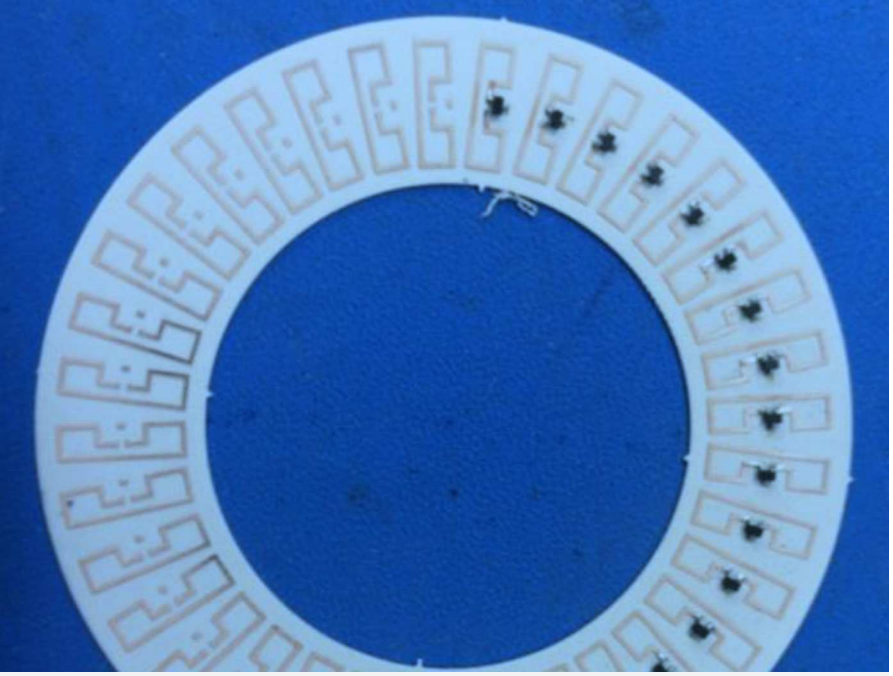


National Aeronautics and Space Administration

Sensors

RFID-Based Rotary Position Sensor

For Sensing or Refining Angular Position of a Rotating System

Innovators at the NASA Johnson Space Center (JSC) have developed an RFID-based system for sensing the angular position of rotating systems. The RFID-Based Rotary Position Sensor can be used as a position/orientation sensor, or implemented in a controller to interpolate and refine the rotation angle of a rotating system. The RFID-Based Rotary Position Sensor is part of a suite of RFID-based technologies developed at NASA JSC to monitor and manage inventory based on passive RFID sensors. NASA's RFID sensors can wirelessly track either bulk levels or discrete quantities of materials within a container without having to attach RFID tags to each item. The RFID-Based Rotary Position Sensor was created as part of a hand-crank dispenser system in order to track items that were too small to tag individually, but the sensor can be used on a larger scale and in a variety of applications to sense or control angular position of rotating systems.

BENEFITS

- *Widely adaptable:* The system can be tailored to specific applications for determining the position, or controlling, a rotating structure
- *Uses standard, cost-effective components:* The technology leverages common RFID integrated circuits and is compatible with the EPCglobal Class-1 Generation-2 RFID standard
- *Offers power-free sensors:* The RFID ICs are passive, which means the sensor does not require additional wired power or batteries

APPLICATIONS

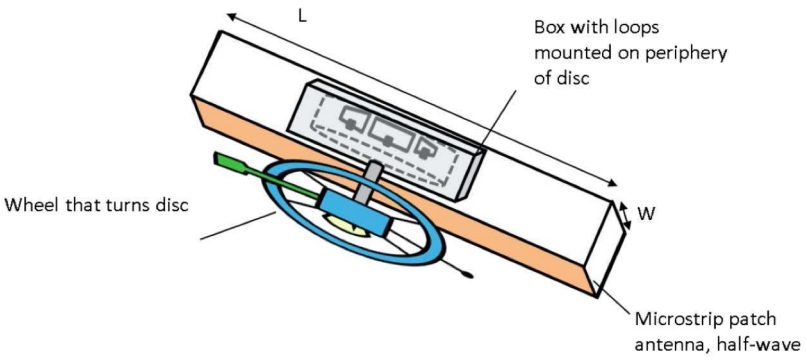
- Aerospace
- Automotive
- Consumer goods
- Industrial machinery
- Inventory management
- Logistics
- Medical devices
- Military
- Oil and gas
- Robotics

technology solution

THE TECHNOLOGY

The RFID-Based Rotary Position Sensor was designed for use in a hand-crank dispenser with a circular disc inside the dispenser box containing a plurality of RFID integrated circuits (ICs) around the disc's periphery. An antenna is coupled to the crank on the outside of the box, which allows a user to turn the disc and dispense items. An RFID interrogator, coupled to a processor, determines the orientation of the crank based on the RFID ICs, providing information about the rotation angle of the internal disc which can then be used to assess level of material remaining in the dispenser. This sensor can be useful for items that are too small to tag individually (e.g., pharmaceutical pills), but there are various potential applications for the sensor system including use in limit switches, position sensors, and orientation sensors. The configuration of the RFID ICs and antenna can be tailored for specific applications. For example, the system could be used in a rack-and-pinion gear system to measure the rotational or angular displacement that arises from a linear force. Furthermore, the system could be incorporated into a rotary controller to refine the rotation angle of a rotating system, like a steering systemor rotor, for example.

NASA's RFID-Based Rotary Position Sensor is at a TRL 6 (system/subsystem model or prototype demonstration in a relevant environment) when used in its original application as part of a hand-crank dispenser system. For additional applications that have not been explored by NASA, the invention is at a TRL 4 (component and/or breadboard validation in a laboratory environment).



An example steering controller with RFID-Based Rotary Position Sensor

PUBLICATIONS

Patent No: 9970782

More Information

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NASA's Technology Transfer Program pursues the widest possible applications of agency technology to benefit US citizens. Through partnerships and licensing agreements with industry, the program ensures that NASA's investments in pioneering research find secondary uses that benefit the economy, create jobs, and improve quality of life.

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MSC-TOPS-82