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Terra response: a subsurface anomaly detection system

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The need for object detection and recognition stems from the demands of many varying, worldwide applications including humanitarian, industrial, defense, and recreational needs. To date, the primary subsurface and anomaly detection techniques include ground-penetrating radar, ultrasonic testing, ferrous material detection, and chemical detection. Each application arises from shared or distinctive interests within a specific field, and each method offers unique advantages and disadvantages. The industrial sector has become a source of incredible demand for subsurface object detection and recognition. As utility companies increasingly locate cable and pipe beneath the ground and within structures while transitioning to nearly exclusive use of plastics for those components, they have simultaneously generated a growing demand for detection of plastics within various mediums, particularly earth and concrete. The need for non-destructive testing has also grown within this sector. The following paper will introduce a technology and describe its operation purely on detecting the electromagnetic signals generated from within the Earth itself. By being able to measure and monitor these signals generated from the core, such a system will not only be able to identify the shape and orientation of an underground object, but also, based on the changes in the measured signal, can predict the material composition of the object. This will demonstrate that such a system is the first of its kind to offer anomaly object detection and recognition in a completely passive manner with the added ability to locate a host of materials, including plastics.

Biography

Andrew D Lowery has received degrees of PhD (2012), MS in Mechanical Engineering (2006), BS in Computer and Electrical Engineering (2004) from West Virginia University. Currently, he is the Lead Scientist at Plasma Igniter, LLC. His research interest is in the areas of design and controls, electromagnetics, and engineering education, resulted in peer reviewed publications, including 19 conference proceedings and 10 articles and bound papers. He is a member of the Institute for Electrical and Electronics Engineers, Society of Automotive Engineers, and Sigma Xi, The Scientific Research Society.

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