



National Aeronautics and
Space Administration



TECHNOLOGY SOLUTION

Communications

Smart Enclosure using RFID for Inventory Tracking

Inventory tracking for containers such as waste receptacles or storage containers

The NASA Johnson Space Center has developed a method for tracking collections of items in a smart container using radio-frequency identification (RFID) tags with a high level of read accuracy. Automating the tracking of a collection of items (particularly small items) represents a major industrial hurdle due to both tag size and cost. This technology promises to successfully address these hurdles. The smart enclosure innovation can track individual items in the smart containers regardless of item placement, or on conveyor belts. The technology improves the read accuracy of items moving on, for example, a conveyor belt, which in turn can enable the use of smaller, lower cost tags. The NASA patented technology is available for licensing.

This NASA Technology is available for your company to license and develop into a commercial product. NASA does not manufacture products for commercial sale.

BENEFITS

- High level read accuracy
- Reduced tag cost
- Small items can be cost-efficiently tagged and tracked



THE TECHNOLOGY

The smart enclosure innovation employs traditional RFID cavities, resonators, and filters to provide standing electromagnetic waves within the enclosed volume in order to provide a pervasive field distribution of energy. A high level of read accuracy is achieved by using the contained electromagnetic field levels within the smart enclosure. With this method, more item level tags are successfully identified compared to approaches in which the items are radiated by an incident plane wave. The use of contained electromagnetic fields reduces the cost of the tag antenna; making it cost-effective to tag smaller items.

RFID-enabled conductive enclosures have been previously developed, but did not employ specific cavity-design techniques to optimize performance within the enclosure. Also, specific cavity feed approaches provide much better distribution of fields for higher read accuracy. This technology does not restrict the enclosure surface to rectangular or cylindrical shapes; other enclosure forms can also be used. For example, the technology has been demonstrated in textiles such as duffle bags and backpacks.

Potential commercial applications include inventory tracking for containers such as waste receptacles, storage containers, and conveyor belts used in grocery checkout stations.



This NASA-developed technology can be used for various applications including the tracking of inventory in grocery stores.

APPLICATIONS

The technology has several potential applications:

- Inventory management
- Emergency medical equipment and supplies
- Smart shelves, drawers, and containers
- Trash receptacles
- Medical Storage
- Shipping containers
- Grocery store shopping carts and conveyor belts
- Refrigerator inventory
- Security

PUBLICATIONS

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