UGVs have traditionally been utilised as specialist EOD platforms although the past decade of operations in Afghanistan and Iraq especially saw a distinct uplift in the use of micro-UGVs for ISR missions. MT takes a look at the current ground robotics market.

Companies like ReconRobotics, which developed the SCOUT XT micro-UGV, experienced a surge in demand for throwable systems from user communities including SOF and law enforcement teams. These UGVs could be thrown into compounds, buildings and rooms. However, after supplying thousands of systems such as the SCOUT XT to niche users including US Navy SEALS and US Army Green Berets, the company experienced a dearth in supply with company president Alan Bignall conceding how demand had come to a "halt."

Similarly, Roboteam’s IRIS (Individual Robotic Intelligence System) is an ultra-light weight, fast deployable, extremely ruggedized hand-carried unmanned system. It is designed to support several units such as SWAT Teams, public safety, military and law enforcement. The hand-carried system is controlled by the Ruggedized Operator Control Unit (ROCU) - a high resolution, handheld, touch-screen operator console with gamepad controllers.

Other nations have also experienced the same trend with UGVs, following increases in demand during operations in South Central Asia. However, trends are reappearing in the market which could signal some type of revival for UGVs outside the EOD arena.

**Operational Use of Unmanned Ground Vehicles**

For example, the French DGA announced a deal with ECA Robotics in February 2012 to supply 29 COBRA MkII multi-mission lightweight UGVs to the Army. Worth US$2.9 million, the contract comprised a four-year deal including deployment to the French task force operating in Afghanistan where they assisted in EOD operations. The UGV could also be integrated into the French Army's SIT ComDÉ system to further enhance the ISR capability of Sagem’s FELIN advanced soldier system. However, French forces pulled out of Afghanistan later in 2012, thereby nullifying the utility of the COBRA MkII on operations.

However, at IDEX 2015, Nexter Robotics unveiled it had sold 50 units of its NERVA UGV in 2014 with company sources informing MT how customers included French Special Forces, the Royal Netherlands Army, and counter-terrorism and police units. The NERVA is being primarily for ISR missions.

The French Army is also understood to be planning to receive five platforms with a four-month test programme envisaged to begin imminently.

At the event in the UAE, NERVA was exhibited networked to the TITUS APC. The UGV now comprises an alternative mobility capability allowing wheels to be replaced with tracks, thereby allowing greater accessibility up and down stairs and over more difficult urban terrain. The UGV’s ground control station can be integrated with video feed from an overmatching UAV for top cover and greater situation awareness of the ground in general.

Similarly, the UK dabbled in the use of UGVs in Afghanistan with the British Army releasing an UOR in December 2011 for a remote-controlled, autonomous, mobile ground surveillance platform, calling for a 24-hour surveillance capability with endurance out to beyond 16 hours with a maximum range of 20km via its own ground control segment. This saw the develop-
ment of an unmanned SNATCH Land Rover platform designed primarily for perimeter protection around Camp Bastion in Helmand Province, but the idea was quickly transitioned into the Operation "Talismen" CIED capability. Essentially, the unmanned SNATCH platform could be operated ahead of a Combat Logistics Patrol in order to clear, find, fix and clear IEDs along a given route.

But once again, the idea failed to gather any kind of momentum and when British forces withdrew from Camp Bastion late last year, the unmanned SNATCH concept had failed to make a mark.

Companies including Raytheon have since then developed CIED laser-based technology called SOTERIA for mounting on unmanned SNATCH Land Rovers as well as smaller, more tactical UGVs.

Highlighting how the number of cleared or detonated IEDs had increased year-on-year by 9% in Afghanistan since 2010, a spokesperson for Raytheon described how they had become the biggest threat to coalition troops. "IED use is increasing and the military expects that these improvised bombs will continue to be a major problem in current and future conflict zones. The initial detection of IEDs is the biggest technical challenge facing the MoD in current operations," the spokesperson explained to MT.

The SOTERIA solution remains classified but it is understood to utilise optical processing technology allowing for "high probability" of IED detection with low false positive rates and detection of high, medium, low and zero metal content IEDs. Raytheon also unveiled the "SafeRoute" UGV concept featuring SOTERIA technology, allowing an unmanned platform to slowly move across a track before halting and scanning an area to its front, clearing it before moving off again.

Once again, despite completing a trials process with the UK’s MoD, the technology appears to have failed to make a mark in the Armed Forces with military observers explaining how the technology was too slow in progressing down a designated route.

However, in the US, Qinetiq North America announced two contracts in December as part of the US DoD’s Man Transportable Robotic System (MTRS) Increment II programme. The deal will see the company refurbishing the Army’s TALON IV UGVs as well as development of an improved TALON platform for the US Navy (USN).

Nexter Robotics’ NERVA is controlled via an end user device such as smartphone or tablet allowing dismounted soldiers to operate the system on the move.

EOD/IEDD ROBOTS AND DEVICES

- **PIAP GRYF**
  - IBIS
  - TRM

- **PIAP SCOUT**
  - INSPECTOR
  - EOD/IEDD robot for pyrotechnic operations and reconnaissance

- **EXPLORER**
  - EXPLORER inspection device
  - neutralizing and assisting robot

- **EXPERT**
  - small robot for reconnaissance

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Similarly, Israel Aerospace Industries’ (IAI) Ramta has completed the engineering testing phase and has begun building a technology demonstrator of a multi-sensor system called MIDS (Mines and IED Detection System) for detecting deep buried and surface-laid mines and IEDs. Elsewhere, Israel continues to remain at the forefront of development of UGVs with such platforms expected to continue to be deployed in kinetic and ISR missions, especially on the border with Gaza.

According to sources within the IDF, systems such as G-NIUS’s GUARDIUM UGV could be armed with remote controlled weapon stations, communications nodes and ISR payloads. Sources also acknowledged that UGVs were playing “catch up” with counterparts in the air force.

The IDF is expected to complete the development of a UGV capable of being modular enough to provide infantry, SOF and EOD units with a mature capability. Requirements call for an ability to patrol undergrowth through tunnels in poor visibility which will also require it to possess a CIED capability. UGVs will be able to provide intelligence regarding tunnel networks as used by Hamas during recent conflicts, including mapping as well as a stand-off capability ahead of IDF units entering in order to clear and hold.

Other developments

Finally, US UGV specialist iRobot is heavily marketing its tracked 710 WARRIOR platform to the Asia Pacific market. In show at Global Security Asia 2015, the company disclosed that they had rebranded the platform the 710 KOBRA for the local market. Despite having been first designed in 2007, iRobot admitted that it had made a series of improvements to the UGV last year including improved computer processing, lift capability and a logistics capability in the form of a rack, allowing the UGV to carry up to 45kg. This means Kobra’s manipulator can lift up to 150kg, compared to 136kg in previous variants.

The UGV also includes an EO camera with 180° field-of-view, quad-disruptor and multi-firing circuit array on the manipulator arm.

Also in Asia Pacific, it has emerged that the RoK is in the process of integrating a ground-penetrating radar (GPR) on board an undisclosed UGV. The GPR technology is based on Chemring’s Non-Intrusive Inspection Technology which will be integrated on board a Hyundai-Rotem UGV. GPR technology utilizes radar technology to detect under- soil IEDs.

The KAPLAN EOD robot by Arelsan enables a bomb squad to examine a suspicious object from at least 500m and is equipped with a seven-degree-of-freedom robotic arm for detailed inspection and disposal of explosives. The agile vehicle platform provides enhanced mobility on various terrains such as rock piles, steep slopes, stairs etc. under snowy and muddy conditions.

OTO Melara is focusing R&D activities on the design of an original robotic system able to perform routinely surveillance and tactical patrol operations, offering a family of highly mobile robotic vehicles, both tracked and wheeled, which offer excellent performance in terms of load capacity, speed, precision, and controllability.

The UGVs, which are constructed around a precise modular architecture, can take on board a range of actuators and sensors which make the vehicles capable of undertaking different missions.

The family consists of a complete series of robotic platforms starting from the smallest 3kg four wheels TRP 3 FROG to the biggest 200kg 6x6 PRAETOR, passing through the EOD specialised TRP 18, the mines-detector light tracked dual-use platform, both TRP 2 in military version and TRP 7 – HS supporting Home Land Security Forces. “The Control Ground Station, which is the same for all the vehicles, derives directly from our lengthy experience in the field of the remote control and ruggedised armament systems,” a company executive told MT.

The TRP2 – Combat can be disassembled in light-weight independent parts, in order to be easily transported by soldiers on the field, ready for operation in few minutes. It is equipped with a light machine gun FN MINIMI 5,56 mm or equivalent, 40mm grenade launcher, or different light machine guns upon request. It is electric-powered and can achieve a maximum speed of 15km/h.

Ground robots now carry weapons, cameras and sensors and other peripherals to complete their assignments through the spectrum of conflict. The proliferation of UGVs systems in the US services’ order of battles should not lull OEMs and suppliers in this sector into complacency. Indeed, industry needs to remain attentive to the significant acquisition, strategy and policy changes occurring in the DoD’s ground robotics portfolio – which is arguably entering a second, or 2.0 department-wide phase.

The use of ground robotics in the US DoD grew exponentially during the combat campaigns in Iraq and Afghanistan. In 2004, 162 robotic systems were deployed to Iraq and Afghanistan, with a primary focus on EOD. The Pentagon currently has more than 7,000 systems deployed overseas, supporting EOD, mine countermeasures, surveillance, and other missions.

Heidi Strao, Assistant Secretary of the US Army for Acquisition, Logistics & Technology, in a keynote address to an industry group in AUSA 2014, emphasised common architecture, open-source software and open standards for robotics development.

One of the significant developments in migrating from proprietary to the open standards addressed by the service official is the Army’s UGV Interoperability Profile (IOP). The new protocol is being developed within the US military and is being shared with allies, including NATO. Companies that want to build components for Army robots are already manufacturing them to be IOP-conformant, evident in the new TALON V robot.

This January, William Downes, a Pentagon spokesperson for acquisition programmes, pointed out that many aspects of IOP’s roadmap remain uncertain, in particular, whether the US government will turn it over to industry, or to a non-profit robotics association that implements standards.

Here’s another development industry needs to monitor. The number of versions or models of ground robotic vehicles is decreasing to permit the services to provide better repair part and other life cycle support. The services’ programme managers have conceptually addressed this requirement at recent AUSA and Modern Day Marine conferences attended by MT. While service representatives confirmed this concept is still on their programme horizons, they declined to provide the number of UGV models in their near- or long-term plans.

One New Product and Beyond

One representative new offering in this sector is Qinetic North America’s (QNA) TALON V IOP+ Tactical Robot. The vehicle was unveiled at, and demonstrated for this author, at AUSA 2014. The robotic platform builds upon 10 years of lessons learned from TALON IV’s operational service in Iraq and Afghanistan. Jason Montano QNA’s Product Manager for TALON Robotics in the Unmanned Systems Group, emphasised that TALON V is IOP compliant – allowing it to fit into the US Army’s evolving roadmap of interoperability among current and future UGV platforms. The TALON V was announced “production ready” at AUSA 2014.

Beyond the TALON vehicle family and other medium and smaller unmanned ground products, the US military services will continue to have large unmanned ground systems in their inventory. In one instance, the Army’s fleet of 6t M160 M4s (by DOK-ING) will provide clearance of anti-personnel mine-sown areas. And the service is among those eyeing other large unmanned vehicles beyond the M-160 – and with good reason. The Pentagon’s lessons learned from the casualties generated from convoy missions along improvised explosive device-laden routes in Iraq and Afghanistan, created the need for logistics and other purpose trucks to continue to go into harm’s way without crews.

The DoD’s insatiable demand to remove crews from large manned vehicles has not been lost on industry. Oshkosh Defense is one company stepping up its pace of innovation as it continues to refine its TERRAMAX UGV vehicle kit system. Last May, Oshkosh announced it expanded its unmanned system portfolio – integrating its TERRAMAX UGV technology onto an Oshkosh MRAP All-Terrain Vehicle to demonstrate capabilities for route-clearance missions.

While the US military ground robotics market will provide new opportunities for industry, the requirements and other programme underpinnings for these vehicles will rapidly evolve – demanding that companies in this sector continue to have agile and responsive business models.

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