INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

All-Direction and High-Resolution Subsurface 3D Imaging Radar Using Distributed Moving Transceivers

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Category
Hardware

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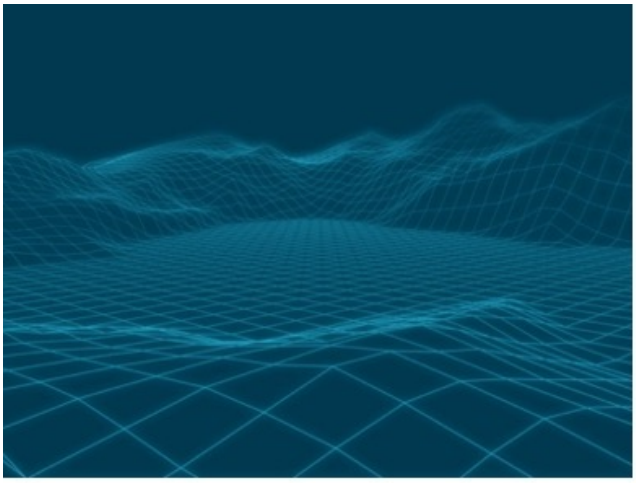

OVERVIEW

Multi-static synthetic aperture radar for autonomous 3D subsurface imaging

- Provides high-resolution, 360-degree imaging in minimal time
- Applies to archaeology, infrastructure assessment, military detection, geological surveying

BACKGROUND

Ground-penetrating radar (GPR) systems are widely used for subsurface exploration to detect buried objects or features. Traditional GPR systems, however, have limitations, particularly in terms of resolution and the time required to achieve comprehensive imaging. These systems often provide limited field of view and require extensive manual operation, making them less efficient for large-scale or high-resolution surveys. Technological advancements to improve GPR systems are essential, especially for applications requiring precise and rapid imaging of subsurface structures. The primary shortcomings include low resolution, limited coverage, and lengthy scanning processes, highlighting the need for enhanced methods that offer quicker and more detailed subsurface imaging.

INNOVATION

Researchers have developed a novel multi-static synthetic aperture radar system mounted on robotic platforms revolutionizes subsurface imaging by enabling autonomous, high-resolution 3D detection of buried objects. Unlike traditional GPR, this system leverages a 360-degree field of view, significantly enhancing imaging capabilities and reducing the time required for comprehensive scans. The use of robotic platforms allows for automated and precise data collection, eliminating the need for extensive manual operation. This architecture greatly improves resolution and efficiency, making it suitable for a variety of real-world applications. Potential uses include archaeological digs, military detection of unexploded ordnance, infrastructure assessment to locate underground utilities, and geological surveys for resource exploration. The technology ensures faster, more accurate detection, setting a new standard in subsurface imaging.