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Licensable Technologies

Ultrasonic-Enabled Detection of Improvised Explosive Devices (IEDs)

Applications:

- Stand-off identification and localization of explosives materials

Benefits:

- No direct contact required
- Rapid detection enables use at speed on convoys or at checkpoints
- Directional search enables localization of concealed explosives
- Detection method is specific to explosive materials
- Highly specific; minimizes false positive alarms

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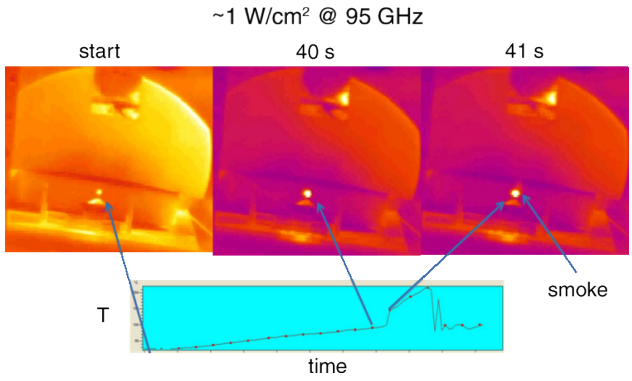
Summary:

Current stand-off techniques for detecting improvised explosive devices (IEDs) are inadequate, relying upon radio frequency anomalies and visual clues. These methods are not specific to explosive materials and are highly unreliable. Specific trace explosives sensors may more reliably detect explosive materials, but require detection at close range and are not amenable to detection at convoy speeds.Challenged to address the problem of detecting concealed IEDs quickly and reliably, scientists at Los Alamos National Laboratory (LANL) have invented an entirely new detection technique that uses targeted acoustic resonance excitation of IEDs to create a heat signal that can be detected with a thermal imaging camera. This invention enables the detection and localization of IEDs from a distance, even while the detection device is moving at speeds of up to 40 miles per hour.



The image shows a sample of an explosive material, PBX9501, being stimulated by a remote millimeter wave source. Stimulation results in a temperature increase, detectable by a thermal imaging camera.

The detector comprises a directed ultrasonic source and thermal imaging camera. Using an air-coupled ultrasonic transducer, or a modulated electromagnetic method of generating acoustic energy at the target, acoustic energy is transmitted in a desired direction over any terrain. This energy is pulsed on and off at a unique sequence which has been pre-measured experimentally to create a response in explosive materials, even after passing through or being generated in a container wall. When the ultrasonic energy encounters an IED, whether buried, hidden or concealed on a person, it excites the explosive material inside the IED, producing a region of higher temperature within the energetic material. The increase in temperature is too small to propagate, so the IED is not detonated, but the temperature change can be detected using a sensitive thermal imaging camera. By using a camera, the operator is able to exactly localize the "hot spot" indicating the presence of an IED, and does not need to be close to the target. Existing high-speed imaging technology, enabling IED detection, can provide military convoys with the ability to screen the road ahead for threats.

LANL is currently looking for commercial partners to develop and deploy this proprietary technology.

Development Stage:

Proof of concept testing completed.

Patent Status:

U.S. Patent Application No. 11/877,775 "Method and Apparatus for Detecting Explosives" filed 10/24/2007.

Licensing Status:

Please contact Robert Dye for licensing information.

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