



Sensors

RFID Tag for Long Range and Wide Coverage Capabilities

Radio Frequency Identification (RFID) Beamformed Retroreflector Technology

Researchers at the NASA Johnson Space Center have created a suite of RFID technologies focused in the areas of inventory management and tracking systems and one of those technologies is the RFID Tag with Long Range and Wide Coverage Capabilities. This technology can be integrated to a RFID Tag with a beamforming network capable of receiving and sending long range signals from different directions. Typical RFID tags offer either wide coverage with limited range or long range with narrow coverage. However, this technology, which can even employ passive RFID tags, is capable of doing both, opening the RFID technology to a new spectrum of applications, including inventory tracking, navigational systems, and predictive analytics. With its dual benefits of long range and broad coverage made available by retroreflection, these RFID tags can easily enhance existing RFID infrastructure to enable new applications in many industries.

National Aeronautics and Space Administration



BENEFITS

- Flexibility - can use IC-based RFID tags or SAW tags
- Range - allows a reader to detect tag information over greater distances
- Low Power Requirement - passive RFID tags are used without the need for tag power
- Enhancement - provides tools and applications with sensory capabilities
- Location aide - can determine location without GPS

technology solution

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THE TECHNOLOGY

The RFID Tag with Long Range and Wide Coverage Capabilities technology allows a RFID tag to direct a RFID reader beam signal back in the direction of arrival. This technology requires no added power to provide telemetry for long range readers by using multiple beams instead of one narrow beam signal. Each of the predetermined number of beams is typically associated with a unique identification number to derive bearing information. This innovation is suited for IC-based RFID tags as well as Surface Acoustics Wave (SAW) tags, which are useful for extreme environments.

The technology improves the ability to obtain telemetry (quantity, location, or sensor information) without GPS over a distant range. When the tag reports its identification, it also provides angular information to the source, which makes this technology useful for navigation and mapping applications. Because the technology provides an estimated angle between the signal antenna and the surface of each tag, the technology is able to triangulate the position of a mobile item identified with a RFID tag. The same innovation can be integrated to a RFID reader in order to enhance its range and distribute power to passive tags. The innovation has commercial applications in construction, oil and gas, seaport/harbor management, Internet of Things (IoT) and many more industries.



The beamforming RFID retroreflector technology is suitable for tracking and navigation needs in seaport and harbor management, oil and gas, logistics/inventory, and construction.

APPLICATIONS

The technology has several potential applications:

- Construction - RFID navigation and mapping technology
- Oil and Gas - companies seeking passive sensor capabilities with suitable extended range
- Logistics/Inventory - tracks location, movement, quantity, etc. of items and/or lots
- Seaport/Harbor Management - long distance tracking of shipment boxes
- IoT - enhance capabilities on predictive analytics, security, and inventory management systems

PUBLICATIONS

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