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# Robots ready to support soldiers on the battlefield

Intelligent armed vehicles that use GPS, laser and heat-recognition technology are close to being deployed in hotspots

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**James Bloom**The Guardian, Wednesday 25 June 2008

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The US army has 1,700 Lockheed Martin Mule armed vehicles on order

At a desert test site in Texas, a street battle rages between US soldiers and local "insurgents". It's much like any other training exercise, except the soldiers are accompanied by a Mule (Multifunctional utility/Logistics & Equipment), an armed robot the size of a Humvee. The insurgents are positioned overlooking an intersection, a potential kill zone. The commander pulls out what looks like a PlayStation gamepad and the Mule is sent forward.

It presents a tougher challenge than the typical human soldier. The Mule can fire Javelin anti-tank missiles and has a turret-mounted machine gun, in addition to a digital "eyeball" with laser and heat-recognising target acquisition systems for aiming its weaponry. It is semi-autonomous, using GPS to navigate and localised perception to avoid trees and buildings. Its six wheels are on pneumatic legs, enabling it to climb over cars and barriers. Within minutes, the formerly deadly intersection is secure.

In just a few years' time, Lockheed Martin will start shipping the Mule to conflict hotspots. The US army has 1,700 on order for 2014. Fifteen Warfighter brigades will be equipped with the units, constituting a human to robot ratio of 29:1. Many will be used to clear minefields and carry gear, but half will be armed.

## Unfriendly fire

Foster-Miller is another company fielding Armed Unmanned Ground Vehicles (AUGVs). Three Swords robots - tracked devices the size of a chest of drawers fitted with light machine guns - were tested in Iraq last summer by the US army. Apparently they were a success. The company is now promoting a heavily armed version called Maars, which, according to the brochure, can be programmed to recognise no-fire zones.

"The robot hasn't fallen over once," says David Byers, assistant program manager for the Mule. "In fact, last summer in testing, it was being used to pull soldiers out of a ditch."

In the past five years, military use of robotic systems has increased dramatically. The US army alone has fielded more than 6,000, many of them in Iraq and Afghanistan. They are mostly used to conduct reconnaissance and disarm explosives, but there are regular news reports of Uncrewed Aerial Vehicles (UAVs) performing missile strikes on insurgents they were monitoring ([Launching a new kind of warfare](#), October 26, 2006).

"A lot has been learned from UAVs," says David Chang at West Point Military Academy. "UGVs are almost a decade behind UAVs in development and the technological challenges are far greater. Picture the difference for a UAV at 20,000 feet with no obstacles, and contrast that with a UGV, which must navigate in a dense urban environment. Sensors, fusion of information, detecting negative obstacles and real-time control is imperative to ensure safety."

Byers says autonomous convoy experiments with the Mule, where the UGVs follow each other in a flocking pattern, have been going well. "If the robot is lost, inertial navigation systems can put it out of harm's way. If the operator is taken out" - injured, killed or loses contact - "then control can be transferred to another authorised party." The [reaction from the US army](#) has been overwhelmingly positive.

The British army would not comment on whether it plans to use armed robots, but it already incorporates many of the unarmed models in its operations. Stefan Kern, one of the organisers of the European Land Robot Trial, says: "The German army is strongly investigating the use of unmanned ground vehicles, but armed robots are not the focus of this process. Short-term realisable robots are the major challenge at the moment."

No one thinks the robots will be completely autonomous any time soon. Chang says: "There are still challenges to be overcome in situational awareness and tactical behaviours. When these units are eventually fielded, there will always be a human in the loop to make the tough decisions." Byers adds: "There will always be a soldier involved, at least part-time."

## Shooting second

In Australia, a company called Metal Storm has adapted the Packbot, produced by its American partner iRobot. The Packbot is usually used to gather sensory data on dangerous locations, and has been adapted into a semi-autonomous killing machine called the Warrior: it can automatically acquire and fire at three targets in approximately 1.2 seconds, selecting the appropriate munition for each target. Stationary versions of Metal Storm weapons are already used for perimeter security. According to Joe Dyer of iRobot, the real benefit of the system is its resilience. As he succinctly puts it: "A robot can shoot second."

Nimblett of Lockheed is confident that army units with robotic capabilities will have a clear advantage over their enemies. "Battlefield perception is much better with the robots," he says. "So the real advantage is in our situational understanding." You only have to watch the video of a Swords cruising into a potential combat zone, its gun turret rotating, to get the idea.

The only force outside the US with plans to deploy armed robots is the South Korean army. Last year Samsung announced it had built an armed sentry to be deployed at the border with its northern neighbour. The robot is essentially a machine gun turret, without the manoeuvrability or firepower of its US rivals. It doesn't interact with other battle units in the way the American, network-centric, models do.

For now, the US army has the clear advantage in armed robotics. The technology it is developing gives them and their allies the ability to outmanoeuvre and outgun enemy combatants with unprecedented ease.

But won't that be unfair on human opponents who don't have the US army's resources?

Byers is dismissive: "I hope it is unfair. You should never go into a fair fight."

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