Gunshot Detection Systems

Science and Technology

CHALLENGE: LACK OF GUNSHOT DETECTION SYSTEMS IN THE FIELD

Active shooter events have become an almost weekly threat in the United States. In an active shooter event, real-time accurate information has been proven to save the lives of citizens and first responders, reduce causalities, and speed law enforcement's (LE) ability to respond to and neutralize the threat.

First responders need a simple technology that will alert them to shooting incidents nearly instantaneously; provide critical information ahead of their on-scene arrival (e.g., multiple types of gunshots suggesting multiple shooters); and record evidence that is useable in court. These three capabilities would improve the safety and effectiveness of responders to gun violence incidents.

Many existing US-produced gunshot detection systems are available for indoor and fixed outdoor locations, but only a few are designed to be portable for easy deployment in the field. Further, most of these systems use just one source to detect a gunshot – sound – which can lead to high false-positive rates. What is needed is a system that uses two sources to detect a gunshot, sound and flash (sight), to dramatically reduce false-positive rates and is portable and easily moved from location to location with minimal resources or technical experience.

SOLUTION: PORTABLE TECHNOLOGY

First responders require a gunshot detection technology that works outdoors and can be easily installed. Another requirement is that the technology be portable/mobile and easily moved as necessary by no more than two officers without the need for technicians to do the set up or transportation. The solution also must have a quick alert system that shares critical information with appropriate responders in an intuitive and helpful manner.

The Department of Homeland Security Science and Technology Directorate (S&T) completed the Gunshot Detection technology development effort that will enhance the commercial off-the-shelf Guardian Indoor Active Shooter Detection System as it is designed to operate in outdoor environments and be easily moved and "installed" by one or two officers. The existing Guardian hardware suite and processing algorithms were the starting point and from there, this baseline system had its mechanical and software components enhanced to meet the ultimate goal of the effort: a portable prototype.

The resulting prototype technology is portable and operates in outdoor environments, requiring only a single officer to relocate it, and provides easy-to-use supporting software applications including file formats, active shooter event presentation, and communication channels and protocols aligned with the stated requirements.

IMPACT IN THE FIELD

The first capability, real-time alerting, will enable LE to adjust coverage of gun-related incidents and shorten response times. The second, pre-arrival information, will enable responders to approach a gun-related incident more safely and with greater awareness. The third capability, availability of recorded data, will provide better evidence and lead to the apprehension and conviction of more criminals.

Having the capability to deploy mobile gunshot detection systems will enhance the ability of LE to respond to gun violence events quicker and with greater situational awareness, whether that event happens in a location with infrastructure or not.

UPCOMING MILESTONES

Near-term improvements include: mechanical design features, ingress protection against moisture and dust/contaminates, National Information Exchange Model compatibility, and additional channels allowing for 360-degree coverage as well as extended detection ranges. The schedule calls for:

- Fall 2021: Range test initial prototype (completed)
- Spring 2022: Prototype demonstration (completed)
- Fall 2022: Final prototype successfully field tested