On the Cutting Edge of Landmine Technology

The tools and technology of the demining world are constantly developing and improving. This article briefly describes several new instruments and techniques currently being developed that will hopefully aid in future demining activity.

Giant African pouched rats are being trained to detect landmines in Tanzania. *c/o www.altpet.net*

by Nicole Kreger, *MAIC*

Introduction

Cost, time and usability are currently the biggest issues being debated by the mine action community. While advancements in demining technology are indisputably imperative to the success of demining programs, it will ultimately depend on the donors and most importantly, the users, on whether this technology will actually save lives. What follows is a brief description of some of the latest up-and-coming innovations in the technology and tools used in the field of demining.

Technology

Acoustic Detection

Acoustical scientists are developing new methods of detecting landmines, two of which were presented at a meeting of the Acoustical Society of America that took place in early June of this year. The first method, developed by a research team from Georgia Tech, releases small seismic waves into the ground and measures the subsequent vibrations. The waves are not large enough to set off the mines, but they have been able to allow researchers to distinguish mines from other objects, such as rocks and sticks, in lab tests.

The other acoustical detection method was developed by a team from the University of Mississippi. This technique uses broadcast sound to produce measurable vibrations that can pinpoint concealed landmines with a laser sensor. In a difficult Army field test last year, the system was able to locate a record 95 percent of the buried mines. The team is now honing the system to make it capable of recognizing different types of landmines. For more information, visit the following websites:

• http://www.acoustics.org/press/139th/press_release.html#t09
• http://www.gtri.gatech.edu/res-news/MINES.html
• http://www.olemiss.edu/news/newsdesk/story438.html

Underground Detection

Blue Peter Technologies Co., Ltd., of Russia is striving to become the world's leading producer of underground detectors. The company's 2-D and 3-D Mobile Underground Detectors are designed for underground detection in almost any field, from electrical work to military use. In particular, its ability to find both plastic and nonplastic mines could revolutionize the demining field. The detectors will be produced and marketed starting later this year. For more information, visit the following website:

• http://www.koreaherald.co.kr/SITE/data/html_dir/2001/06/12/200106120008.asp

Silicon Polymer Detection

At the University of California, San Diego (UCSD), chemists created a silicon polymer designed to identify evidence of explosives. A very thin wire of silicon surrounded by an electrical conductor will glow under ultraviolet light—*unless* an explosive is present. The UCSD team harnessed this idea to create a device capable of being used in landmine detection. Researchers hope to put the instrument to use both on land and in water. UCSD chemistry and biochemistry professor William Trogler, who helped write an article on the project for the German chemistry journal *Angewandte Chemie*, said the polymer is capable of detecting TNT present in air down to one part per billion and in water down to 50 parts per billion. The team hopes to increase this sensitivity to one part per trillion. For more information, see:

• http://chem-faculty.ucsd.edu/sailor/TNTdetectors.html
• Angewandte Chemie International Edition, 2001 / 40, No. 11

New Tools

The BMR-3M

A new vehicle for mine clearance called the BMR-3M has been tested in Russia. The vehicle is designed to enter mine fields before infantry or escort military personnel into mined areas. Devised to detonate underground charges, the tank-like contraption is covered with several layers of armor on its underside in the event that some mines subsist. The machine is equipped with a jammer to block signals to radio-controlled mines, and it is designed so that the crew inside can use a machine gun to shoot at unexploded mines. The BMR-3M has been under combat conditions in Chechnya. For more information, visit the following website:

• http://www.milparade.com/2000/38a/02_01.shtml

HOPE

Current demining methods, such as mine detection dogs, metal detectors and manual probes, are often not ideally accurate since mines can be easily missed if they are small or made of plastic, and detection moves very slowly. The Handheld Operational Demining System Project (HOPE) employs a handheld device that makes use of ground penetration radar, a microwave radiometer and a metal detector. A processing system combines the three tools' data for quicker, more accurate results. The device is even capable of distinguishing between different types of mines. The project designers aim to create a more effective and cheaper method of mine detection. HOPE is currently enduring rigorous tests and field trials and should be completed within the next three years. For more information, visit the following website:

• http://www.hope-project.com/

CheckSITE

Sense Technologies, Inc., is developing a new global security product called CheckSITE. The system incorporates Oak Ridge National Laboratory's (ORNL) microelectromechanical sensor (MEMS) technology. While it may be used for a number of purposes, one of CheckSITE's intended uses is as an explosive detection tool, which would have a great impact on the landmine community. CheckSITE's objective is to provide a simple, quick and inexpensive detection tool to improve a number of fields related to explosives. For more information, contact:

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The BDM 48

A Canadian company has developed a tool called the Brush Deminer, or BDM 48, which is currently being tested by Thai soldiers. With its powerful steel teeth, the BDM 48 can easily clear mine-affected land of dense brush while its operator controls it comfortably from the air-conditioned cab. This method is considerably better than the current manual efforts of deminers, who wade through overgrown vegetation and detect mines individually, a very tedious process. Major Harry Burke, of Canada's National Defense said that the machine was ideal for the border terrain of Sa-Kaeo province on the Thai-Cambodian border, where it is being tested. Hopefully, the BDM 48 will significantly reduce the costs and the time involved in current demining techniques. For more information, visit the following website:

• http://strategis.ic.gc.ca/SSG/tp00226e.html
or contact either of the following:

~Jennifer Sloan
Press Secretary
Office of the Minister of Industry
Tel: (613) 995-9001
~James Roberge
Aerospace & Defense
Technology Partnerships Canada
Tel: (613) 941-6738

Neutron Detector

Dr. Richard Craig, a scientist at the Pacific Northwest National Laboratory in Richland, WA, recently received the Christopher Columbus Foundation Award for 2001 for his work on a new landmine detector. The new tool is called a timed Neutron Detector, and it detects hydrogen atoms, of which both metal and plastic mines are comprised. The system is lightweight and therefore portable, and it enables large amounts of land to be scanned in small periods of time. The grant from the Christopher Columbus Foundation will allow Dr. Craig to continue developing this work-in-progress and hopefully make it available to the demining community in the near future. For more information, visit the following websites:

• http://www.pnl.gov/news/2000/00-43.htm
• http://www.ornl.gov/news/pulse/pulse_v71_01.htm
or contact:

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Tel: (315) 258-0090

"Mr. Bean"

Researchers are working to train Mr. Bean, a giant African pouched rat, to detect landmines in Tanzania. These types of rats are easy to train and have a dog-like sense of smell. The Belgian government provides funding for the research, hoping to find a less expensive, but still effective, mine detector than those used currently. Rats are too small and light to set off mines, making them ideal as mine detectors. Currently, their most difficult obstacle as nocturnal animals is overcoming heatstroke. For more information, visit the following websites:

• http://www.ananova.com/news/story/sm_318674.html?menu=news.quirkies
• http://users.skynet.be/apopo/rat.htm
• http://www.rmca.org/Articles/suicide.htm

The Geo-3

Field tests have successfully been conducted on the Geo-3, an experimental new mine detector that uses radar. The system was developed by specialists of the Radioavionika Joint-Stock Society in St. Petersburg and tested in the suburbs of Grozny, Russia. There the system detected mines and shells as well as other explosive devices containing no metal objects. Even more impressively, the detector found UXO buried underground and hidden in recesses in brick walls.

For more information, visit the following website:

• http://rcaam.milparade.com/free/212/3-02.shtml

Conclusion

For general information about different types of demining technology, visit the following website:

• http://www.doe.carleton.ca/~jknight/LandMines/weplinks.htm#Acoustic ■

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