

Multifrequency-Scanning Capaciflector

Combines fast material identification with proximity measurement

NASA offers companies the opportunity to license or jointly develop this innovative sensor technology.



NASA Goddard Space Flight Center has developed a capacitive sensor that provides a unique combination of capabilities: fast material composition identification and proximity measurement. The multifrequency-scanning capaciflector performs all of the functions of typical proximity sensors with hardware and software extensions to scan and analyze capacitance-versus-frequency data, enabling material identification.

Benefits

- **Multifunctional**, providing fast material composition identification as well as proximity measurement.
- **Stable**, eliminating thermal drift issues.
- **Rugged**, performing flawlessly in harsh environments.
- **Precise proximity data**, dramatically increasing detection range and sensitivity over existing technologies.
- **Efficient**, requiring only milliwatt levels of power.
- **Versatile**, allowing multiple configurations and combinations.
- **Low cost**, using standard, commercially available hardware.





Commercial Applications

- Soil information detector
- Aircraft safety (e.g., determining the type of snow and ice accumulation on wings)
- Security systems (e.g., weapon or explosive detection, motion detection)
- Safety systems (e.g., human detection in automotive and heavy machinery applications)
- Air bag deployment sensors and systems
- Land mine detection systems
- Industrial robotics applications (e.g., obstacle detection, guidance systems)
- Industrial process control

More information about working with NASA Goddard's Technology Commercialization Office is available online.

<http://techtransfer.gsfc.nasa.gov>

The Technology

NASA Goddard Space Flight Center developed the multifrequency-scanning capaciflector as a replacement for the gamma-ray spectrometers typically used to identify material composition in extra planetary rover applications. Compared to gamma-ray spectrometers, which typically take 10 minutes to identify material, Goddard's multifrequency-scanning capaciflector provides faster material identification and precise proximity data in a rugged and stable package.

The multifrequency-scanning capaciflector differentiates the effect of a material's permittivity from the geometry of the object by using the shape of the capacitance curve as a function of frequency. A capaciflector sensor, coupled to current-measuring voltage follower circuitry, is driven by an oscillator that is swept in frequency and generates an output corresponding to capacitance as a function of the input frequency. This swept frequency information is fed into an apparatus for comparing the shape of the capacitance-versus-frequency curve against characteristic capacitance-versus-frequency curves for a variety of materials. Using pattern-matching techniques, the multifrequency-scanning capaciflector can identify the object's material and its distance.

NASA Goddard's patented concept can be adapted and utilized in a broad range of applications—from determining the type of snow and ice accumulation on aircraft wings to weapons and explosives detection to industrial process controls including mass detection, moisture detection, material identification, fluid monitoring, capacity monitoring, and counting.

Commercial Opportunity

This technology is part of NASA's technology transfer program. The program seeks to stimulate commercial use of NASA-developed technologies. NASA's multifrequency-scanning capaciflector has been patented (US 5,521,515). NASA invites commercial companies to consider licensing or jointly developing this technology. NASA is flexible in its agreements, and opportunities exist for exclusive, nonexclusive, and exclusive field-of-use licensing.

For More Information

If you would like more information about this technology or about NASA's technology transfer program, please contact:

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