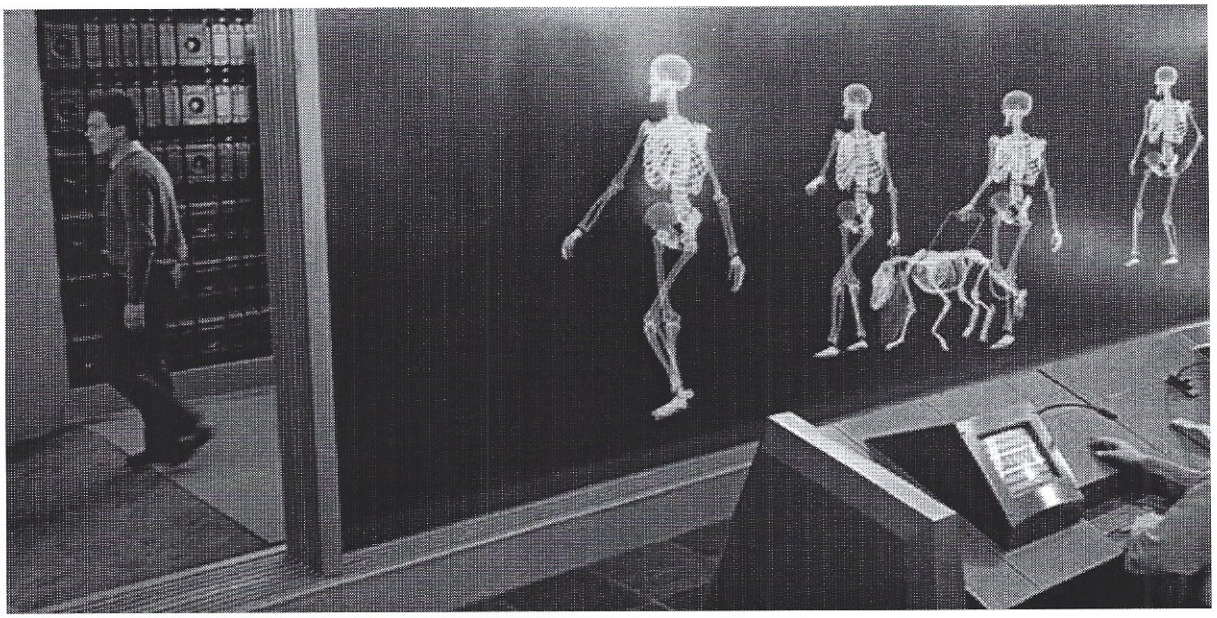
Remote Sensing Bombs Could Stem Terrorism

Al Williams March 29, 2016



If you understand technology, there were a lot of things hard to explain on Star Trek. Transporters, doors that were smart enough to open unless you hit them during a fight, and the universal translator all defy easy explanation. But one of the hardest things to explain were Mr. Spock's sensors. From the ship or with a tricorder, Spock could sense at a distance just about anything from chemical compositions, to energy, and even the presence of life (which, today, at least, is difficult to determine even what that means).

Remote sensing would have a very distinct use in today's world: finding terrorist bombs earlier. A recent article published on *New Scientist* by [Debora MacKenzie] points out that stopping attacks like the recent one in Brussels is difficult without increasing congestion. For example, putting checkpoints at doors instead of inside transit stations is common in Asia, but causes lines and delays.



The United States has used ion mobility spectrometry (IMS) to detect explosive traces on swabs (using machines like the one on the left). However in the early 2000's they experimented with a version of the device that used puffs of air to determine if people had explosives while they passed by the machine. By 2010, officials decided the machines broke down too often and stopped using them.

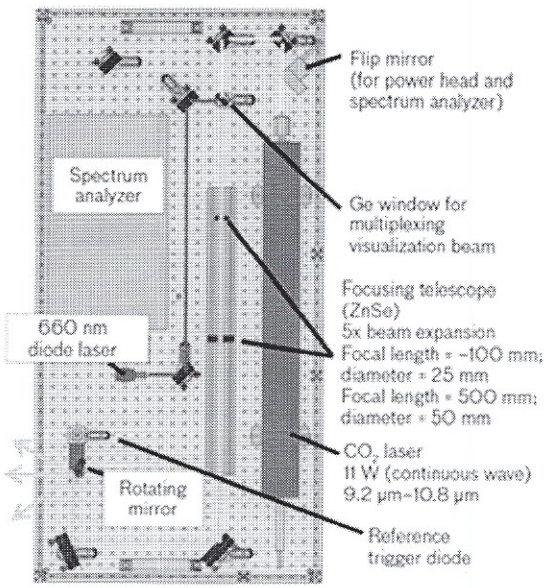
Remote Sensing in Practice

According to an expert at Rand Corporation, remote sensing is likely to employ imaging or sniffers. However, imaging solutions are easy to fool since a bomb can take the shape of an ordinary object. Sniffers, including biological sniffers (known as dogs), are harder to fool. The problem is that deploying thousands of dogs to cover the world's airports is difficult.

A security firm, Morpho, is working on something they call "the tunnel of truth"–pedestrians walk through the tunnel, and it scans them with multiple sensors, including things like IMS, facial recognition, and even analysis of eye movements to detect nervous people. To Sci-Fi fans this sounds like the public transportation scanning from the movie *Total Recall* which is where the image at the top of the post comes from.

The Sounds of Micro Explosions

Lincon Laboratories has another remote answer. Dynamic photoacoustic spectroscopy (see figure below) uses a laser to sense remotely gasses and aerosols. Looking for the right signature can allow that device to find explosives from a distance (up to 100 meters away).



Curiously, the system works by listening for the sounds of tiny detonations. The laser uses a frequency that vaporizes molecules found in explosives, and the device listens for the nearly undetectable sound of that event. Researchers claim it can detect 200 nanograms per square centimeter of material on a moving car door handle.

There are other laser-based systems including G-Scan, which uses Raman spectroscopy and a green laser. Some systems employ microwaves. Everyone agrees that a system that could detect explosives quickly and without many false positives from a distance would be a good thing. In fact, some systems could even detect bomb making facilities and stop a bombing before the bomb even exists.

Hacking

At Hackaday, we often talk about hacking for the greater good. We have a large community of smart people. Maybe we need to start thinking about this problem. A simple open source explosive

detector that worked could be a game changer, not only against terrorism but perhaps solve other problems like land mines.

I'm hoping the comment section will generate some ideas on how this might work. Don't just think of cameras and spectroscopy. Think outside the box–that's what our community is best at doing. A good enough idea might attract some interest and maybe one day soon we'll feature a Hackaday.io project that can detect suicide vests or other dangers to innocent people. That's a hack that would make the world a better place for everyone.

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