

New ground for mine detection

NIITEK designs and develops vehicles and robot-mounted mine detection systems. Company president Juan Navarro talks to *Defence & Security Systems International* about its innovative ground-penetrating radar (GPR) technology, currently used by coalition forces in Afghanistan as well as for humanitarian demining missions in Angola and Cambodia.



NIITEK's technology has a reputation for highly reliable performance.

How did NIITEK come about?

Juan Navarro: NIITEK was founded in 1998. It was primarily based on the work of Günter Wichmann, a German scientist who began developing ground-penetrating radar (GPR) solutions specifically for the detection of buried explosives in the 1960s. The emphasis in developing the GPR was to focus on the fidelity of the signal versus software interpolation.

Compared with other GPRs developed for the likes of archaeology, construction and road inspection, NIITEK's hardware has always been focused on the better automatic target recognition algorithms. This is the equivalent of the difference between a high-definition and typical low-resolution TV – with a high-definition signal, you can better read and understand it.

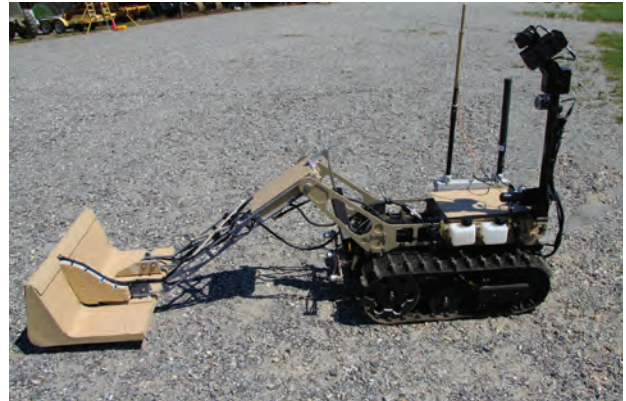
Our principal aim has always been to improve signal fidelity by developing ultra-wideband radar with a low radar cross-section. A low-radar cross-section eliminates other images, which is very important for signal strength.

Up until 2006 – the year I arrived at the company – we conducted a lot of experimentation and testing with the US Army. Around that time, we were selected as the radar for its future combat systems and as a subcontractor to BAE for its ground mine detection system.

My job has been essentially to take NIITEK from being a technology-centric company to being a more systemised business – one in which we could produce and deliver these technologies.

How have you managed to achieve those aims?

Well, without wishing to pat ourselves too hard on the back, we really have a perfect storm scenario. Our technology provides great performance.



Robots, like the one above, can detect mines without putting lives at risk.

For example, JIEDDO (the Joint IED Defeat Organisation) put out a challenge to get a system out to other current theatres of operations, so we did some tests and ended up doing a really great job in looking for really hard-to-find types of target. We did this through implementing the correct programme management process and ensuring that we had the correct systems engineering process in place at the right time. Our mission is to develop, deliver and successfully deploy these systems.

In the first operational evaluation, which we completed in September 2008, we were able to detect a significant number of the IEDs that could not be found with other sensors. The US Government subsequently awarded us a production contract followed by five more.

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Could you provide an overview of your product range?

Although our products are mainly deployed on Husky vehicles – admittedly our preferred solution as we enjoy a great partnership with CSI. We have also mounted system functions for humanitarian demining, multidrive vehicles such as tractors and autonomous six-wheel vehicles, used predominantly in Angola and Cambodia, as well as TALON robots. We have also have a metal detector within the GPR.

Our product range – in terms of GPR – has become increasingly miniaturised in recent years to support multiple platforms. In taking this to the next level, we are currently working on an early-stage handheld system that incorporates both GPR and metal detector.

In working on concepts such as miniaturisation, how important a role does R&D play?

We place a significant amount of emphasis on R&D and have a state-of-the-art production facility in Charlottesville, Virginia, US, dedicated to fielding buried explosive detection systems. Not only are we primarily an R&D company, but as part of the Chemring Group, we are well supported in our efforts of expanding current sensor technology into various different forms.

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NIITEK continues to form partnerships with academic and industry institutions – how would you describe the company's approach to collaboration?

The universities we work with are often provided with funding by the US Army to take a look at multiple sensors in order to see which algorithms work best for them. In that scenario, we work with these institutions, which then take our data and compare it with other systems.

Other partnerships with the likes of iRobot and Kinetic are based on the platform that we are using. This relates to fusion sensors where we take our sensor and GPR and fuse it with other types, whether it is a metal detector, hyperspectral or other detection technologies.

At NIITEK, while we have a lot of talented software and technology people educated to doctorate and PhD level, we don't claim to be expert in everything. We always look for a partnership that fills a gap for us such as signal processing, sensor, hardware systems integration or production.

Your solutions have been adopted by the US and coalition forces in Afghanistan – in which other regions you are present?

We have conducted humanitarian demining missions in Angola and Cambodia. Currently, we have several Nato coalition forces that are evaluating our technology – I can't supply their names right now – but we are looking to investigate other opportunities further down the line.



The firm provides troops on the front line with much-needed support.

How do you see yourself staying ahead of the curve in future years?

The enemy changes its tactics everyday so we need to look at improving sensor capabilities and fusing other sensors in order to detect different types of anomalies both in the soil and on the surface. If it were just a mine problem, it would be pretty easy – today, there is developed understanding of the different mine types that exist, such as anti-tank and anti-personnel mines. We also know who makes them and what their characteristics are.

The main challenge we envisage in future years comes in the face of new homemade devices that can range from day to day. We need to be constantly improving our equipment so we can detect threats and provide advance warning to the folks out in the field. ■

Further information

NIITEK
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World Leader in Counter-IED Ground Penetrating Radar Systems

Counter-IED | EOD

NIITEK, part of the Chemring Group, is the world leader in the design, development and production of Counter-IED Ground Penetrating Radar ("GPR") systems. NIITEK's Advanced GPR systems are at the leading edge of mine detection technology and are successfully being used by US and Coalition forces in Afghanistan.

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