ULTRA LYNX

Imagine a device that will identify who shot what: where, when, how and why!

A sensor that uses innovative technology to immediately identify ballistic data that will enable digitalisation of weapon analysis

The unmonitored and unaccountable use of firearms around the world is a contentious issue. High-profile shootings in the UK and the US; Jean Charles de Menezes, Mark Duggan and Azelle Rodney in the UK and Philando Castile, Alton Sterling, in the US, highlight the catastrophic effects, the public disorder, protests, riots that happen when delays, conflicting information and statements occur after a fatal shooting.

As the Cato Institute report on Police Misconduct has highlighted, there is a clear need for a system that will provide evidence for such investigations, particularly in areas of the US where there are excessive complaints of misconduct, such as Los Angeles and in Phoenix.

It is generally desirable in a fully functional society that the actions of an armed individual can be monitored so that anyone can be held accountable for using their firearm. This is particularly important if the individual is in law enforcement or has a legal authority to carry and use a weapon; public confidence in the system is of paramount importance for a smooth functioning society.

To address such problems, Ultra are working with UK based SME Inov8ive who have developed their patented Kinetic Discharge Sensor (KDS) that uses cutting-edge technology, to detect data from the projectile as it moves along the barrel. The data is fed into a central processor, which integrates other sensors and produces a signature. The net result is that the KDS can produce an accurate, repeatable ballistic digital signature that provides data giving the why, what, where, when and how the weapon has been used. The KDS has the potential to become a complete AI intelligence-based system and easily integrates with Ultra's software defined hub, UltraLYNX.

There are currently other devices in development that are intended for use as firearm accessories or attachments. These mainly monitor weapon use and count the number of rounds fired, using an accelerometer to detect movement of the firearm, which indicates whether a shot or shots have been fired. The problems with using an accelerometer stem from the algorithm comparing the sensitive input, which is inherently susceptible to knocks and drops, which produces similar feedback to a firearm discharge. False results are often induced and reported. Acoustic based sensors have also had media coverage after encountering similar errors in interpreting sounds such as cars backfiring as gunshots.

Inov8ive's KDS solution overcomes all these issues by using alternative technology which avoids such effects from external influences and only detects ammunition discharge.

Although still in development, initial trials have confirmed that the sensor and algorithms can accurately provide a repeatable ballistic signature (weight, burn time, muzzle velocity, etc.) which is not affected by the calibre of the weapon, movement or transition, rate of fire or mechanism.

Integrating additional micro sensors, barrel temperature, muzzle position and the six degrees of freedom of movement of a firearm in three-dimensional space, alongside gesture monitoring can be collected at millisecond intervals. Inherent to our natural actions through the movement of the firearm and, specifically, the millisecond movements before and post-discharge, the KDS can also detect stability, trigger flinch, follow-through, time distribution, recoil analysis, firearm positioning, and holster draw analysis.

All the data captured is kept secure by encryption stored locally and/or communicated off board, via UltraLynx. This enables captured data to be shared with attached devices and transmitted to the Command Centre or combat management system. Data is then streamed (in real-time) which allows immediate situation awareness and response made, whether in training or RSOI operations (Reception, Staging, Onward Movement, and Integration).

The KDS presents a game-changing innovation that could lead to several products including:

Marksmanship application – that will require no calibration or any additional devices, the sensors small footprint and weight that does not affect the operator, working with in transitional and other scenarios on a variety of mechanisms. We provide the tools to analyse prior, current and post-event results with training by the instructor alongside command to assess the progress of a unit.

Situation Awareness – live streaming of data (real-time) can be used within the prior, live and post-management of situations (situation awareness) via an Application Programming Interface (API). In either a one-to-one or one-to-many configurations.

Next Generation of Armoury application – From an armoury perspective, there is also a need to understand the status of the firearm (maintenance) alongside logistical information on ammunition (shots used), autonomous resupply and part replacement.

It doesn't stop there; we believe this technology could play a crucial role in collecting evidence for criminal investigations. This sensor technology could give live access to data that would help in criminal investigations to immediately determine each line of fire and who was at fault, enabling an appropriately accurate and more rapid response to be achieved. The delay and lack of forthcoming information would be radically improved, and this technology would certainly be in the public interest for development in the future.

All the collected metadata can be used as a historical dataset which can provide predictions, analysis and decision-making support using geospatial location.

KDS is able to detect and digitise discharge straight out of the box; there is no need to calibrate the device or "learn" the round. The devices are interchangeable, so they will always produce consistent and repeatable results which is envisaged to be an enabler for accountability, autonomy, machine learning and human Artificial Intelligence.

Ultra are proud to be partnered with Inov8ive and look forward to bringing this unique sensor technology to market. ■

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