

# ***SERDP PROJECT OF THE YEAR***

## ***MUNITIONS MANAGEMENT***

### **DEVELOPMENT OF A MICRO-FABRICATED TOTAL-FIELD MAGNETOMETER**

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Magnetometers are one of the basic instruments used for the detection and discrimination of unexploded ordnance (UXO). Cesium vapor atomic magnetometers are commonly used since their readings are independent of the orientation of the sensor, which eliminates noise problems from rotation or even vibration of other types of sensors. To better discriminate UXO from clutter or scrap, a high spatial density of readings is desirable. Efficiently making and positioning such measurements accurately requires arrays of sensing elements. Existing cesium vapor sensors, however, are extremely large and consume a lot of power.

Along with his partners at the National Institute for Standards and Technology and Sandia National Laboratories, Dr. Mark Prouty has developed a miniature total field sensor that consumes a small fraction of the power of existing commercial sensors (less than 10%). These sensors could replace inductive coils currently used in electromagnetic devices for UXO detection and discrimination. Measuring the magnetic field instead of its rate of change, as an inductive coil does, has considerable advantages. Measured performance of better than 10 pT per root Hz under actual field conditions has been demonstrated.

Miniature total field sensors represent a radical jump in reducing the size, weight, and power consumption of traditional magnetometers. Such advances will enable new sensor configurations for land, airborne, and marine platforms to be designed that will enhance discrimination capabilities by a higher density of measurements with greater positioning accuracy. Commercialization of these new sensors is under way for munitions detection, and broad-scale applications in the next decade will revolutionize other fields as well.

*For more specific information about this project, stop by Poster #52.*