



# Eyes

## on the road

To what extent can artificial intelligence do away with the need for humans to enforce the rules of the road? **James Allen** reports on the new technologies that are changing the way local authorities are keeping their roads safe and prosecuting offenders



The availability of cameras capable of not just recording, but also recognizing when an offense has been committed, is not new, and has been well documented with regard to speed enforcement. However, the prevalence of the technology is increasing as the scope of illegal behaviors it is tasked with capturing also grows.

In the UK, this has been in large part due to a change in the law,

explains Noel Frost, head of enforcement at Siemens ITS.

“The use of CCTV equipment to collect evidence and enforce parking, bus lane and moving traffic contraventions is highly regulated by the availability of legislation from the Department for Transport [DfT] and the Vehicle Certification Agency [VCA].

“In 2015, the Parking Deregulation Act was passed, changing the ways that local authorities can use their civil enforcement powers to deal

with parking in nuisance areas such as double-yellow lines and pedestrian crossings.

"There is also use of the London Local Authorities Act, now permitting London Boroughs to carry out the monitoring of moving traffic regulations such as banned turns, one way, no entry and yellow box junctions."

In light of the new legal framework, Siemens has developed an enforcement solution that combines ALPR technologies with video analytics. Designed to work autonomously, the LaneWatch system relies on two high-definition cameras working together: one captures a video recording of the contravention through a wide-angled color lens, while the second monochrome camera uses infrared lighting, alongside a cut light filter, to accurately identify license plates in all weather and lighting conditions.

Images of the incident, as well as date, time and location information, are then automatically collated to form a package of evidence for the prosecution of an offender. It is only at this stage of the enforcement process that human intervention is required, where an operator will carefully assess the evidence and ultimately make the call as to whether the owner of the vehicle is issued with a ticket or the case is dismissed.

### Back to school

A growing trend for applying new machine vision technology comes in the form of ensuring car-free space directly outside of school gates.

In the UK, the zones are marked by yellow zig-zag lines as well as 'School - Keep Clear' painted along the curbside of the road. Vehicles are not permitted to stop for any period of time. Traditionally, the enforcing of such regulations was largely achieved by the physical presence of parking attendants, but a role is developing for unattended cameras to help share that load.

"The deployment of unattended equipment reduces the need to post civil enforcement officers into often-volatile environments, where the public perception can be unaccepting of the overarching traffic principles, usually in pursuit of personal advantage," says Frost.

**“**Even if we had an army of enforcement people, it still wouldn't have created the same degree of safety at the school gate as this project

**Stuart King, cabinet member for environment, transport and regeneration, Croydon Council**



"School drop-off and pick-up areas are a common problem across the UK, where on-street officers are ineffective due to the nature of driver behavior.

"The presence of either an officer or a mobile enforcement vehicle provides a very visual deterrent to drivers – but equally when they are absent, offending rates rise once more.

"The deployment of an unattended enforcement device will have a greater effect on both short- and longer-term decision making by drivers, in much the same way unmarked police cars have on major driving routes," he says.

### Real-world deployment

Traffic managers in Croydon, a south London borough, sought to address some of the traffic-related issues outside three of the schools in the area.

Stuart King, the cabinet member for environment, transport and regeneration at Croydon Council, says, "There was a real problem and the conventional approach of having officers on-site would only be a sticking plaster because, with 88 primary schools – and most of them

Machine vision software from Videalert can be run on existing cameras, reducing the need for new infrastructure





having similar problems – we would have needed an army of parking enforcement staff to constantly maintain an on-site presence at each location.

“But like all local authorities, we’ve had drastic reductions in our government grant – 70% over the past 10 years – so we simply don’t have the funds to employ the numbers of enforcement staff we would need.”

Instead, Croydon trialed the installation of the Siemens cameras at opposing ends of the road, along with signs informing drivers that they weren’t allowed entry during drop-off and pick-off times.

An approved list of registered vehicles, comprising those of local residents, school staff and a small number of parents with children who had mobility issues, are exempt from the new rules. Their details are fed into the system, and the cameras are designed to ignore them.

For every other driver accessing the road at the prohibited times, a £65 (US\$83) fine – rising to £130 (US\$166) if not paid within two weeks – is issued.

For the first month, penalties were not formally enforced, with only a warning letter sent to the offending party, notifying them of the change.

Subsequently, the fines issued have totaled £300,000 (US\$383,000) across the three schools, which, King notes, has more than covered the initial outlay of installing the systems. Crucially, driver behavior has also been affected.

Above: In the UK, a hard-hitting advertising campaign was used alongside new camera enforcement solutions to combat problems parking outside schools



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He says, "We had some amazing results. The schools have told us it has made a significant and immediate difference to the school gate environment."

Not only are there fewer drivers flouting the rules – many are even choosing to leave their cars at home altogether.

"Across the three schemes, there has been a significant reduction in the number of trips to school being made by car," says King.

"We expected – and wanted – it to encourage some behavior change, prodding some parents who live a walking distance from the school to decide that this is healthier and easier, but we didn't expect the numbers to be as impressive as they were.

"Even if we had an army of enforcement people, it still wouldn't have created the same degree of safety at the school gate as this project."

The extent of the ALPR-based enforcement pilot's success has led to it becoming a permanent addition at each of the three locations, while the council intends to roll it out to more schools in the borough.

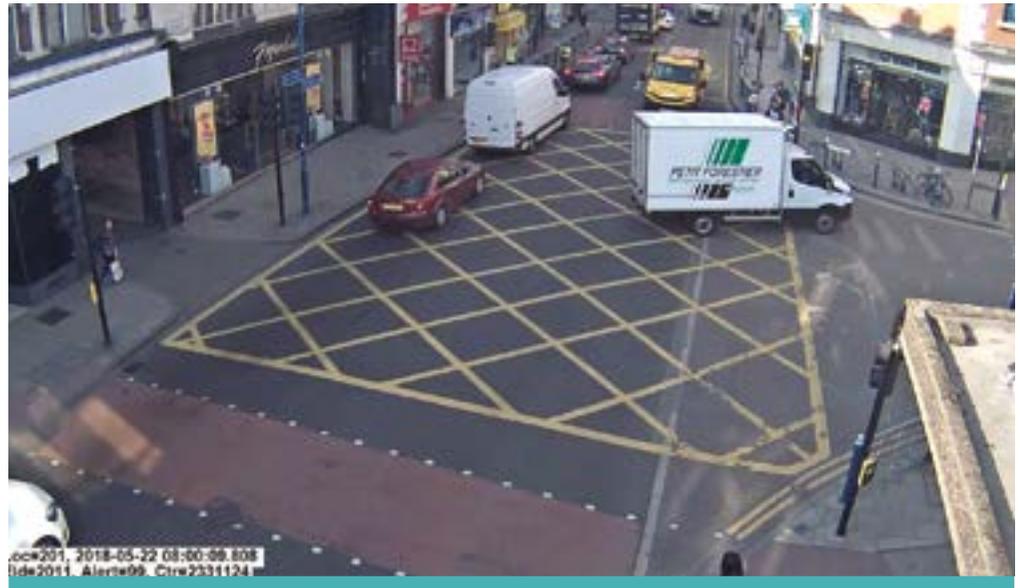
### Alternative system

Another unattended camera system, developed by Videalert, addresses the same problem, but takes a different approach.

Much like the Siemens system, it relies on combining video analytics with ALPR technology, with a human required only to retrospectively check what's been spotted. The software that comes with Videalert's technology, however, means specific vehicle activity can also be picked up by the camera.

"With the software, a rule can be established at a specific location," explains Tim Daniels, sales director at Videalert. "For example, it might be detecting a vehicle that has moved in a particular direction or has stopped in a certain place for three seconds or more."

The system is fast making a name for itself in the world of unattended



Above and left: The London Borough of Wandsworth has unattended cameras for enforcing yellow box junctions and no right turns

"Two of the companies were not in a position to present, so that left Videalert and another manufacturer," he says.

"From the company's report, and from what I know from other boroughs, the other system may well have required additional street furniture. The council has progressively become more interested in the streetscape, ensuring the streets are aesthetically pleasing, so we would have struggled to get permission to place the cameras in some areas," says Marshall.

"Videalert is different, however, and Richmond has been using its systems since 2013. This equipment has the ability in almost all cases to work from the existing infrastructure and it simplifies everything because it's a very compatible system.

"The other part was its capture rates. Videalert's ability to pick up a range of contraventions – and the number of them – meant it came out way ahead of the other system that was tested."

Wandsworth installed the system on four cameras, and within the first month of them being implemented, the costs of procurement were already covered.

cameras. Wandsworth, another borough in London, wanted to introduce such a system to deal with a number of traffic hot-spots. To choose the right technology, the council invited four suppliers to demonstrate the capabilities of their products.

Jim Marshall, head of parking operations for both Wandsworth and neighboring borough Richmond, was heavily involved in the procurement and saw a clear winner early on in the process.



Left: The city of Portsmouth, UK, used ALPR cameras with a smart machine vision system installed on them to monitor bus lanes around the city

Therefore, Marshall is currently in the process of acquiring additional funding from the local authority to roll out the cameras more widely across the borough.

### Multiple applications

On the south coast of England, Portsmouth City Council has also opted for Videalert. Initially using the cameras for bus lanes in several locations, the council then turned its attention to schools.

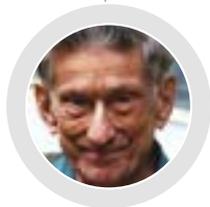
Matt Crowder, civil enforcement supervisor at Portsmouth City Council, says, “The thing we had to be careful of with the school locations is that some of the roads are really narrow, so a car might stop on the zig-zag lines, not necessarily to park or drop off kids, but because traffic is coming the other way.

“With this system installed on the cameras, the vehicle has to actually be stopped on the line for a certain amount of time before it kicks in, so if it stops because a car is coming the other way and then moves on, the system doesn’t tend to pick it up.”

Portsmouth now has 12 cameras with the Videalert system installed on them – seven specifically for schools and five for bus lanes. While the bus lane cameras are in place at

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**Richard Allsopp, emeritus professor, Center for Transport Studies, University College London**



specific locations on a more permanent basis, those for schools are moved around between 30 locations earmarked as having the most prevalent safety concerns.

The effect has been dramatic, with compliance across the sites being as high as 90% in some places. The council even made the shortlist in the ‘Road Safety, Traffic Management and Enforcement’ category at the UK’s National Transport Awards this year for the project.

Any concerns that the Videalert enforcement system is just a way to make money, or even cut jobs at the council, are dismissed by Crowder.

“It’s actually had no impact on numbers of staff. It has just enabled us to cover more schools on a daily basis,” he says. “We try to commit 60% of our resources to schools every day, so by using this system installed on the cameras we’re just covering seven more schools than we did previously.

“They are also not really there to make money either; they were put in place to increase safety.”

Regardless of how capable the Videalert system is, Portsmouth, like Wandsworth, Croydon and every other authority relying on unattended cameras in the UK, is legally required to have a human involved in the process prior to a driver receiving a ticket for a contravention.

There is currently no indication that a relaxing of the laws will be introduced any time soon, but the technology is continuing to develop regardless.

Centre for Transport Studies emeritus professor at University College London Richard Allsopp is in two minds about the direction in which unattended camera surveillance is heading.

“In principle, any potential error that the designer of the system can foresee can be dealt with,” he says. “However, I think we should be careful because the place of enforcement is a last resort and it can only work when widespread respect for the rules that are being imposed is maintained.

“We really do rely on a large majority of people wanting to be compliant almost all the time – and if we were to start elaborating or multiplying the number of rules or situations where you might be caught out by a camera or find a fine coming through the post when you simply hadn’t been aware of anything untoward, then that would begin to threaten this widespread general acceptance that we depend on.”

Systems such as Videalert’s are showing that this technology is already at the stage where errors can be phased out with only limited, or even no, human intervention. Now it’s up to traffic managers to make sure they use the power at their disposal effectively. ○