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Detection and Sensing of Mines, Explosive Objects, and Obscured Targets XVI

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Editors

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Introduction

In the terrestrial realm, hastily scattered and buried minefields can be a major impediment to military operations. For this reason the remote detection of minefields is a key to the implementation of new Army war-fighting doctrine based on rapid movement. Detection of mines to address Naval doctrine in the marine environment, whether in the surf zone, near-shore region, or in deep water is also a continuing technical challenge. During the last decade, the use of mines and explosive objects as effective defensive weapons and as an inexpensive terrorist alternative has proliferated worldwide. As a result, the detection of mines, explosive objects, and obscured targets remains an ever important topic: not just because of its military related applications, but also for its humanitarian and environmental impacts. It is relatively easy to lay a minefield or use an explosive device but very dangerous, costly, and time consuming to detect, localize and to clear it. In the humanitarian context, the threat of a minefield is that it remains active and in place for a very long time, generally outlasting any minefield documentation. Improvised devices can cause massive personal trauma and these devices present unique detection challenges.

Unexploded ordnance presents a hazard for military operations during and after conflicts, as well as a tremendous environmental liability on lands where it is present as the legacy of decades of testing and training. It is very important, therefore, to directly address these issues in a broad forum. The detection of mines/minefields, other explosive objects like improvised explosive devices, and unexploded ordnance is a challenging problem because of the variability in target shape and size, material, color, and backgrounds and because they can undergo changes once deployed. In general, mine detection is hampered by problems of low detector signal under common environmental conditions. Detection frequently occurs in the presence of significant amounts of both natural and anthropogenic clutter. In order to increase the effectiveness of mine detection it is essential to develop technically superior sensor modalities, better understand environmental effects on sensors, implement innovative uses of sensors, and enhance sensor fusion and data fusion capabilities.

This issue presents a selection of the presentations at the 2011 SPIE *Defense, Security + Sensing* Symposium that addressed the areas of sensing and detection of explosive object targets in the marine and terrestrial environment by different sensor modalities, the detection of bulk explosives, environmental effects of sensor performance, and sensor signal processing and data fusion.

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