



Professor Using High Tech to Detect IEDs

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MANHATTAN, Kan. -- Hardly a day passes without news of U.S. troops being killed or wounded in Iraq, often from car bombs, roadside explosives and similar methods. Halfway around the world, Bill Dunn, a Kansas State University nuclear engineering



professor, works on ways to detect such explosives at a safe distance. Since November, he has been applying technology about neutron and gamma ray radiation to detect improvised explosive devices, or IEDs in military jargon.

Dunn isn't seeking just scholarly satisfaction for proving some abstract theory.

"Everybody knows somebody affected by this war. Every single day somebody is being killed over there," said Dunn, whose expertise is radiation measurement and applications. "There's an urgency about this project because it could potentially save lives."

As of Sept. 14, at least 1,897 members of the U.S. military have died since the beginning of the Iraq war in March 2003, with more than 14,000 more wounded, according to an Associated Press count.

Lt. Col. Barry Venable, a Department of Defense spokesman, said IEDs are a major problem, largely because of munitions left behind after the fall of Saddam Hussein.

"When you consider about 70 percent of all attacks are made with IEDs of all types and account for more than one-third of all U.S. casualties, they are a big problem," Venable said.

With some modifications here and a few tweaks there, Dunn believes technology routinely used to figure soil density or measure muscle fat in meat can detect explosives.

Dunn envisions two types of sensors. One would be large and transported in a van, capable of detecting explosives several yards away. The van could be at a vehicle checkpoint and data could be fed into a computer a safe distance away.

Right now, the sensors can work up to a couple of yards, but Dunn's goal is to extend that range to at least 10 yards and be able to detect an explosive in less than 10 seconds.

After the London transit bombings in July, Dunn started work on a smaller version - about 3 feet by 2 feet - that could be wheeled around to check smaller items such as suitcases and knapsacks.

It may be some time before the sensor could be carried by hand.

"Working with existing technology, we're not optimistic about making something hand portable, but as technology advances, that may be possible," he said.

Dunn also wants to find out how small an explosive can be and how many items can be around it and still be detected.

"Obviously, if we deploy something that detects explosives, the enemy will simply try to obscure them more and more," Dunn said. "We want to be able to detect the explosives within a lot of clutter."

Cornelius Beausang, a nuclear physicist at the University of Richmond in Virginia who's not involved in Dunn's research, said while he's not an expert in looking for explosives, "I know this can work in practice, but whether you can make it work for a roadside bomb in Baghdad is a challenge. But it's not impossible, I think."

The timetable from research to reality depends on funding. Dunn is operating with a \$200,000 grant from the Marine Corps but hopes to get more. "If we get more money, we could develop a small detector in a year and a larger one in less than two years. At the current rate, it would take four years," Dunn said.

John Blair, program manager for the Lexington, Ky.-based M2 Technologies Inc., a conduit between researchers and the military, brought the idea to Dunn. Blair said research elsewhere that deals with detecting IEDs takes different approaches.

"They're looking at everything from better sniffers to better X-ray machines," Blair said. "What is unique about his research is the methods used to analyze the data."

He said Dunn's research shows promise and more government money has been requested.

"We gave him a little bit of seed money to see if it can work and he did it," Blair said. "Because of recent events in London, we have looked at accelerating this."

Blair said the eventual goal is being able to identify a bomb from 200 yards away and detect roadside IEDs while traveling at a high rate of speed.

"Are we there? No. Are we close? No. Are we on the path that could be successful? And the answer is yes," Blair said.

Recently, Dunn was busy in his laboratory, which looks like a storage yard.

Several plastic 10-gallon barrels filled with fertilizer, sand or water are near a platform on which there's a 3-square-foot aluminum box. Cables and electrical cords snake around the floor. Three metal canister-shaped detectors relay information to a laptop computer.

Part of the testing includes placing a barrel of fertilizer inside the metal box, which stands in for a vehicle. Fertilizer substitutes for explosives because it has some of the same properties, such as a high nitrogen content that reacts much the same way to the radiation.

Neutrons and gamma ray radiation from various sources are beamed into the box. The detectors read the return signals, somewhat like a radar gun. The signals go into a computer to determine whether there's something to worry about.

"We're trying to get as many signatures as possible to see if it's likely that an explosive is present," Dunn said. "Any one by itself wouldn't be conclusive, but in combination, we're trying to show it's likely to be an explosive material."

Beausang said using radiation to locate high concentrations of several elements present in explosives seems like a good approach.

"Instead of looking for one aspect of the data, you look at multiple aspects at the same time and that is what I think he's doing," he said. "Certainly, it is a legitimate way to detect explosives."

It's complex technology, but Dunn has a simple goal.

"We're looking for one thing. We're only interested if there are explosives on board," he said.

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