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EXPLOSIVE NEWS

2014

Happy
New
Year

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Dolphin Sonar Inspires Coin-Sized Bomb Detector

Source: http://i-hls.com/2013/10/dolphin-sonar-inspires-coin-sized-bomb-detector/?utm_source=rss&utm_medium=rss&utm_campaign=dolphin-sonar-inspires-coin-sized-bomb-detector&utm_source=iHLS&utm_medium=Guy&utm_campaign=RSS&goback=.gde_1528217_member_5801558673813680128#!

Nature inspiring technology. Dolphin clicks have inspired the development of a cheap, coin-sized radar gadget that can sense hidden electronics. The device could be used to find covert surveillance bugs, bomb triggers or timers – even if they are hidden in large piles of clutter or garbage.

While watching a nature show, acoustics engineer Timothy Leighton of the University of Southampton, UK, wondered why dolphins blow clouds of bubbles from their blowholes to corral fish. Surely, he thought, these “bubble nets” must reflect sonar clicks and wreck the dolphin’s ability to locate their prey? “Even the best man-made sonar couldn’t distinguish between the fish and bubbles,” he says. “There had to be something else going on.”

According to New Scientist, by experimenting with different forms of acoustic signals, he found that a large pulse followed by a small one could reflect sound waves in such a way as to allow fish and bubbles to be easily distinguished. “We built a sonar that did this and took it out to sea and it worked beautifully,”



Leighton says, though he adds that he isn’t sure this is how dolphins detect their prey.

The same technique should in theory also work with radio waves, so Leighton built a prototype radar and tested it. He found it could tell the difference between a wide range of materials.

The radar is small – about 2 cms across – and Leighton says it can be built for just €2. “If you have bombs hidden in roadside rubbish like plastic bags, wood scrap, bike wheels and drinks cans it distinguishes the interesting devices – those containing metal wires and semiconductors – so you might pinpoint a bomb circuit for instance,” he says. It could also be used after an earthquake to locate people buried in rubble by seeking their iPods or phones.

“This advanced radar shows promise,” says Gary Kemp, programme director at Cambridge Consultants in the UK. Any technology that increases the probability of detecting improvised explosive devices or buried casualties will undoubtedly save lives, he says. “Evolution has once again sparked ideas for remarkable innovation.”

October deadliest month in Iraq since 2008

Source: <http://www.middle-east-online.com/english/?id=62325>



Violence in Iraq is at its worst level since 2008, figures showed Friday, as premier Nuri al-Maliki was to appeal for Barack Obama’s help to combat a spike in militancy.

The new figures capture a months-long surge in unrest despite wide-ranging operations targeting insurgents and a major tightening of security in Baghdad and elsewhere, with no sign of respite ahead of elections due within months.



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Two years after US forces withdrew from Iraq, Maliki is to call for more military equipment and greater security cooperation in talks with the American president later on Friday in Washington, after likening the fight against Al-Qaeda-linked militants to a third world war.

Figures released by the ministries of health, interior and defence showed that violence last month left 964 people dead - 855 civilians, 65 policemen and 44 soldiers - and another 1,600



wounded.

The United Nations put the figure even higher, with 979 people killed and 1,902 wounded.

"Indiscriminate violence is constant," UN special envoy Nickolay Mladenov said in a statement.

"It is urgent that the Iraqi leaders take together the necessary bold steps to bring an end to the current mayhem, and to foil attempts by terrorists to destroy the social fabric of the Iraqi society."

The overall government death toll is the highest such figure since April 2008, when 1,073 people were killed.

At that time, Iraq was slowly emerging from a brutal sectarian war that claimed tens of thousands of lives and only slowed when the United States sent in a surge of troops and partnered with former Sunni insurgents against Al-Qaeda's local affiliate.

But nearly two years after the US military withdrew from Iraq and a civil war erupted in neighbouring Syria, Iraq once again appears on the verge of another round of sectarian bloodletting.

Violence continued to roil Iraq on Friday, with four people killed in the north of the country.

Figures compiled by AFP based on reports from security and medical officials showed a decline in violence last month, but still put the

death toll at one of the highest levels of the year.

Overall, at least 743 people were killed in attacks in October, according to the AFP tally, more than in January, February and March combined.

Militants last month targeted everything from public parks and restaurants to funerals and government buildings, killing security forces, civilians and civil servants, with dozens of suicide bombings and vehicles packed with explosives ripping through towns and cities.

Many days saw waves of violence nationwide, with a spate of attacks on October 5 killing 73 people, while 77 others died on October 17. On both days, the deadliest attacks were carried out in Baghdad.

Resurgent Al-Qaeda emboldened by Syria war

Much of the violence has been attributed to the Islamic State of Iraq and the Levant, an Al-Qaeda front

group opposed to Iraq's Shiite-led government that has carried out attacks in both Iraq and neighbouring Syria.

Diplomats and analysts have called for Maliki's government to seek a long-term accommodation with the country's disaffected Sunni Arab minority in order to drain support for militancy.

But officials have thus far concentrated on security operations that they insist are yielding results.

Maliki has meanwhile sought to drum up US support, calling in a speech on Thursday for an "international war against terrorism."

Speaking at the United States Institute of Peace, the Iraqi leader called Al-Qaeda "a virus" which was trying to spread "a dirty wind" around the region.

"If we have had two world wars, we want a third world war against those who are killing people, killing populations, who are calling for bloodshed, for ignorance and do not want logic to govern our daily lives."

Ahead of Maliki's talks with Obama, the United States vowed to help Iraq combat terror groups, but said Baghdad needed a broader strategy which was not just based on strengthening its military arsenal.

The top US commander in the Middle East, General Lloyd Austin,



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meanwhile gave voice to increasing concern in Washington that Al-Qaeda will manage to hunker down in a safe haven stretching from

western Iraq into Syria, in an interview with the Wall Street Journal.



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Source: <http://www.smithsdetection.com/en/products-solutions/explosives-detection-liquids/55-explosives-detection-liquids/ace-id.html>

New Sewer Sensors Sniff Out Signs of Bombs and Drugs

Source: <http://i-hls.com/2013/11/new-sewer-sensors-sniff-out-signs-of-bombs-and-drugs/>

Bomb-makers and chemists with Breaking Bad crystal-meth type labs better watch out. A sewer system full of chemical sensors could sniff out their homemade labs as part of a €4.5 million European Union-funded research program called Emphasis.



The idea is that once a sewer sensor finds telltale traces of home-brewed explosives, it sounds an alarm and a police team carrying a portable, high-resolution sensing unit can be dispatched to narrow the search and pinpoint the exact location. The technique could also be modified to look for signs of illegal drug factories.

According to New Scientist, Emphasis is led by Hans Önerud, an analytical chemist with the Swedish Defense Research Agency in Kista, north of Stockholm. His approach relies on the fact that some liquids and gases from bomb or drug production will leak into the sewers through sinks, baths or toilets, and into the air via windows and skylights.



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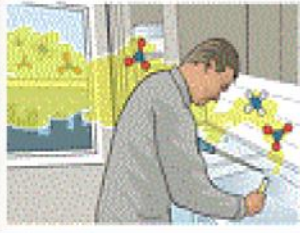
He says a hint that such gases might be detectable became clear in the wake of the London bombings on 7 July 2005 that killed 54 people. Fumes from the explosives made at a house in Leeds, U.K., killed

EMPHASIS

A novel system for pin-pointing IED manufacturing facilities

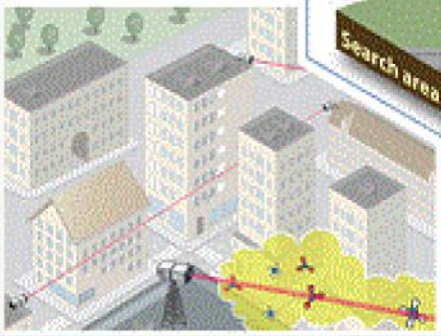
1. Illicit production of home made explosives and bombs

The explosives/precursors are vented out into the surrounding air and discharged into the sewage.



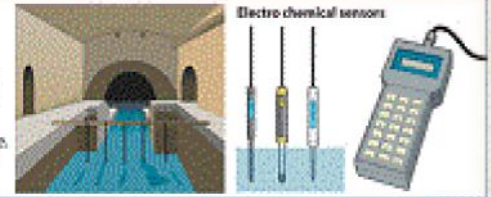
2. Area monitoring subsystem

Static sensors with the capacity to monitor long distances (e.g. 100-400 metres) will be used for continuous online air monitoring of explosives present in the vapour phase. The weather conditions and architecture of the city influences the distribution of the explosives in the atmosphere.



3. Sewer water monitoring subsystem

The chemical syntheses of explosives used in illicit bomb factories necessitate the disposal of surplus reagents into the sewage. This will lead to concentration gradients of the explosives in the sewage. Electrochemical sensors can be used for detection of explosives in the sewage.



4. Communication systems and search strategy

The network of static sensors requires an extensive system for data communication. The intention is first to cover a large area that will be reduced step by step to smaller areas as a consequence of a positive alert. The number and position of the sensors will be increased in the narrowed area.

5. Command centre

The analysis data from the sensors are fused and sent to the command centre where further automatic data processing occurs.



6. A positive alert

Alerts are handled by security personnel. Stand-off detection using mobile units, in covert format, will be used for pin-pointing the bomb factory. The quality of the collected data will yield sufficient assurance to lead to further actions by police and is intended to be acceptable as evidence in subsequent forensic analyses (performed outside the EMPHASIS concept).



7. LOTUS – Localisation of Threat Substances in Urban Society

The systems of the FP7 project LOTUS and EMPHASIS will complement each other in the detection of IED manufacturing facilities. The LOTUS project is based on using mobile units, e.g. police cars, equipped with sensors and a similar communication system. The harmonisation of the LOTUS and EMPHASIS systems is a possible future outcome.

plants in the garden.

Örnerud's team claims that they have successfully tested their sensors in the lab. The sensors are designed to pick up signs of explosives precursors, such as chemical reagents and reaction breakdown products. Each sensor comprises a number of 10-centimetre-long devices called ion-selective electrodes that are submerged in the wastewater flow of a sewer.

Only ions that come from the breakdown products of bomb-making chemicals can diffuse through the membranes in the electrodes, changing a resistor's voltage in a telltale way. Software looks for patterns in the concentration of target ions. Above ground, an infrared laser carries out a sweep of an area looking for the spectra of target gas molecules. The Emphasis sensors have been developed and tested on faeces-rich wastewater in the lab and will be tested in real sewers next year.

Instead of ad-hoc sampling, sensors could track drug use in real time – for example, monitoring usage patterns to inform public-health programs. "We are thinking about illicit drugs detection and this could be the next aim we focus on," says the project's sensor specialist Frank Schnürer of the Fraunhofer Institute in Germany. The country's Ministry of Education and Research will be looking for research proposals for sewer-based drug detection soon, he says.



Implant Sciences Sells QS-H150 Explosives Trace Detectors for Nuclear Power Plant Protection in China

Source: <http://phx.corporate-ir.net/phoenix.zhtml?c=88760&p=irol-newsArticle&ID=1872980&highlight=>

Implant Sciences Corporation (OTCQB: IMSC), a high technology supplier of systems and sensors for homeland security and defense markets, announced today it has sold multiple units of its QS-H150 handheld explosives trace detectors to a customer in China. The units will be deployed across several locations for the purpose of protecting nuclear power plants in multi-layered security environments.

"We've been selling our QS-H150s in China since 2005, and during that time they have earned a well-deserved reputation for superior performance. QS-H150s are trusted for use in the most mission-critical settings," stated Implant Sciences' Vice President of Sales and Marketing, Darryl Jones. "In the past Implant Sciences has provided QS-H150s for nuclear power plant protection in other countries such as Japan and Spain. We are pleased to announce this sale which marks the first such deployment in China."

About the QS-H150 Handheld Explosives Trace Detector

The QS-H150 utilizes Ion Mobility Spectrometry (IMS) technology, providing fast, accurate detection of trace amounts of a wide variety of military, commercial, and homemade explosives. Built with no radioactive materials and featuring a low-maintenance, self-calibrating, and self-clearing design, the QS-H150 provides very high levels of operational availability. The QS-H150 has been proven to perform well in a wide variety of temperatures and challenging environments, from humid jungles to dry, sand swept deserts.

Features:

- Photonic (non-radioactive) ionization
- Patented non-contact vortex collector sample acquisition
- inCal automatic internal calibration system
- No calibration or verification traps
- Simultaneous vapor and particulate detection
- Threat and taggant identification

Benefits:

- Lower total costs of ownership
- Very low false positive rate
- Full range of detectable substances
- User-expandable threat library
- Fast analysis
- Rapid clear-down
- Minimal maintenance requirements



TSA to Test New Checkpoint Detector Systems

Source: <http://i-hls.com/2013/11/tsa-to-test-new-checkpoint-detector-systems/>

The U.S. Transportation Security Administration has ordered advanced software and hardware for uncovering liquid explosives and other threats.

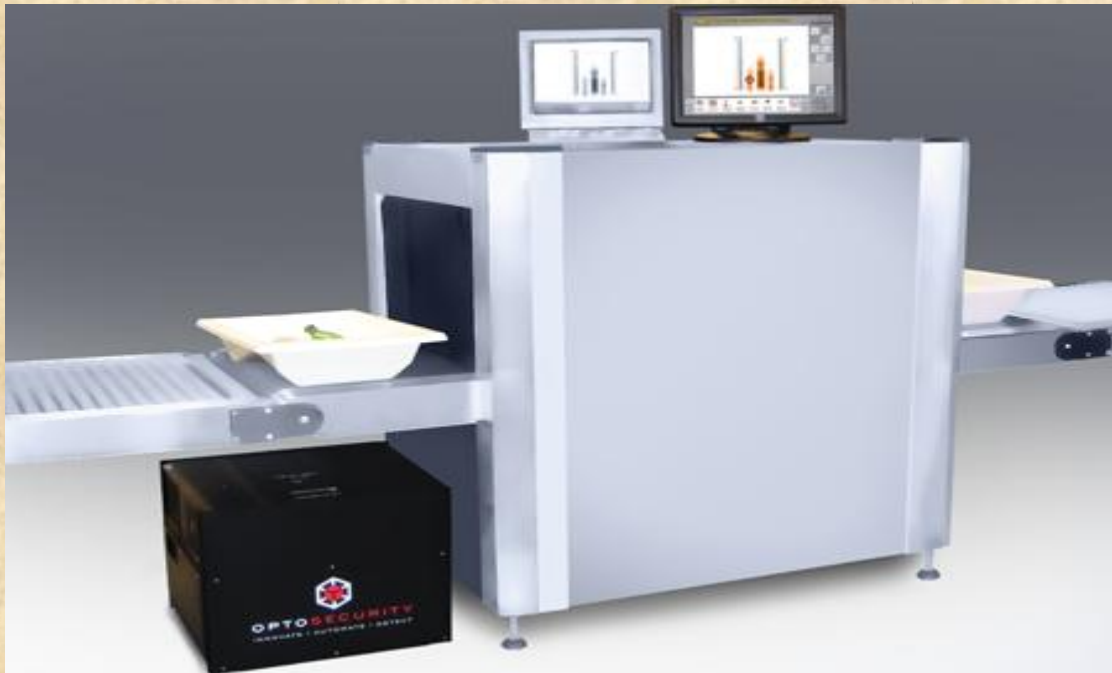
The systems, which can be retrofitted into existing checkpoint X-ray detection devices, are from Optosecurity Solutions and will be tested at various TSA locations around the country.

Optosecurity is providing its OptoScreener and eVelocity systems under the contract. OptoScreener retrofits into existing X-ray detection platforms to automatically detect liquid explosives, other liquid threats, bottles, firearms and firearm parts, and other threats.



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eVelocity is a solution that allows airports to collect and integrate real-time operational data from



multivendor X-ray machines. Analysis of the data is done using queuing services and image analysis of scanned items.

New Explosives Detector Receives DHS Approval

Source: <http://i-hls.com/2013/11/new-explosives-detector-receives-dhs-approval/>

Implant Sciences Corporation announced that the QS-B220 explosives and drugs trace detector has been issued a SAFETY Act Designation from the Department of Homeland Security.



The SAFETY Act facilitates the development and deployment of effective anti-terrorism technologies by providing product liability protection. The Act creates liability limitations for claims arising out of, relating to, or resulting from an "Act of Terrorism" where Qualified Anti-Terrorism Technologies have been deployed.

Implant Sciences Corporation, a high technology supplier of systems and sensors for homeland security and defense markets, have developed the QS-B220 to use Ion Mobility Spectrometry (IMS). This rapidly detects and identifies trace amounts of a wide variety of

military, commercial, and homemade explosives.

The system features a large touch screen for simple operation. Image: Implant Sciences



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With low maintenance requirements, the QS-B220 can be deployed for a low total cost of ownership. The device features a radioactive material-free design, push-button maintenance and diagnostics, and a patented inCal(TM) internal automatic calibration system.

Features:

- inCal automatic calibration
- Photonic (non-radioactive) ionization
- Easy-to-use touch screen user interface
- Low maintenance design delivers low total cost of ownership
- Full range of detectable substances with user-expandable threat library

Benefits:

- Very low false positive rate
- Capable of rapidly detecting and identifying both explosives and drugs
- Rapid clear-down
- Lower total cost of ownership
- Minimal maintenance requirements

The Ergonomics of bomb-making at sea

Source: <http://www.homelandsecuritynewswire.com/dr20131114-the-ergonomics-of-bombmaking-at-sea>



Sailors preparing ordnance for delivery // Source: wikipedia.org

In an effort to stem work-related injuries and speed the assembly of munitions aboard aircraft carriers, the Office of Naval Research (ONR) spearheaded the development of a more efficient and ergonomic way to build bombs at sea, officials announced 6 November.

An ONR release reports that the ONR-sponsored improvements will allow sailors to move around more freely and assemble multiple bombs simultaneously on smaller, individual stands.

"The main objective here is to improve the quality of life for Sailors," said Tom Gallagher, who manages the ONR TechSolutions program that oversaw the improvements. "They asked for a better, safer, more comfortable way to

build these weapons, and that's what we're delivering."

For safety reasons, crews try to avoid storing assembled bombs aboard ships. Instead, sailors work in the ship's magazine to put together weapons as needed.

In addition to being heavy, bombs include many components such as noses, tails, fuses, lugs and wires that have to be assembled without power tools. Until now, this has been done on a long table in confined space, requiring repetitive and often

awkward motions that can result in painful and costly injuries, especially to the back.

During a recent demo at Naval Station Norfolk, Virginia, sailors from USS George H.W. Bush (CVN-77) who had never seen the new tables before were able to set them up in less than two minutes and begin building a GBU-16, a 1,000-pound laser-guided bomb.

The new stands can accommodate bombs weighing up to 2,000 pounds and be adjusted for height, eliminating the need for workers of different heights to repeatedly bend down or stretch awkwardly to reach components.

The idea for the new bomb-assembly tables came from ONR's naval aviation science advisor as a result of direct interaction with sailors. ONR then partnered with Naval Surface Warfare Center Carderock Division - Ship



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Systems Engineering Station (NSWCCD-SSES), BAE Systems, and Newport News Shipbuilding to make them a reality.

"It's a perfect example of how a TechSolutions project is supposed to work," said Tom McCammon, an engineering technician at NSWCCD-SSES. "We have been getting invaluable feedback from Sailors, which shortens our design cycle and helps us get this improved capability to the fleet even faster."

The release notes that TechSolutions is designed to bridge the gap between warfighters and scientists by accepting requests directly from Sailors and Marines and

delivering prototypes to them within eighteen months.

Through this and other programs, ONR is finding affordable solutions that answer Chief of Naval Operations Adm. Jonathan Greenert's call in his 2014-2018 Navigation Plan for timely modernization to increase the proficiency and readiness of deployed forces.

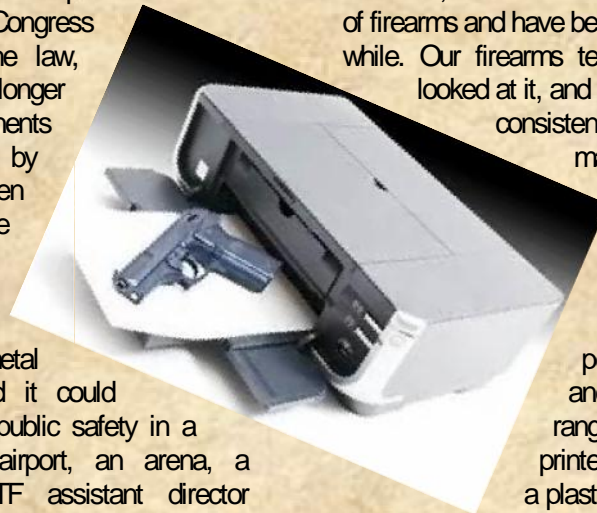
The next step for the prototype bomb-assembly tables is to bring them aboard an aircraft carrier to allow sailors to build bombs on them in an actual magazine. This will provide valuable information on how best to integrate them into a real ship environment.

Security agencies concerned about plastic guns

Source: <http://www.homelandsecuritynewswire.com/dr20131119-security-agencies-concerned-about-plastic-guns>

The Undetectable firearms Act of 1988, which makes it illegal to manufacture, import, sell, ship, deliver, process, transfer, or receive a firearm which is not detectable by walk-through metal detection, is set to expire on 9 December 2013. If Congress fails to reauthorize the law, plastic guns will no longer require metal components which are detectable by metal detectors. "When these 3D firearms are manufactured, some of the weapons can defeat normal detection such as metal detectors, wands, and it could present a problem to public safety in a venue such as an airport, an arena, a courthouse," says ATF assistant director Richard Marianos.

Officials at the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) are exploring the extent to which 3D printed firearms can be a threat to public security. Findings from an ATF study released last week conclude that 3D printed guns are lethal and difficult to detect. "When these 3D firearms are manufactured, some of the weapons can defeat normal detection such as metal detectors, wands, and it could present a problem to public safety in a venue such as an airport, an arena, a courthouse," says ATF assistant director Richard Marianos told NPR.



ATF is more concerned about 3D printed guns than it was earlier this year, when spokesperson for the ATF field office in Charlotte, North Carolina, Earl Woodham told *Vice* that, "we are aware of all the 3D printing of firearms and have been tracking it for quite a while. Our firearms technology people have looked at it, and we have not yet seen a consistently reliable firearm made with 3D printing."

KUHF News reports that 3D printed guns are made of strong and flexible materials with bullets that can penetrate human organs and the skull at close range. A high grade 3D printer can print the parts for a plastic gun in as little as ten hours. Federal agents are not primarily concerned with a gang member or ordinary felons getting his or her hands on a plastic gun, as they are still less effective and more costly than conventional guns. Some criminals or terrorists may make the investment to obtain or print a 3D gun, especially as the technology and materials improve.

Texas based Defense Distributed has published online instructions for making a 3D printed handgun. Company founder Cody Wilson told *Vice*, "we are trying to follow the law as it is now and be good citizens."



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Building a gun at home does not violate federal laws, but a license is needed to sell weapons to others.

Plastic guns have been available since the 1970s but they have always contained metal components for parts like the trigger and hammer and firing pin, according to Earl Griffith, chief of the firearms technology branch at the ATF.

The Undetectable firearms Act of 1988, which makes it illegal to manufacture, import, sell, ship, deliver, process, transfer, or receive a firearm which is not detectable by walk-through metal detection, is set to expire on 9 December 2013. If Congress fails to reauthorize the law, plastic guns will no longer require metal

components which are detectable by metal detectors.

“You can always say the genie’s out of the bottle, why do we need a new law?” Representative Steve Israel (D-New York) told NPR. “Well, I’ll tell you why we need a new law. If it’s easy to make plastic guns, we want to make it harder for them to get past metal detectors and onto our planes.”

The law was last reauthorized in 2003, but Israel has doubts on whether the law will be reauthorized before the upcoming December deadline.

The ATF is working with airport security and other law enforcement partners to do more training on how to detect plastic guns.

Advance in bottle scanning could enhance airport security and benefit passengers

Source: <http://www.lanl.gov/newsroom/news-releases/2013/November/11.25-magray-screening.php>



MagRay engineer Larry Schultz puts a bottle of surrogate material that mimic homemade explosives into the MagRay bottle scanner.

Los Alamos scientists have advanced a Magnetic Resonance Imaging (MRI) technology that may provide a breakthrough for screening liquids at airport security. They’ve added low-power X-ray data to the mix, and as a result have unlocked a new detection technology. Funded in part by the Department of Homeland

Security’s Science and Technology Directorate, the new system is named MagRay.

The goal is to quickly and accurately distinguish between liquids that visually appear identical. For example, what appears to be a bottle of white wine could potentially be nitromethane, a liquid that could be used to make an explosive. Both are clear liquids, One would be perfectly safe on a commercial aircraft, the other would be strictly prohibited. How to tell them apart quickly without error at an airport security area is the focus of Michelle Espy, Larry Schultz and their team.

“One of the challenges for the screening of liquids in an airport is that, while traditional X-ray based baggage scanners provide high throughput with good resolution of some threats, there is limited sensitivity and selectivity for liquid discrimination,” said Espy, a Los Alamos National Laboratory physicist and MagRay Project Leader. “While MRI can differentiate liquids, there are a certain class of explosives, those that are complex, homemade, or may have mixes of all kinds of stuff that are more challenging.”

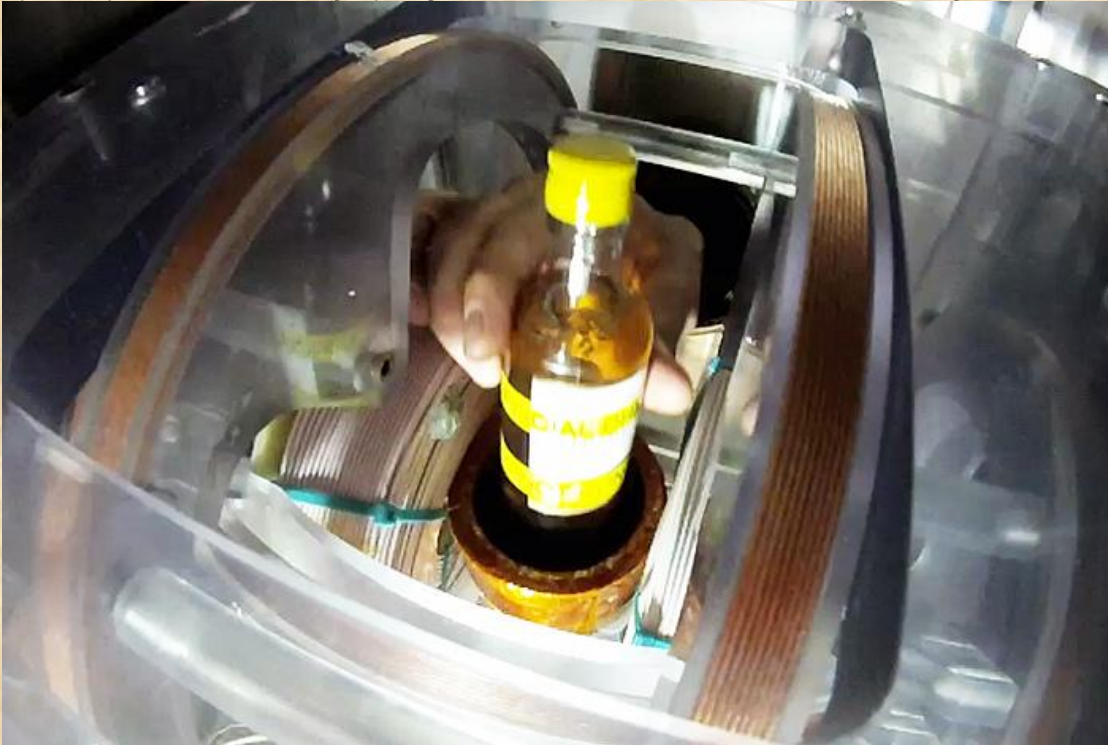
In a new video, Espy and the MagRay team explain how the new technology works, how they’ve developed an easy operator interface, and what the next steps might be in transitioning this technology to the private sector.

“I am amazed at how good it works,” said Espy. “We’ve been able to look at a really broad class of explosives, we’ve been able to look through all kinds of packaging, and we’ve unlocked a new parameter – proton content – that’s not available to either X-ray or MRI alone.”



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“We’re looking for where a liquid lies in a sort of three-dimensional space of MRI, proton content, and X-ray density,” said Schultz, MagRay engineer. “With those measures we find that benign liquids and



threat liquids separate real nicely in this space, so we can detect them quickly with a very high level of confidence.”

Testing explosives capability helping armor research

Source: <http://www.homelandsecuritynewswire.com/dr20131203-testing-explosives-capability-helping-armor-research>

In modern warfare, military vehicles use enormous armored panels to defend against weapons. Boosting protection by adding more steel, however, eventually makes equipment too heavy to use. There are other ways to defend against a weapon besides trying to stop it with just mass — smarter, more economic ways that are waiting to be discovered.

A testing explosion at the Idaho National Laboratory // Source: inl.gov



Far out in the eastern Idaho desert, four men crowd behind a half-buried bunker and wait. James Schondel, a burly man with a thick mustache, leans over what looks like a lunch box with a long white wire attached to it. He yells, “Fire in the hole!” before pressing a button on the box. The resulting “BOOM!” shakes the ground and feels like a pound to the chest even on the far side of the bunker. At INL, unique testing grounds and expertise align to combat contemporary national security challenges.

This is the team of Idaho national Laboratory (INL) explosives experts, materials scientists, and armor researchers who work in unique conditions amidst the sagebrush and tumbleweeds to study explosives and armor technology that could protect war fighters and enhance national security.

An INL release reports that today the researchers are using a new capability that could aid the design of stronger armor for U.S. troops. By



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seeing through smoke and fire, INL's newly implemented flash X-ray system can reveal how a projectile or weapon interacts with armor at the exact moment of impact. This approach allows researchers to form a better understanding of the complex and high-speed interactions between weapons and armor.

This day of testing is dedicated to learning about the formation and flight of a specific weapon. "The reason we do this is because we have to calibrate a weapon, then we design the armor to counter it," said Henry Chu, an armor specialist and the senior researcher at the site today. "[First] we've got to know what we are up against. We need to see through all the smoke and flashes to see what is going on."

In modern warfare, military vehicles use enormous armored panels to defend against weapons. But boosting protection by adding more steel eventually makes equipment too heavy to use, said Jeff Lacy, an armor researcher who operates the flash X-ray system. There are other ways to defend against a weapon, he said, besides trying to stop it with just mass; smarter, more economic ways that are waiting to be discovered.

The team is looking at ways to create lightweight, cost-effective armored material that is still high performance in combat. The armor specialists are also trying to find new ways to "defeat" weapons when they contact an armored surface. But in order to determine what those defeat mechanisms are, the researchers must understand the physics of the weapon itself. That is where the flash X-ray becomes important.

Freezing a bullet

Unlike a high-speed camera, the flash X-ray can penetrate smoke, wood and other low-density materials to photograph the exact moment when a weapon pierces a target.

"An X-ray is an old technology that [generates] a high-energy wave to travel through low-density stuff like air, smoke and fireballs and can see what is going on inside a blast event," said Lacy. While X-ray technology might be old, this particular piece of equipment is very powerful. The flash X-ray is "dumping 6000 amps at 450,000 volts in only 25 nanoseconds," he said. "That's very modern technology, and very cool." It is this kind of power that gives the researchers the ability to see when a bullet hits armor.

Today the team is taking photos of copper "jets" shot from a shaped charge. A shape charge is the inner explosive device that can be found in a variety of military weapons and also commercial mining and drilling operations. The shape charge is a copper lining in the shape of a cone that is surrounded on one side with explosive material. When the explosive detonates, the copper cone collapses in upon itself to form a long, incredibly fast jet that can penetrate several inches of armor steel.

The crew wants to capture an image of the jet in flight, before it rams into the layers of armored steel they stacked as a target directly below. To do this, the X-ray must be timed perfectly. A silver-coated paper screen triggers the X-ray. When the jet pierces through the screen, it sends a signal to trigger the flash X-ray. To set it off at just the right moment, Lacy sets the flash X-ray to fire at 7.5 microseconds (7.5 millionths of a second) after the shape charge penetrates the trigger screen to catch it in midflight.

Captured in flight

Chu grabs the film out of protective metal plating and scans it into his computer. He watches as a grainy grey and white image appears — a long broken line floating above a black block.

"You can see that the jet is a stream of high-temperature copper particles, roughly about 600 degrees centigrade," said Chu, pointing at the long line on the computer screen. It is very hot, but it is not molten like most people think — it is actually a stream of particles that is broken up, not in a continuous stream."

Understanding how the copper behaves in flight could reveal opportunities for defeating this powerful weapon. Right now, these types of munitions cause a lot of damage to barriers and armored vehicles.

Comparing the images with the depth of penetration into the steel targets, the researchers gain insight into material behavior of the steel, explained Ben Langhorst, an INL materials scientist. He works hand-in-hand with fellow scientist Michael Bakas, who works in the laboratory to pick out and design new armor materials.

In the laboratory, the researchers will analyze the armor's performance based on how the projectile gets broken up, shatters or stays intact. By looking at images taken before,



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during and after a projectile, such as a bullet, hits the steel, Langhorst can determine the velocity of the projectile, and how much energy it lost going through the target. Shattering a projectile, bending it or stopping it altogether are all different ways the material is changing the energy, or power, of the projectile. INL researchers are looking at how these characteristics between the different outcomes (like shattering versus bending) could help defense strategies.

Knowing how armor fails against weapons brings the scientists closer to designing a material that can withstand such lethal forces in the field of duty.

“The engineering challenges are exciting, and being able to incorporate bombs and bullets into your work is always fun,” said Langhorst with a sly grin, “especially when it is scientific in nature.”

52 Doctors and nurses killed in Yemen’s ministry assault

Source: <http://www.aljazeera.com/news/middleeast/2013/12/strong-blast-rocks-yemen-defence-ministry-201312565750185751.html>

A suicide bombing has rocked Yemen’s defence ministry complex in the heart of the

Yemen’s Higher Security Committee said 52 doctors and nurses were killed in Thursday’s attack on the Ministry of Defence and around 162 people were injured.



A suicide bomber and gunmen wearing army uniforms targeted the ministry compound in the capital Sanaa in the worst single attack in Yemen for 18 months.

capital Sanaa, followed by a gun battle that left many casualties, according to the Yemeni

A statement by the committee said some of those killed were Germans. It did not give a number of officers and gunmen dead.

The ministry said that the attackers had



Defence Ministry (5 Dec 2013).

targeted and badly damaged a hospital inside the complex but that



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the situation was now under control. Foreign doctors and nurses are reported to be among the ones killed.

The suicide explosion was caused by a bomber who drove a car packed with explosives into the gate; media reports quoted the defence ministry as saying. The blast was followed by another car of gunmen opening fire at the ministry.

Plumes of smoke billowed across the complex, situated on the edge of the Baba al-Yaman neighbourhood.

There was no immediate claim of responsibility for the attack.

Fighters emboldened

Yemen has been plagued with a series of violent attacks, as the interim government grapples with southern secessionists, al-Qaeda-linked groups and northern Houthi rebels, as well as severe economic problems

inherited from veteran President Ali Abdallah Saleh who was forced out of office following protests against his rule in 2011.

Fighters were emboldened by a decline in government control over the country and seized several southern cities before being driven out in 2012 in an offensive supported by United States and drones.

Al-Qaeda-linked fighters have killed hundreds of Yemeni soldiers and members of the security forces in a series of attacks since then. In July last year, a suicide bomber wearing a Yemeni army uniform killed more than 90 people rehearsing for a military parade in Sanaa. Al-Qaeda later claimed responsibility for the attack.

Yemen's defense minister, Major General Muhammad Nasir Ahmad, escaped a car bomb on his motorcade in September 2012 that killed at least 12 other people.

The fight against explosive devices in Afghanistan

Source: <http://www.counteriedreport.com/news/the-fight-against-explosive-devices-in-afghanistan>

In Afghanistan, bags of ammonium nitrate are smuggled over the border with Pakistan to use as homemade explosives while insurgents turn innocuous household items into improvised explosive devices. While stepping on one almost

automatically those caps are activated and the IED goes off," Organisation for Mine Clearance and Afghan Rehabilitation (OMAR), Conventional Weapons Destruction, Project Manager Hukum Khan Rasooly said.

And while stepping on one almost certainly means serious injury or death, disposing of them can be just as dangerous.

Just outside Kabul local elders discover what they believe to be old Soviet explosives. A specialist team from the Organisation for Mine Clearance and Afghan Rehabilitation or OMAR, led by Hukum Khan Rasooly is called out to investigate.

Rasooly said, "They look like a toy for the children. When they come across them, they do not have that knowledge to recognise that these are UXOs or sub-ammunition. They start playing with them, and that causes them to



certainly means serious injury or death, disposing of them can be just as dangerous.

"These numbers are saved here. Whenever you are dialing these numbers on the cell phones, then there is caps, electric caps, and



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blow off. And most of the casualties now in Afghanistan are from these items.”

The first thing that strikes you about these unexploded devices is just how inconspicuous they are. They really do look like any other rock. And you can just imagine a child from the local village, which is about 100 metres in that direction walking over and picking one up. And that is how thousands of people die in Afghanistan every year.

After the explosives have been found, many are destroyed in place, work that requires a deft hand and nerves of steel. One wrong move could see an explosive ordnance disposer blown to pieces.

But not all explosives are detonated in location. Explosive ordnance disposal teams from the Afghan security forces collect weapons caches from all over the country and bring them to police stations like this one where they are prepared for disposal.

“The bags you see contain 300kg of ammonium paste. We found it in a 2007 model Toyota Corolla ready to use in a suicide attack. It was discovered at Pul-e-Charkhi Gate in Kabul and diffused.”

“The danger is the threats to the roads, villages and people. Children cannot go to school. It has threatened agriculture. Farmers cannot work freely,” Afghan security forces Deputy

Commander of weapons collection, Colonel Aqa Gul Mushtaq said.

After the explosives are diffused, they're taken to controlled disposal sites such as this one in Jalalabad. Today, conventional weapons destruction teams or CWDs funded by the US Department of State prepare to remotely detonate 2.5 tonnes of explosive materials.

“Around 100,000 tonnes of UXO are separated around Afghanistan. Just imagine, by the collecting and destroying of those items, how many innocent lives have been saved,” Hukum Khan Rasooly said.

Organisations such as OMAR, HALO and Sterling (two other organisations which, like OMAR deal with mine clearance and explosive ordnance disposal) focus efforts on training diffusers, clearing ordnance and running programmes to educate local people on the risks of unexploded ordnance.

And with counter-IED now an integral part of the NATO Training Mission Organisations such as OMAR, HALO and Sterling (two other organisations which, like OMAR deal with mine clearance and explosive ordnance disposal) focus efforts on training diffusers, clearing ordnance and running programmes to educate local people on the risks of unexploded ordnance.

U.S. Navy to Adopt New Explosives Detection Tech

Source: <http://i-hls.com/2013/12/u-s-navy-to-adopt-new-explosives-detection-tech/>

U.S. Navy bomb-disposal experts are asking industry members to submit candidate ground-based multispectral and hyperspectral imaging systems for comparative tests and evaluations scheduled for next summer.

Explosive Ordnance Disposal Technology Division in Indian Head, Md., have issued a sources-sought notice for the Ground-Based Hyperspectral Imaging program.

The initiative is surveying industry for multispectral and hyperspectral imaging systems able to detect explosives at standoff distances. These ground-based systems should help experts detect trace and bulk explosive materials at safe distances at checkpoints or with portable handheld systems, Navy researchers say.



According to Military & Aerospace, officials of the Naval Surface Warfare Center (NSWC)

Hyperspectral imaging sensors look at many spectra of light in closely spaced bandwidths.



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It differs from infrared thermal imaging, which only looks at one light spectrum, and from multispectral sensors, which look at several different light spectra spaced widely apart.

The big advantage of hyperspectral imaging is in the detail it can provide. **An infrared sensor or multispectral sensor for example, might**

indicate the presence of a target of interest. A hyperspectral sensor though, might indicate not only the presence of a target, but also the kind of metal it's made from, the color and type of paint it has, or the amount of moisture it contains.

There is a relevant **video** at source's URL.

U.S. "bomb library" marks 10-year anniversary

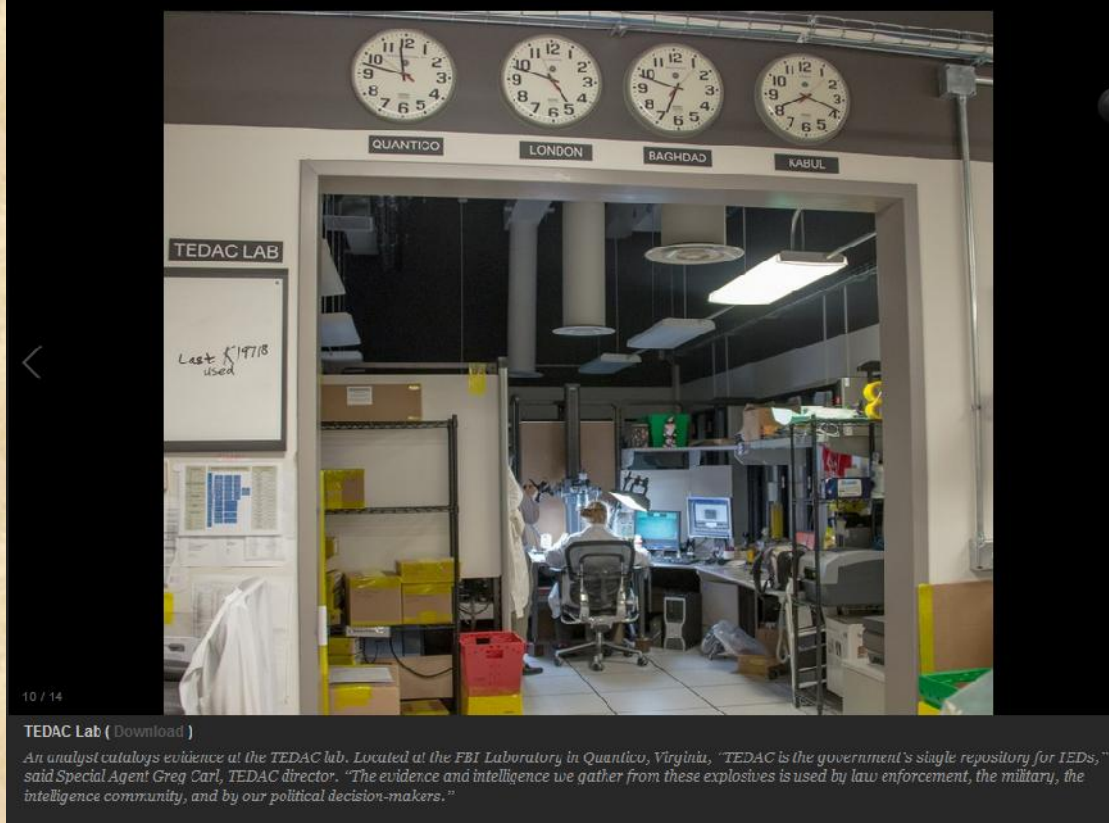
Source: <http://www.homelandsecuritynewswire.com/dr20131213-u-s-bomb-library-marks-10year-anniversary>

It has been ten years since the FBI established the Terrorist Explosive Device Analytical Center (TEDAC), and since that time the multi-

says that today, TEDAC coordinates all those efforts.

Located at the FBI Laboratory in Quantico,

Photo Gallery: Inside TEDAC



agency operation — sometimes referred to as America's bomb library — has become an important tool in the nation's fight against terrorism.

Before TEDAC, no single government entity was responsible for analyzing and exploiting evidence and intelligence related to the improvised explosive devices (IEDs) used by international and domestic terrorists. The FBI

Virginia, "TEDAC is the government's single repository for IEDs," said Special Agent Greg Carl, TEDAC director. "The evidence and intelligence we gather from these explosives is used by law enforcement, the military, the intelligence community, and by our political decision-makers. There is no question that the work we have done — and continue to do — has helped to save American lives."



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Whether bombs come from the battlefields of Afghanistan or from homegrown terrorists within U.S. borders, TEDAC's thirteen government agency partners and seventeen external partners collect the devices and send them to TEDAC to be analyzed and catalogued.

"We exploit the devices forensically," said Carl, a veteran FBI agent who is also a bomb technician.

The results are analyzed by TEDAC's Intelligence Unit, and disseminated to law enforcement entities and the intelligence community to provide key intelligence on terrorist networks. "Based on the forensic evidence — DNA, fingerprints, and other biometrics — we try to identify the bomb maker and also make associations, linking devices together from separate incidents."

Since its creation in 2003, TEDAC has examined more than 100,000 IEDs from around the world and currently receives submissions at the rate of 800 per month. Two million items have been processed for latent prints — half of them this year alone. "Just from the sheer volume," Carl said, "we have a lot of experience identifying IED components and blast damage." As a result, he added, "we have identified over 1,000 individuals with potential ties to terrorism."

Also based on TEDAC analysis, more than 100 people have been named to the U.S. government's Terrorist Watchlist, a database that identifies subjects known or reasonably suspected of being involved in terrorist activity. "Putting individuals on the list prevents them from entering the country," Carl said.

The FBI says that subject matter experts from TEDAC can quickly deploy to incidents — such as the Boston Marathon bombings last April — and work with FBI Evidence Response Teams and local law enforcement to collect critical evidence and quickly transport it to the FBI Laboratory in Quantico for analysis. "We sent our folks immediately to the scene in Boston to help coordinate the collection and processing of evidence," Carl said.

The agency notes that TEDAC is capable of much more than evidence collection for criminal prosecution, though. "Since we also partner with the military and the intelligence community, our work is utilized by many different sources," Carl said. The military, for example, uses TEDAC intelligence for force protection and to disrupt terror networks. Decision-makers can count on TEDAC's intelligence — based on forensic science — to help them form policy.

"And our interagency partners use TEDAC for research," Carl added, explaining that agencies can "check out" a bomb — much like a library book — for testing and further analysis. "We maintain all of the devices that we've collected going back to the inception of the center."

Looking back over a decade, and forward to the future — TEDAC is building a state-of-the-art facility in Huntsville, Alabama — Carl said, "I see TEDAC as good government. The fact that you have multiple agencies coming together, working toward one common cause, without duplicating resources, means that everyone benefits. And that helps make the country safer."

