

# Engineers Deliver Robot to Neutralize Remote Explosives

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Engineers from the Air Force Research Laboratory Materials and Manufacturing Directorate have rapidly prototyped, developed, and delivered low-cost expendable robots to disable and dispose of improvised explosive devices.

The BomBot, which has already established its value during a variety of mission profiles in Haiti, Afghanistan and Iraq, was delivered to support requests from Air Combat Command, the Marines, and Central Air Forces.

Directorate engineers developed the technology in response to an urgent need from the joint services explosive ordnance disposal (EOD) community for a low-cost, remotely controlled robot that can be rapidly deployed to place explosive charges on or near an improvised explosive device without exposing the system operator to danger.

This compact and versatile system, which costs roughly \$6,700, is being deployed in rigorous environmental conditions where more expensive robots with a greater logistical burden are currently used. In just 90 days, the first prototypes of the system were delivered to users in the field.

"IEDs, or improvised explosive devices, are key instruments of terror that conform to no set rules or standards; the construction is left entirely to the imagination and ingenuity of the evildoer," Walt M. Waltz, Air Force Research Laboratory's Airbase Technologies Division Robotics Research Group Leader said.

"The devices can be disguised to look like common everyday objects, and to make matters worse, the blueprints for these bombs are easily available."

When an IED is identified, rarely do EOD personnel attempt to dispose of these explosives by hand. Instead, they approach them remotely, sometimes dispatching robots costing \$110,000 to \$140,000 to disable or detonate the packages.

Many of the current systems are large, must be transported on a Humvee or by trailer, and move at speeds of just a few miles an hour.

In addition, these robots sometimes draw unwanted attention to an incident site, where keeping warfighters and civilians at a safe standoff distance is imperative.

The need for a low-cost, compact robot with a decreased logistical burden was quickly identified by the joint services EOD community participating in a notional concept working group.

With IED use in areas of conflict overseas becoming commonplace and the Combating Terrorism Technology Support Office receiving official requests for new robotic tools and technologies from EOD personnel in the field, ML began development of the BomBot.

The BomBot is a modified 4x4 remote controlled truck that has been equipped with a pan and tilt camera and a charge dispenser. The robot can reach speeds of 30 to 35 miles an hour.

However, a specially designed control unit, developed by Nomadio Inc., allows the operator to regulate the speed at low, medium and high settings. Nomadio has experience developing high redundancy, high security, short range digital radio systems that are intended for the

command and control of military robots.

"Nomadio's technology provides the robots with secure, frequency hopping command and control, and the ability to relay information back from the robot's sensing devices," Waltz added.

"The system can be used in rigorous environmental conditions, several times daily, allowing EOD personnel to accomplish force protection and IED disposal activities from a safe standoff distance."

Based on feedback from EOD personnel who have received prototype BomBots, engineers made adjustments to the radio's capabilities, to stick control, and to the camera mount, and assisted in the development of an operating instruction for the technology.

The entire program has been transitioned to Navy EOD Technology Division personnel at Indian Head Naval Ordnance Station, Md., who will work closely with West Virginia High Tech Consortium to initiate production on the final version of the BomBot.

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