

# Robotic Sensors for the Soldier

Colonel Jim Braden, Project Manager, Robotic Systems Joint Project Office discusses robotic support to the dismounted soldier and marine

***"I handle ground robots for two Services," explained Col. Jim Braden, Project Manager, Robotic Systems Joint Project Office (JPO) outlining his task for the organisation's sponsors, the Army and the Marine Corps. "That is an interesting and challenging thing. I've been told it's not truly Joint until you have three of the four Services but I do work closely with the Air Force and the Navy as well. One of my sister organisations that I work with regularly is the Naval EOD Technical division."***

"When industry, academia or soldiers and marines come up with an idea, we work with that idea but my core competency is actually in fielding them, putting them in the hands of operators and giving them the tools to do their trade. We have had to do some very technological things to address that threat. We have done that but, at the end of the day, technology doesn't win battles, soldiers and marines win battles. The technologies we give them allow that soldier or marine to step back a few hundred metres from the threat."

The JPO is within the Program Executive Office Ground Combat Systems, supporting a range of effectors including the Heavy Brigade Combat Team, the Stryker Brigade Combat Team and the Brigade Enhancement programme, which is tasked with tying the Current Force into the Future Force.

"We give soldiers the tools they need to execute the heavy combat task and robots tie into that on the ground side," Col. Braden explained. The JPO is organised into three tiers: Maneuver -infantry, mechanised and armoured forces; Maneuver Support combat - engineers and military police and Sustainment - Combat Service and Combat Service Support.

These three tiers directly support the ability to meet validated requirements for Unmanned Ground Vehicles

(UGVs). Col. Braden explained the process, "There are a couple of ways to start a validated requirement. The most common right now is a Joint Urgent Operational Needs Statement. That is something that comes from over in the Fight. They identify a need, they put it up through their chain of command and it eventually gets validated by Centcom, which then gets sent to the Joint Requirements Oversight Council to validate that requirement. Once they have validated that requirement then it goes to the Service for funding. The bottom line is those validated requirements have to find resources. There are a lot of validated requirements out there that are not resourced. Industry has been doing a particularly good job showing what they can do for technical solutions but we cannot always find the resources to address these things."

As the Current Fight started, Col. Braden recalls, numbers of available robots were very low, "You could count the number of robots across the DoD on a couple of hands. The only real focused ground robots at the time were Explosive Ordnance Disposal (EOD) systems."

That changed quickly, as did the support mechanisms required as UGVs moved from US based research projects to fielded systems. "The best [we and industry] could do in 2004 was 162 robots. We have now fielded thousands of them. As we fielded them, we had to determine how we fixed them – how do we make those systems operational in a challenging environment, and the environment is challenging. There's a lot of dust, sometimes temperatures of 130F and 90 percent humidity. Soldiers and marines are working lengthy days, a minimum of 16 hours repairing them, it is hard work. That is the environment we are asking the technology to work in. You do not have a lot of time to do preventative maintenance, so we need robustness."

Initially a new initiative, the Joint Robotic Repair Facility was created to reflect the expanded role. That

title was subsequently changed to the Joint Robotic Repair & Fielding activity and supports the current fight both in Iraq and Afghanistan.

Col. Braden said, "We actually do the training as we field the systems. We do some limited operational an intermediate level maintenance and we provide a supply of spares. We either fix it or we give them another one"

Embedded Repair Fielding Teams go out with the UGVs to units, something Col Braden believes needs to be increased.

A range of systems have been used. Colonel Braden cited a number of systems including the MV-4, acquired from Croatia, reflecting that country's experience in clearing minefields. He noted that once in the field in Iraq, units also began to use it like a mine flail, roller to clear areas and a unit rolled through.

The first UGV systems were put in the hands of the EOD community, reflecting the self evident priority. Now each EOD unit has several UGVs, providing a high degree of flexibility.

The next recipients have been combat engineers who had differing requirements as Col. Braden explained, "You never want to give away tempo. If you stop and have to clear an IED you give away tempo. The combat engineers by mission area, enable manoeuvre and tempo and IEDs are an obstacle, so we gave the engineer clearance teams small robots. They went out and they got tempo back to the force."

While Afghanistan and Iraq in particular have been the crucible for UGV development, available systems have been developed 'under fire' While the enduring role for UGVs are secure, their development under the Future Combat Systems (FCS) programme has been more deliberate and necessarily so in delivering a concept that calls for the integration of unmanned air

▶ and ground platforms and the accommodation of manned unmanned teaming.

For this dismounted soldier, the key programme has been the Small Unmanned Ground Vehicle (SUGV) a small, portable reconnaissance robot.

"What does the SUGV do what my current robots don't do?" asked Col Braden. "The SUGV has a link into the network so that the information that it gets is provided to everybody else out there on the battlefield up to battalion, brigade and beyond. The network is one thing that my current robots don't have. The other thing that it has is a highly integrated sensor. Right now, none of my Bots are out there designating."

Perhaps the greatest single difference explained Col. Braden is the SUGV's reduction in weight, a key factor when soldiers and marines are carrying 70-80lbs of equipment in addition to kit such as body armour, personal weapon and ammunition. "When we move over to Afghanistan, you won't have the road network as you do in Iraq, and people are going to be walking a lot more. Every ounce of weight you put on a soldier takes away from something else so the weight of the robot is very important because somebody is going to have to put it on their back and hump it in."

"That is the biggest sustainment challenge for robotic systems and we are looking at number of

initiatives with the Marine Corps Warfighting Lab as well as the Army Labs on ways to offload things from soldiers' backs."

Another factor in the FCS UGV suite is the MULE, designed to carry equipment. Col. Braden said, "We have loaded our bodies with an incredible amount of equipment. The MULE offloads that equipment so you don't have to carry an extra battery or chow and the things we need. It just follows where a soldier goes and it doesn't need heads down system control."

#### HEADING UP

The need for an improved display and control solution for operators that doesn't interfere with the user's immediate situational awareness (SA) is a key requirement moving forward.

"Right now, soldiers operating UGVs are heads down," explained Col Braden. "The first thing that happens when you go heads down is that you become a liability to your unit. Someone now has to protect the operator – in the Marine Corps we call that a Guardian Angel. It used to be that that first guy to get shot is the guy with the handset, now the first guy who gets shot is the guy who is heads down. The technologies we are giving them, cause them to look down at things to get their [UGV based] SA and when they look down at things,

they become the target of the enemy."

One of the initiatives of the Joint Project Office is pushing for, is the integration of UGV control functionality on a soldier's weapon. "The one thing is that we never want is to look down when we are in harms way," commented Col Braden.

This, he acknowledges will add to the weight of the weapon, which will be part of the trade off process. "I want my robot control system - day and night - on my M16. I want everything right on the weapon systems. It might be a lighter, smaller weapon, but the bottom line is that every place you are looking, you have your weapon with you and controlling your robot - the things you need to support your infantry squad."

"Nobody looks at somebody who is pointing a weapon down range as someone who is not in the fight. If we can put the situational enhancement on the weapon, that would be a win-win for everybody." Col Braden notes that work on putting the display from the UGV onto the eye in pilot programmes is looking very promising.

"The CONOP is to put it all together so the soldier can enhance their mission effectiveness. It's never about the technology it's about the effect on the soldier" he concludes. ■



An Explosive Ordnance remote control robot carries a bottle of water, with a candle light inside, to symbolise an Improvised Explosive device, during a training exercise in Tikrit, Iraq © DoD