NASA-JSC Technology Opportunity

MSC-22839-1, Locating Concealed Objects Using Spectral Signatures

A new technology incorporating mainly commercial-off-the-shelf hardware and revolutionary software that provides a method and apparatus for detecting, locating, and identifying concealed non-metallic objects found in a microwave penetrable environment has been developed at the Johnson Space Center. This invention also has the capability of distinguishing underground air voids or pockets of liquid from the surrounding soils. In addition, it could be used to find non-metallic land mines and underground plastic pipe networks. The technology is versatile, can be used in the field, and is potentially cheaper than competing methods.

Potential Commercial Uses

The potential use of the technology for locating concealed objects using spectral signatures is in detection, search, geophysical measuring and surveillance applications.

Examples of uses are as follows:

- Locate and identify plastic land mines.
- Detect underground plastic pipes. With more specific information (i.e. soil permittivety, etc.) the depth and diameter of the pipe can be determined.
- Determine the presence of a fluid in a pipeline.
- Detect the interface between different geological materials, air voids and liquid pockets.
- Detect the different density interfaces within a storage tank (i.e. determine the thickness of settled layers).
- Determine the thickness of concrete or other pavement.
- Detect the size and depth of an object encased in concrete.

Benefits

<u>Performance</u>

- This technology has been proven to locate plastic or nonferrous objects in microwave permitting soils up to 4 meters.
- It overcomes the problem of the apparent disappearance of an object at some frequencies caused by either a permittivity match with the surrounding soil or an unfavorable complex addition of reflected energy at the receiver.

- This technology can be used in substantially solid materials, such as a wide variety of soils or earth formations.
- It can reduce the number of false detections.
- It overcomes the problems arising from high moisture content in the soil or a layer of water above the object to be located.
- It is not affected by temperature fluctuations and variations.

Equipment

- The equipment required for this technology is lighter, less expensive and amenable for field use in different environments.

Price

- The equipment uses commercial off the shelf parts coupled with revolutionary software. This combination should lead to a less expensive option than current designs.

Development Status

A prototype has been developed for this technology and thoroughly tested.

Options for Commercialization

This technology opportunity is part of the NASA Technology Transfer Program, the goal of which is to stimulate development of commercial applications of NASA developed technology. NASA is seeking industrial partners to continue the testing effort and license the technology for commercialization.

The invention, "Method for Locating a Concealed Object," is protected under U. S. patent number 6,501,414 issued on December 31, 2002. The patent is owned by the United States of America and was developed by the National Aeronautics and Space Administration.

Contact for Technical Information

NASA Johnson Space Center
Technology Transfer and Commercialization Office
Mail Code HA
2101 NASA Road 1
Houston, TX 77058
Phone: (281) 483-1749
Fax: (281) 244-8452
E-mail: commercialization@jsc.nasa.gov