FACT SHEET 04

HOW DOES TECHNOLOGY ASSIST WITH TRAFFIC ENFORCEMENT?

Enforcement of traffic violations is not about making money, it is about reducing bad driving by ensuring that road users comply with the relevant regulations. If drivers behave as they are supposed to, journeys are safer, risks are reduced, and the road network is more efficient. Technology plays a key role in delivering appropriate enforcement across the road network.

Contrary to some reports, speed and red light cameras are supported by the travelling public. In 2019 a survey for the AA suggested that eight out of ten people believe it is acceptable to use automatic cameras to identify vehicles involved in traffic offences.

Spot speed cameras

These cameras typically use a sensor technology, such as radar, laser or lidar to identify vehicles travelling faster than the permitted speed on that stretch of road. The first generation of 'wet film' cameras took two pictures a set time apart to demonstrate that the vehicle was travelling too fast; the gap between the two images could be measured and the speed calculated from that. Modern digital spot speed cameras operate in a similar way, capturing two high resolution images that are a known time or distance apart, watermarking the image with the measured speed and capture time.

A speed camera may capture the face of the driver, if it is viewing the front of a vehicle. It will always capture the vehicle's make, model and registration number plus the date and time of the offence. During daylight or where additional white light is used, the vehicle's colour will also be captured, but some systems operate with Infra-Red (non-visible) illumination, resulting in a grey scale image.

Spot speed cameras are typically placed at a specific location where there have been a significant number of serious road collisions.

Average speed cameras

These cameras are used to identify drivers breaking the speed limit over a longer stretch of road or even along a route. The cameras do not themselves measure the speed, but operate as capture nodes, sending data back to a remote server which uses simple arithmetic to calculate the 'average speed' of a vehicle along that known length.

Each camera records the number plate of every vehicle which passes, along with an image of the vehicle and an accurate time stamp. This data is stored temporarily on the camera, with just the number plate read communicated to the remote server. A known distance along the road another camera reads the number plate again, and the read plate is sent to the remote server. The time between the two captures is calculated and from that the speed is determined, knowing the exact distance between each capture point. If it is calculated that the speed is too high, the images are retrieved from the roadside cameras and transferred to the server, allowing a violation record to be created.

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For example, if two cameras are two miles apart and the speed limit on the road is 60mph, then if a vehicle is photographed less than two minutes apart, it is clear it has been breaking the speed limit.

Because the calculations are done away from the camera, they can even identify whether certain vehicles are breaking a limit for their vehicle type. For example, a speed limit for cars could be 60mph but for lorries it is 40mph. By cross-checking the registration number against the DVLA database, the type of vehicle is identified and – in the example above – if it is found to be an HGV which travels between the cameras in fewer than three minutes, it can be identified as speeding.

Average speed cameras are used widely to keep the flow of traffic harmonised in areas prone to congestion at peak times, because driver behaviour tends to be uniform where they are used.

Red light enforcement

Technology similar to spot speed cameras is used to identify vehicles driving through red lights. They detect vehicles crossing a stop line once the light has turned red and takes two pictures of the offence, one as the line is crossed and another to demonstrate that the vehicle has continued to travel. The picture identifies the vehicle and that the light is red at illuminated at the time.

Yellow box and other driving violations

By using video analytics, it is possible to monitor a range of different types of road to ensure that vehicles are obeying the rules of the road. For example, a video camera monitoring a yellow box junction can automatically detect and record a vehicle making an illegal turn or stopping in the box in contravention to traffic rules.

Similarly, video technology can be used to monitor bus lanes. The technology identifies the type of vehicle, either using a 'white list' of approved vehicles or using automatic classification tools. If it is not a bus, the camera will record that it is in the bus lane, supported with an accurate time stamp and a video clip of the violation taking place. It can even reliably identify the difference between, for example, a bus lane and parking lane beside it.

This technology is also used outside schools, at bus gates and on roads with a weight limit. In each case video footage is saved for evidential purposes.

Motorway driving

Particularly on Smart Motorways, radar is used on motorways to identify stopped vehicles on the carriageway. This technology can, however, also be used for effective enforcement.

Radar constantly surveys around two miles of motorway, covering all lanes. By analysing the movement of vehicles, the radar can identify vehicles tailgating the one in front. By using CCTV cameras, the offending vehicle can be identified, and a warning issued.

Similarly, this technology can be used for vehicles with bad lane discipline, such as travelling in the middle lane of the motorway when there is nothing on the inside lane

Traffic enforcement should not be seen as a bad thing; it is a tool which allows the wider road network to operate safely, efficiently and effectively, to the benefit of both road operators and road users. By the appropriate use of technology, we are able to identify and deal with dangerous and inappropriate driving behaviours without taking up vast amounts of police resources. Technology once again makes our roads safer and more efficient.

ITS (UK)'s Enforcement Forum is leading the way in discussion about implementation of these solutions, sharing knowledge from around the world. Many UK members are part of a larger global company and liaise with colleagues around the world to discuss best practice and lessons learned. Sign up for details of regular meetings and webinars and to receive important news about this vital road safety-related Forum.