

Study demonstrates wearable sensors to detect firearm use

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A new study from the University of Pennsylvania demonstrates that wearable sensors could one day transform the correctional system by tracking gun use by community-based offenders, who account for a disproportionate share of fatal and non-fatal shootings.

Currently, detecting and deterring this type of crime can be challenging in the absence of reliable evidence that a particular community-supervised offender illegally used a firearm.

In the study, published this week in the journal *PLOS ONE*, Charles Loeffler, an assistant professor of criminology at Penn, demonstrates the feasibility of using low-cost, wearable inertial sensors to detect firearm usage.

To conduct the study, Loeffler used sensors similar to those found in fitness trackers to recognize [wrist movements](#) and other signals corresponding to firearm use. Research participants included officers from the Penn Police Department, construction workers and individuals engaged in routine daily activities.

The resulting sensor data was used to train a detection algorithm that achieved more than 99 percent accuracy in classifying individual gunshots, demonstrating that firearm use can be reliably distinguished from a range of potentially confusable human activities.

"It turns out that gunshots are highly distinctive events when viewed

from the perspective of the human wrist," Loeffler said. "The wrist experiences a near instantaneous blast wave that is closely followed by the recoil impulse. The entire event is over in a fraction of a second.

"This wearable sensor technology offers criminal-justice practitioners a potential alternative to existing monitoring systems that were not specifically designed to detect individual firearm usage," Loeffler said. "If integrated sensibly into existing community-supervision systems, it could enhance the ability of correctional authorities to deter and or detect firearm use while allowing community-supervised populations to experience less onerous conditions of release."

Provided by University of Pennsylvania

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