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The lifesaving power of semi-autonomous UGV technology ●●

Semi-autonomous unmanned ground vehicles (UGVs) are changing the way defence forces the world over operate. With increasing capabilities, UGVs are able to avoid human injury and casualty, taking charge of many dangerous, dull and dirty operations across the world. Shahar Abuhazira, CEO of Roboteam, outlines how this technology is changing the world for the better.

A recent study on unmanned ground vehicles (UGVs) discovered that the global UGV market is expected to exceed \$9 billion by 2023, with the defense industry as its primary driver.

Due to the maturation of robotic technology and decreasing costs of such technology, military forces around the world are placing robotic platforms in the line of duty where human soldiers used to be. This shift has led to a decrease in casualties in day-to-day missions across the globe and has made dangerous, dull and dirty operations safer and easier to achieve by the warfighter.

On today's battlefield, UGVs serve as weapons, logistic carriers, medical evacuation vehicles and intelligence, surveillance, and reconnaissance (ISR) tools. The increased adoption of UGV's is no surprise seeing how technology providers are working to build platforms that best serve the end user. One example of such innovation is semi-autonomous technology.

For example, Roboteam's "Top Layer" technology is an advanced sensor that allows a single operator to control multiple robotic systems at once. An operator can control every feature on each robot with a single controller. This technology enables the creation of a convoy of semi-autonomous robots through the use of a communication network. The operator can navigate the convoy behind line-of-sight to capture intelligence, dispose of threats and conduct other mission-critical activities.

Each robot is programmed to instinctively follow the designated leader, while also being able to explore independently. The operator can call the convoy back "home" once they have completed their mission. Sophisticated

integrated sensors allow the platforms to navigate obstacles and terrain in urban, outdoor and subterranean environments. By design, the top layer technology is interoperable – meaning that the module works with older platforms and will scale to operate with new models in the future.

Top layer technology was developed to create a smarter, safer and more intuitive UGV designed for allied armed forces. The use of this technology across the globe has already transformed how the armed forces conduct missions.

"It's becoming clear that military agencies see the tremendous value in robotics and they are sharing their needs with industry," said Alfred Rebara, Director of Robotics, Roboteam. "Innovations like the semi-autonomous Top Layer technology are addressing the needs of the war fighter and allowing them to navigate the battlefield more safely. It is our job in industry to support the end user and develop the technology in an effective, timely way."

Top Layer Technology in use

Currently, Explosive Ordnance Disposal (EOD) units rely heavily upon robotics to conduct Counter IED (CIED) and Improvised Explosive Device Disposal operations. Robotics have been relied upon in these formations for decades as revolutionaries and terrorists began to target EOD technicians. Initially these systems were very rudimentary, often created by operators themselves. As the threat evolved, so did the corresponding robotic technology.

While the principle techniques employed by EOD technicians to mitigate explosive hazards have remained roughly the same,



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robotic technology has matured and become ubiquitous at the team level. With the help of robotics, EOD warfighters are now capable of conducting combat Improvised Explosive Device Disposal (IEDD) operations without leaving the safe confines of a Mine Resistant Ambush Protected Vehicle (MRAP). The next wave of robotics scheduled to be used by EOD and non-EOD forces will bring enhanced modular capabilities that allow payloads and specialized architecture, like semi and fully autonomous payloads, to be quickly mounted to combat unique and extremely hazardous battlefield operations. At some point in the very near future, the technology that is at the heart of the Top Layer capability will allow a robot to search, identify and classify explosive hazards.

From EOD to HAZMAT missions, UGVs are paving the way for safety. Semi-autonomous convoys provide soldiers with access to dangerous or previously inaccessible environments, and 3D sensors provide real-time maps of any terrain, which allow forces of any size to move forward without the uncertainty of hidden threats.

Presently, the Department of Defense is experimenting with technology within metropolitan and subterranean combat environments. Major metropolitan areas are assessing the value of the technology in search and rescue operations in response to mass casualty events within train and subway tunnels with the hopes that mapping and detection can speed relief and rescue.

The use of follow me technology has proven useful in creating semi-autonomous convoys of medium-size unmanned robots. Roboteam's Micro Tactical Ground Robot (MTGR) is a man-portable UGV that utilizes an innovative manipulator to add value for EOD and CBRN missions.

When combined with the MTGR, Top Layer technology provides the end user with real-time 360-degree day and night time mapping of virtually any terrain. For subterranean missions, the MTGR's size and HD video cameras allow it to navigate confined spaces.

The future is Top Layer Technology

Unmanned ground vehicles are poised to significantly disrupt the way military forces behave in combat. Specifically, innovations in the UGV space will create robots that are equipped for the "triple D" missions: those that are dirty, dangerous and dull.

We are already seeing robots play a large role in helping to detect and mitigate explosive hazards and bolstering ISR

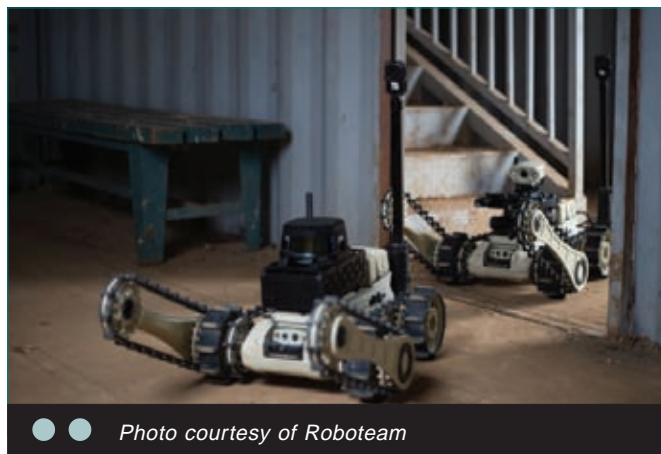
missions. Right now, it is more common to see one operator that is controlling one platform than semi-autonomous units. In the future, we can expect to see the UGV industry incrementally move towards autonomy.

Top Layer technology is a sneak peek into the future, as more industries come closer to unlocking successful automation. We are seeing this innovation take place in the automobile industry, with major players chipping away at the key to autonomous driving. Specific to UGVs, we are also seeing new technology that allows robots to be controlled using voice commands.

The added complexity associated with autonomous robots also creates the need for enhanced security. In the future, unmanned robots will require an ever-growing sophistication and complexity of communication networks that will protect the integrity of a robot's operation.

The lifesaving and efficient power of UGVs is indisputable. Today's battlefield is complex and filled with a multitude of threats – many of which are unseen by warfighters. The robotics industry is providing innovative solutions, like Top Layer technology that are meeting the needs of end-users now and anticipating the needs of the future. As we move forward, we can expect to see emerging technologies, such as artificial intelligence and machine learning, play a larger role in the development of military robotics. For now, autonomous vehicles provide soldiers with an added level of protection and additional capabilities necessary to stay one step ahead of adversaries on the frontlines.

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