State of Knowledge and Practice for Using Automated License Plate Readers for Traffic Safety Purposes

Automated license plate reader (ALPR) systems typically pair infrared and visible-light cameras to scan the surrounding area for license plates. ALPR can identify license plates and read plate characters along with relevant metadata (i.e., geo-location and temporal information, as well as data about the ALPR unit). Systems may consist of fixed, portable, and mobile cameras coupled with searchable databases. License plate information can then be compared to a database or hot list of plates connected with criminal activity to determine if the scanned license plate is of interest to law enforcement. If a match is detected, the system alerts the officer and can, in some cases, display photographs so a user can quickly identify the suspect vehicle. Traffic-safety-related uses of ALPR have included detecting drivers with revoked, suspended, or restricted licenses; detecting vehicles that illegally pass stopped school buses; and identifying vehicles that have been involved in a high number of crashes or involved in hit-and-run crashes.

This study documented the extent of ALPR use for traffic safety purposes, identified the challenges in ALPR use for this purpose, and provided preliminary evidence about ALPR effectiveness in detecting drivers who have revoked, suspended, or restricted licenses. The study began with a literature review. Researchers then recruited law enforcement agencies (LEA) across the United States and conducted six case studies of LEAs using ALPR for traffic safety purposes, including interviews with LEA personnel (users, managers, and administrators).

ALPR Use for Traffic Safety

LEAs use ALPR technology for multiple purposes, from finding stolen vehicles to addressing amber alerts. By far, the most common use was related to some sort of criminal activity. Traffic safety was an important, but often, secondary use of the technology. An officer might stop a vehicle with suspended plates as an opportunity to investigate other illegal activities. A predominant perception expressed by law enforcement personnel was that there was not a huge difference between using ALPR for traffic safety purposes and using it for other purposes.

Hot Lists, Privacy and Legal Issues

If an LEA was interested in deploying ALPR for the purpose of identifying revoked, suspended, or restricted drivers, it was constrained by whether "hot lists" were available for this purpose in the State. A hot list is a database of vehicles of interest, against which license plates captured via ALPR can be compared. Not all States have hot lists that provide revoked, suspended, or restricted licenses. In addition, to be effective in identifying vehicles of interest, hot lists need to be frequently updated. In a few of the case study LEAs, the lack of frequency of list updates was a technical challenge.

ALPR technology has the potential to capture and store data that are personally identifiable information (PII). PII can single out a person and may be used to track that person's movement. LEA staff interviewed, especially administrators and managers, were extremely cognizant of the sensitivity of the data and citizen and advocacy group concerns with regard to protection of PII. Many of these administrators and managers indicated they had policies in place to ensure privacy protection. In addition, most traffic safety uses of ALPR data involve law enforcement officers receiving and acting on real-time information about license plates on hot lists rather than on the analysis of stored data, which can facilitate detailed examination of vehicle movements in time and space. So there are fewer privacy issues and legal challenges associated with this than for other ALPR uses.

Challenges to ALPR Use for Traffic Safety

Three types of challenges were explored: technical, operational, and institutional. Of the challenges that surfaced, none were unique to traffic safety uses. Technical challenges included accuracy and reliability issues with both equipment and databases. Interviewees indicated that officers have struggled with the accuracy of the units and have experienced numerous misreads. However, accuracy issues generally pertained to older units. The accuracy of new equipment was reported to have improved dramatically. Weather can also adversely affect the accuracy of ALPR reads. Maintenance of equipment is a challenge for many LEAs, leading to equipment reliability problems. Some agencies handled maintenance in-house; others relied on external contractors. In either case, when the equipment breaks, it can take months before being repaired. Databases may not be up to date, resulting in false positive hits. Such results may cause officers to question the effectiveness of ALPRs.

Operational challenges included officer distraction and ensuring agency policies were followed. ALPRs can read thousands of plates per day; some units get hits as often as once a min-

ute. Such high volumes of alerts can affect patrol officer safety when the vehicle is in motion, so users often turn the ALPRs off. Most agencies have established departmental ALPR policies, but ensuring that users follow that protocol when on the job is an operational challenge. Often the protocols are time consuming, and so officers may not always follow the required process, which can also reduce the perceived effectiveness of the ALPRs. Most use of ALPRs is reactive—reacting to an alert. However, many interviewees mentioned that they would like to be able to conduct predictive analytics, such as identifying traffic safety hot spots, but funding and skill sets are barriers to implementing more predictive uses.

Institutional challenges related to lack of funding. Almost all case study sites were interested in expanding their ALPR programs by purchasing more units but lacked necessary financial resources. Also, lack of funding often led to equipment reliability issues because funding maintenance of the equipment was a challenge. In addition to growing ALPR programs through the purchase of new units, LEAs reported it was difficult to locate personnel to sustain the program. The larger the program, the more officers are required that are qualified users, trainers, or maintainers of ALPR systems.

ALPR Acceptance
In all the case study sites, acceptance of ALPR in the LEA was high. The main reason for this was the widespread perception that ALPRs are effective policing tools that help officers stop vehicles, and that traffic safety can be improved when that happens. At the same time, it was acknowledged across the LEAs that some officers are more interested in using the tool than others. Interviewees in LEAs were less familiar with levels of community acceptance. In fact, in several of the case study sites, interviewees indicated that people in the community generally do not know about their ALPR use. For some, keeping the use of technology below the radar was seen as lessening the likelihood that privacy concerns will be raised.

ALPR Effectiveness
ALPR effectiveness was discussed in terms of efficiency, productivity, and efficacy. ALPRs are highly efficient and able to process plate reads rapidly. The equipment enhances productivity; more than one interviewee pointed to ALPRs as being a "force multiplier." In all LEA case study sites, ALPR acceptance was high. There was a widespread perception that ALPRs are successful policing tools; however, this was not necessarily linked to benefits for traffic safety. Many interviewees indicated that they do not necessarily see ALPR as a tool for traffic safety; but as a tool that helps stop vehicles. Traffic safety can be improved through these stops. ALPRs enable traffic stops of vehicles on hot lists, which in turn identify vehicles that are more prone to crash risk. According to one agency's analysis, drivers with revoked, suspended, or restricted licenses are 2.2 times more likely to be involved in serious or fatal crashes than other drivers in the State.

Conclusions
ALPRs can be highly effective in identifying habitual traffic offenders and getting them off the road. Recommendations from the interviewed LEA managers and administrators for enhancing the effectiveness of the ALPR technology were to specifically articulate strategic goals and tactical objectives for ALPR technology and to develop and strictly enforce aligned policies on data quality, system security, compliance with applicable laws and regulations, and the privacy of information gathered. Recommendations from users included thorough and ongoing training in system use, a focus on hardware maintenance and frequent updates to hot lists, and linking the ALPR system to the State's crime information computer and having close coordination with the external steward of the hot lists.

Project Note: Congress directed NHTSA to establish the National Cooperative Research and Evaluation Program (NCREP) to conduct research and evaluations of State highway safety countermeasures. Each year NHTSA and the Governors Highway Safety Association work with the States to identify potential highway safety research or evaluation topics believed to be important for informing State policy, planning, and programmatic activities. This project was conducted under the NCREP.

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