



Criminology Technology

A Wearable System for Accelerometer-Based Detection and Classification of Firearm Use

Brief Description of Technology

Wearable inertial sensors to recognize wrist movements and other signals corresponding to firearm usage

Docket # 14-7059

DESIRED PARTNERSHIPS

- License to technology
- Sponsored research

STATE OF DEVELOPMENT

- Prototype system demonstrated
- Journal article published

INTELLECTUAL PROPERTY

UP Provisional Patent Filed
Ref. 14-7059

Recognizing firearm discharges using
wearable accelerometers

REFERENCE ARTICLES

- Loeffler, C.E. (2014) [Detecting Gunshots Using Wearable Accelerometers](#). PLoS ONE.
- Chant, I. (2014) [Wearable Tech Could Help Track Gun Violence](#). IEEE Spectrum.

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Problem

Individuals serving their sentences in the community are responsible for nearly half of gun violence incidents in the US. Released offenders are often required to wear GPS monitoring devices, but there is currently no way to track if these individuals are using firearms in violation of their terms of release.

Solution

Dr. Charles Loeffler at the University of Pennsylvania has developed a wearable gunshot detection system which could detect when individuals fire a weapon. This new system extends the functionality of wearable monitoring devices by using accelerometers to identify the distinct accelerations and movements associated with firing a gun. When combined with existing GPS monitoring systems, an individual could be linked to a crime scene and identified as a shooter.

A prototype device was tested by police officers firing guns at a firing range, the general public going about everyday activities, and construction workers involved in work that could produce shocks or accelerations (sledgehammering, jackhammering, etc.). In these trials the device was able to discern gunshots correctly 99.7% of the time and not identify other events as false positives.

Advantages

- Provides evidence that a monitored individual has fired a weapon in connection with a crime or in violation of his or her terms of release.
- Engineered to detect the unique signature of a gunshot and not be set off accidentally by everyday activities, or even high-impact activities such as heavy construction work
- Could be linked with existing GPS monitoring to provide evidence that the person was at a given location and fired a weapon

Inventor

[Dr. Charles Loeffler](#) is the Jerry Lee Assistant Professor of Criminology at the University of Pennsylvania. His research examines measurement problems in criminology, including estimating the life-course consequences of contact with the criminal justice system. He also works on developing measurement tools for difficult-to-observe criminal behaviors.