/black and white camera to provide contextual evidence to the ALPR read.

Walker believes the electronic zoom control is something the industry has been crying out for: "Many people have ALPR systems based on onboard cameras with fixed lenses. We are seeing a big take-up of our cameras from people who think that it's a hassle to have to change the lenses by taking the camera apart. So we build our cameras with zoom capability, which is controllable through a serial port."

MORE FOR LESS

Another Knoxville-based organization becoming more and more involved in tolling is PIPS Technology, whose parent company Federal Signal recently acquired Diamond Consulting Services (DCS) and its Idris vehicle detection and classification software product. The fruits of this acquisition are already emerging, as Brian Shockley from PIPS explains: "We have just announced an integrated product offering for the road user charging market that is truly unique: an Idris-enhanced camera for the ITS market. The Idris software will reside on board the PIPS SpikeHD ALPR camera."

Blending LPR with other tasks is representative of a wider industry trend; the need to diversify applications. "Whether you're talking about business, technology, or life in general, a common theme typically emerges," he says. "How do I do more with less? Marrying the Idris data with ALPR data generates information such as average speed, vehicle length, and class and headway. Combining these two powerful technologies onto the platform of the SpikeHD product represents a huge step in minimizing the hardware, expense, and level of integration typically associated with lane-level vehicle classification and violation enforcement."

OUT FOR THE COUNT

It is not only ALPR suppliers branching out into other sectors. Indeed, there is a growing trend for other service providers to start moving into ALPR. This trend is aptly illustrated by another UK company, CA Traffic – an organization well known in the traffic monitoring field. In 2008, the company announced it was getting into the ALPR market with the launch of the Evo8 camera. "It's been a relatively soft launch because it's a new market area for us, having previously focused on traffic counting and monitoring," explains CA Traffic's Andy

Evo8 provides a completely self-contained ALPR solution with a wide range of onboard communication options

> "Marrying the Idris data with ALPR data generates information such as average speed, vehicle length, class and headway"

Frechter, recently installed in a business development role. "As well as being in harmony with these areas and the journey-time management that we're involved with, the new system has also opened up a whole new security side. One of the biggest orders we had in 2009 was for the border police of a large European country."

Leeds Council in the UK is another authority investing in CA's Evo8 system for journey-time monitoring, but Frechter stresses how it's a service as much as a product that they are buying: "CA offers a complete solution," he says. "In Leeds, a number of systems are being installed on routes in and out of the city, but we also offer a secure data management system to deliver all of the journey-time information that we are gathering. This means that the

end customer does not need a back-office or a software department, or anything else for that matter, to realize the benefits of ALPR."

Another recent CA project also illustrates this aspect. The company has just completed a journey-time, origin and destination survey in the UK county of Northamptonshire on behalf of consultancy MGWSP. Evo8 cameras were supplied as well as its Evolution data management system. In all, 43 lanes required coverage and the Evo8 (dual-lane camera) was used to cover both dual-carriageway sites and single carriageways with bidirectional traffic.

The cameras were installed to monitor and gather data on the routes for two 12-hour periods. "All cameras were fitted with GPRS modems, which returned the ALPR data in one-minute blocks to our Evolution server," Frechter explains. "Post-survey, the data was retrieved from and processed offline using an adaptive journey-time measurement system. Three forms of deliverable data were supplied: raw data for ad-hoc analysis (time-stamped ALPR recognition data); individual journey times throughout the day for each route; and average journey times for each route for each 15-minute period."

CA Traffic doesn't have its own ALPR software; an OCR engine from the well-known specialist, Dacolian, is used for the Evo8 system. But then CA is not, traditionally, an ALPR specialist – its experience is in journey-time monitoring. But having the foresight to realize the potential for incorporating ALPR into its existing area of expertise is proving to be a successful business strategy. Moreover, it's also a good illustration of why ALPR itself remains a thriving sector – even during a recession. The technology is continually evolving and equally the applications it can be used for are diversifying. ■

Ideal enforcement back-up

Machine vision and LPR specialist Vitronic says its Poliscan[surveillance] system will soon be put to use by German enforcement officers. "Following a successful test phase of automatic license plate search systems, the German police department in Brandenburg has opted to deploy our technology for use in event-oriented license plate search activities," reveals Vitronic's Lucas Goebel. "Since 2007, our ALPR technology has assisted the police department in apprehending 301 criminals and preventing 31 incidents." The police will be using three mobile and two fixed research systems to further crime-fighting efforts, best demonstrated by a recent case where ALPR helped to apprehend two absconding bank robbers.

In other company news, Goebel says that PoliScan[Incar], Vitronic's latest ALPR

system, is also proving popular with police forces: "It attaches to the windshield or rear window and provides license plate identification in moving traffic. From dense city streets to high-speed freeways, front, rear and even side (parked car) plates can be checked," he says. "After the license plate has been read, it is compared in real-time against a database. If a match is found, an alarm is sounded."