

ALWAYS WATCHING

*Automated traffic enforcement can have a big impact on improving safety by reducing speeding and red-light running. However, concerns persist, particularly in the US, around privacy and profiteering. **Tom Stone** and **Niclas Andersson** take a look at how the technology and political debates are evolving and ask what future solutions may be relevant in the drive towards Vision Zero*

Illustration by Patrick George/Debut Art

Over the past decade, there has been a significant reduction in the number of police interventions for traffic violations US, with officers making fewer traffic stops. In LA in 2023 there were over 50% fewer stops compared to 2019. In Pittsburgh traffic stops are down 63% compared to 2017. In Oakland they are down 71% since 2016, and in Seattle they have reduced 83% since 2019.

The retreat of law enforcement from American roadways, which is put down to both cuts in funding and a policy to reduce risky face-to-face confrontations, appears to be a factor influencing a corresponding rise in road fatalities and injuries.

In LA road deaths rose from 242 in 2019, to 337 in 2023, according to LAPD, with similar rises seen in other locations with reduced police intervention. Nationally, US road fatalities remain stubbornly high at around 40,000 a year.

But, as human-controlled enforcement is declining, so the opportunity for more automated traffic enforcement is growing. Proponents argue that automated enforcement is more cost effective in improving safety as it is capable of detecting far more offenders than manual enforcement.

"There are a number of examples of cities deprioritizing traditional traffic enforcement, and then, unfortunately, fatalities have surged," says Adam Snider, director of communications for the Governors Highway Safety Association



(GHSA). "Consequently, drivers should expect more automated enforcement efforts."

Controversy persists

Despite proven safety benefits and the fact that it is already commonplace in many countries, automated enforcement remains a contentious issue in the US, with critics saying these systems primarily serve to generate revenue and can invade privacy. "The expansion of automated traffic enforcement simply creates a new and more effective way to fine exponentially more people," said Tim Curry, policy and research director for the Fines and Fees Justice Center, in a recent interview with *Streetsblog USA*.

With an active and vocal anti-automated enforcement movement it's easy to overlook the fact that it has been permitted in the US for decades, with speed safety cameras first deployed in 1987 and red-light safety cameras in 1992. As of November 2023, 24 states and the District of Columbia allow red-light automated safety enforcement, and 25 states allow automated speed-safety enforcement.

Now, the pressure is on for more states to adopt this technology to improve safety. The National Highway Traffic Safety Administration (NHTSA) reported, "Speeding-related crashes in the US



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Chris Shepherd, lead product & support manager, MAV Systems

accounted for 28% of all traffic fatalities in 2023.” NHTSA data also found that the number of people killed in speeding-related traffic crashes climbed 21% from 2018 to 2023.

In addition to speeding, red-light running is another common cause of crashes, and their frequency is also increasing. The Insurance Institute for Highway Safety (IIHS) reports: “Crashes involving red-light running in the US killed 1,149 people in 2022. That same year, more than 100,000 people were injured in red-light running crashes, up 22% since 2017.”

Overall the financial cost of managing traffic accidents is estimated to be around 3% of GDP in most countries and automated traffic enforcement can reduce the costs to communities while saving lives and reducing injuries.

The case for automation

GHSA believes the expanded use of automated traffic enforcement is essential to reversing the tragic increase in deaths and injuries on US roadways: “When managed correctly, automated enforcement can contribute meaningfully to improved traffic safety and help reverse the rise in traffic fatalities on our roads, potentially saving thousands of lives.”

Automated traffic enforcement uses cameras, radar, and lasers to capture evidence of drivers

ANPR TECHNOLOGY

Automated license plate recognition (ALPR/ANPR) is a crucial component of automated traffic enforcement, enabling vehicles to be identified and citations to be issued. Accordingly, accuracy is paramount.

“The thing that drives it all is accurate data at the right time,” says Chris Shepherd, lead product and support manager at MAV Systems, which has just launched its new AiQ camera, which not only reads plates but also provides additional data such as make, model and color and can spot ‘ghost plates’.

“When you blend all that data in a back office, it enables them to make far more informed and accurate decisions,” says Shepherd. “It helps to reduce the amount of secondary processing, the amount of human resource that has to be committed to cleansing the data because they know the data they’re getting in is accurate.

“For law enforcement, the intelligence picture is far richer. We can tell you what vehicles have got

fraudulent double plates on. We can tell you what vehicles got different plates on compared to the type of vehicles here.”

Andy Humphries, managing director of MAV Systems, highlights the global reach of MAV technology: “One of the key unique selling points for the AiQ is that it reads over 160 different country plates, which is phenomenal. It can read in English, Arabic, and all other alphabets.”

MAV Systems has also addressed emerging threats such as ghost plates – license plates treated with special coatings that make them hard for regular ALPR cameras to read. Shepherd describes ghost plates as “one of the emerging threats to the integrity of the ALPR market.” He explains, “We’ve created a set of tools, algorithms, technologies, AI, which allows us to scan every single number plate that goes past us, and we perform various unique investigations on that number plate, which lets us identify if it’s a ghost plate.”



Inset: Chris Shepherd of MAV Systems, was a recent guest on *TTI's Transportation Podcast*

Left: A Vitronic red-light enforcement camera

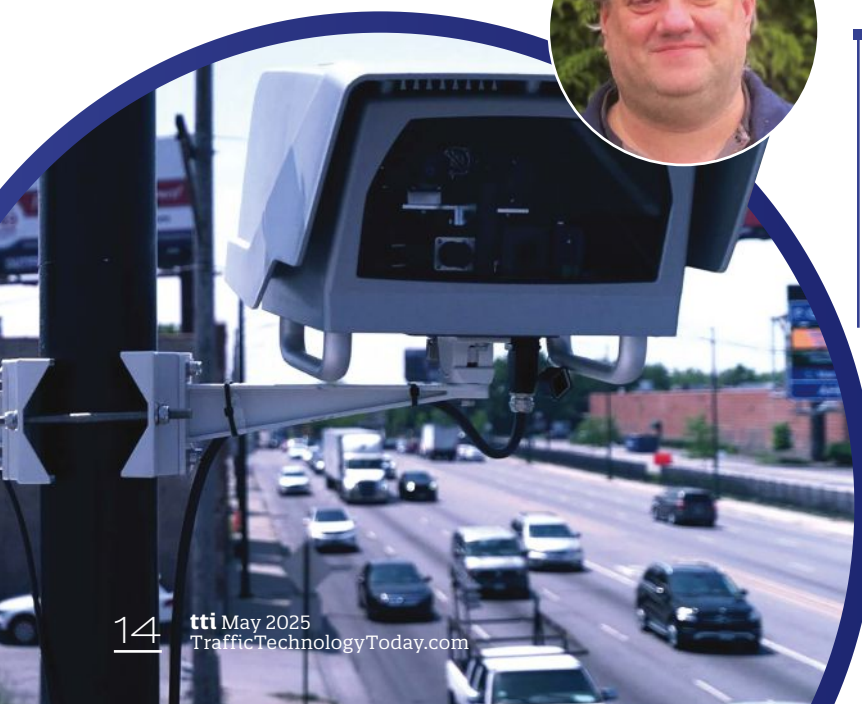
Right: MAV's AiQ ANPR camera

committing moving traffic violations, such as speeding and red-light transgressions.

According to the United States' National Association of City Transportation Officials (NACTO): “Studies show that automated speed enforcement reduces the number of speeding vehicles by up to 65% and can cut serious injuries and fatal crashes by up to 44%.”

A 2023 IIHS study comparing large cities with red-light safety cameras to those without found that automated traffic enforcement devices reduced the fatal red-light running crashes by 21% and the rate of all types of fatal crashes at signalized intersections by 14%.

US Transportation Secretary Pete Buttigieg stated in 2022, “Automated speed enforcement, if deployed equitably and applied appropriately





23%

The proportion of traffic fatalities attributed to excessive speeding in the US

Source: NHTSA

Lidar solution

Poliscan, a scanning lidar technology from Vitronic Machine Vision, provides high accuracy and reliability for documenting traffic offenses. It can measure, track, and record the movement of each vehicle within its field of view, even in complex traffic scenarios. It is also adaptable to various speed enforcement scenarios, such as inside tunnels, around curves, and on hills.

The Poliscan system emits 158 separate laser beams across the roadway that pulsate 15,000 times per second, creating a 3D map of the environment. This allows for highly accurate speed measurements.

Poliscan's AI-based system can distinguish between pedestrians, cyclists, and motorized road users at pedestrian crossings, documenting dangerous violations. Alongside the lidar system an ALPR camera is used to fully identify offending vehicles

The key advantage of Poliscan over radar and other lidar technologies in traffic enforcement is its ability to accurately measure, track, and record the movement of each individual vehicle within its field of view, even in complex and congested traffic scenarios with up to six lanes of vehicles moving in both directions.

“Automated speed enforcement... can provide significant safety benefits and save lives

Pete Buttigieg, former US Transportation Secretary



to roads with the greatest risk of harm due to speeding, can provide significant safety benefits and save lives.”

Equitable deployment

A key argument against manual traffic enforcement is that it is open to inherent bias, which can lead to police discrimination against ethnic and socioeconomic minorities. Automated enforcement has the potential address these kinds of inequities.

But making enforcement more equitable isn't as simple as automating it, as other factors then come into play. “Using machines and not humans has a lot of implications for equity and policing in general,” says John Leibovitz founder and CEO of Passage Safety – a team focused on rethinking automated traffic enforcement. For example, geographic deployment of cameras raises its own equity questions. “In most cities, neighborhoods are stratified in terms of income distribution and other demographic factors,” Leibovitz said in an interview with *Police1* magazine. “If you were to put all the cameras in only one part of the city, you're going to be affecting certain populations more than others.”

Passage Safety addresses this concern in its white paper, *From Speed Traps to Safety Zones*, which proposes a shift in how

cities deploy technology to improve road safety. It argues that Traditional speed cameras have proven effective but limited. “Studies show that when there is a camera at a particular place, people do slow down because they learn that the camera is there, especially repeat drivers such as commuters,” Leibovitz notes.

The problem? Most cities have too few cameras to make a lasting impact. “In Washington DC, there are presently about 130 speed cameras,” says Leibovitz. “There are 15,000 city blocks in Washington DC. That means you're enforcing only 1% of city streets.”

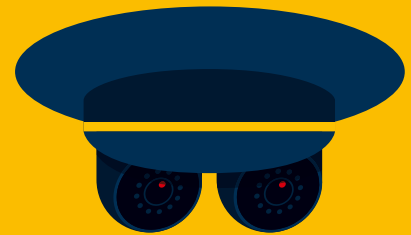
A new paradigm

Leibovitz instead advocates for more widely deployed cameras but with lower penalties – creating ‘safety zones’ rather than isolated speed traps, to create greater compliance. “The zone could be a corridor, it could be a neighborhood, it could be a set of blocks, or it could be all around a school,” says Leibovitz.

This expanded coverage changes the enforcement model. “Instead of having one big fine for blowing through a single camera, maybe you should get several smaller fines,” says Leibovitz. The system could even provide



Above: A tripod-mounted version of Vitronic's lidar-based Poliscan system. It can also be installed on a pole, in a trailer or on a patrol car



LIDAR VS RADAR

The key technologies used in automated traffic enforcement – radar and lidar – have distinct differences that influence their effectiveness. Radar has been in use for several decades and costs less than lidar. It works in almost any weather and can detect multiple vehicles, but struggles to distinguish between different vehicles in heavy traffic.

Lidar, on the other hand, offers a stronger basis for legal cases related to traffic infractions due to its ability to pinpoint the speed of individual vehicles. While heavy fog or snow may reduce its

performance, with modern systems this is increasingly less of a problem.

Lidar may operate in a fixed direction, or it may scan in multiple directions, in which case it is known as scanning lidar. Scanning lidar provides better range and a larger field of view compared to fixed-direction lidar. When compared with radar, scanning lidar delivers a major advantage because it provides a broader field of view.

Once a vehicle is detected breaking the law its identity must be established, which done using ALPR technology.



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John Leibovitz, founder and CEO, Passage Safety

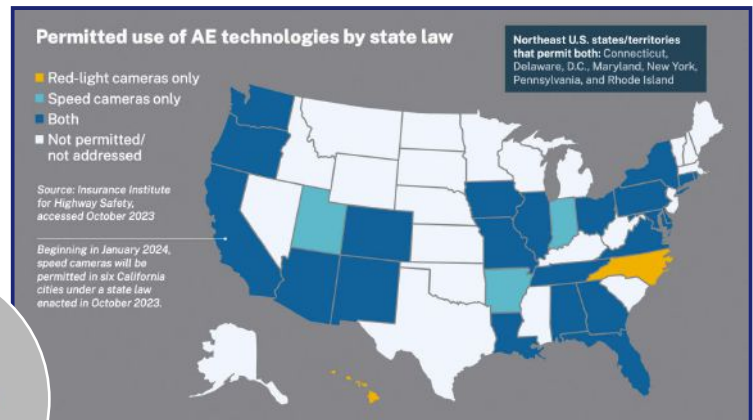
real-time notifications to drivers’ phones in non-distracting ways.

“From behavioral science, we know that the frequency and rapidity of feedback and enforcement does change behavior,” Leibovitz says. “Couple that with advances in technology to make sensors a lot cheaper, and you’re generating a lot of speed data from anonymous drivers.”

Passage Safety’s approach could help balance enforcement. “If you have much more widespread camera coverage, it evens that out in a lot of ways,” says Leibovitz. “Just having more enforcement in some ways can help with the risk side of the equation. And then lowering the fines and giving people notifications and opportunities to modulate their behavior, such as reminders or warnings, so they know that they’re getting fined the next time.”

Nevertheless, any automated traffic enforcement program that is perceived to be revenue-focused, inaccurate, or implemented in a section of a community without justification will ultimately prove unsuccessful. Therefore, it is up to elected officials, law enforcement professionals, transportation engineers, community leaders, and service providers to help guide the automated enforcement implementation process, and secure resources such as funding, data and technical expertise for communities seeking to implement a program. ☒

Niclas Andersson is VP for Vitronic Machine Vision North America



Top: An enforcement trailer from Vitronic

Above: Where automated traffic enforcement is allowed in the US

Below: Vitronic’s vehicle-mounted Enforcement Bar

