Amazon Fulfillment Technology UX | Patent Proposal

Mobile Tray for Automated Inventory Count

Introduction

The Mobile Tray for Automated Inventory Count is a multi-item RFID scanner developed as a tray module. It is constructed to be easily added to and removed from a rolling cart and perform rapid bulk scans of groups of RFID-tagged items placed inside the tray. The device is intended to facilitate fast, high-quality counts for inventory control and quality assurance.

Background Information

The design of the container tray portion of this prototype is similar to that of another patent filing from our lab: *P34502-US Removable RFID Enabled Insert for Urban FC Carts*. The attorney group will provide further information on any prior art.

Unique Factors

Our design contains several distinct features, including:

1. the number and type of antennas installed
2. the fixed arrangement and configuration of those antennas
3. the shape of the tray
4. the sheet metal shielding that is custom-fitted to the insert to constrain the RFID field to the items in the tray
5. the custom controller software

These individual elements are uniquely integrated to enable the rapid scanning of a group of items in a confined area. The reader and software are tailored to a standard tag type, antenna layout, and tray form factor to count every item in five seconds, with 99% reliability.

Details

Design and Configuration

The tray module is embedded with specific RFID antennas in a specific arrangement and an RFID reader development kit that is configured to communicate with the number and type of antennas in use. It is also equipped with a small form factor, system-on-chip PC that handles the configuration of the reader for specific tag scanning scenarios, and runs a custom application that receives data from the reader after each scan and processes it. A user interface on the PC allows for touchscreen input to initiate scans while displaying scanner output, including counts and unique RFID tag values.

The entire assembly is designed to rest in or on top of a rolling cart and be powered by an onboard battery or a nearby outlet.

Operation

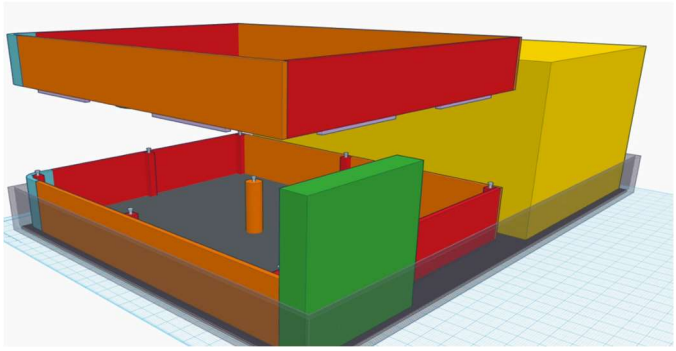
The custom scanning application executes on the PC and connects to the RFID reader, which automatically boots using settings pre-configured to anticipate the data format of the RFID tags in use and perform scans using methods that are optimized for near-field bulk scans with the given antennas.

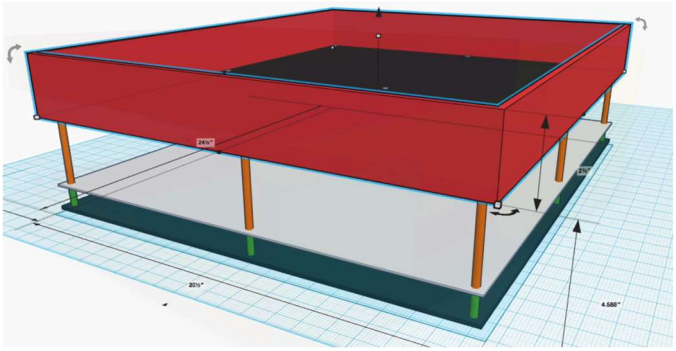
Once the controller application is running, a user places a group of RFID-tagged products into the tray, either directly on the tray surface or contained in a plastic tote or cardboard box. After checking that the items are not stacked or significantly overlapping one another, the user then taps a button on the touch screen user interface to perform a scan. Within seconds, the tags are read and redundantly checked for all items present, and both the total number of tags scanned and a list of each unique tag ID are displayed.

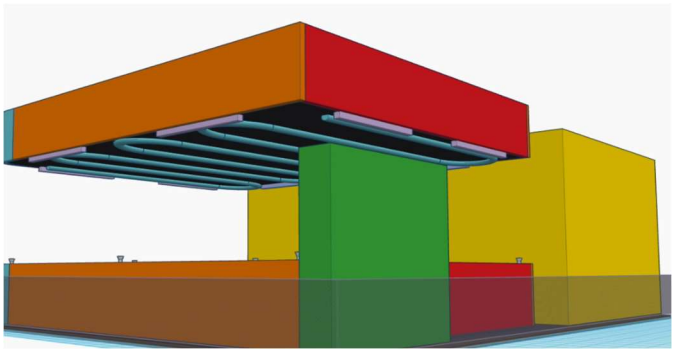
Intended Use

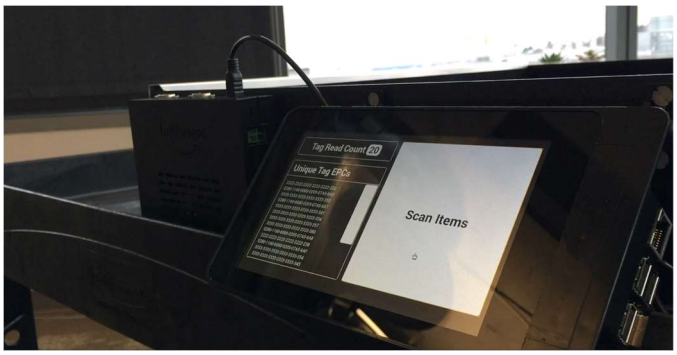
When inventory counts are done manually with a hand scanner, each item has to be scanned individually, which makes the process time-consuming, prone to human error, and expensive. Whether fit to a single mobile cart in a commercial storefront or a fleet of carts in an industrial or warehouse scenario, this invention can produce significant cost savings by quickly scanning multiple items at once while reducing overall count defects.

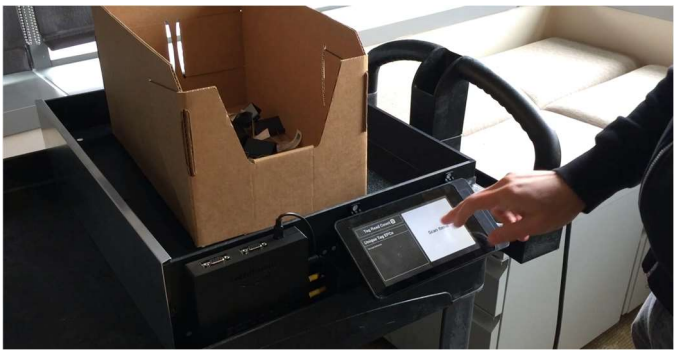
Illustrations and Images











Appendix A: Inventors

Item Description	Title/Role
Allan Bathurst	Design Technologist/System requirements, production management and fabrication
Nelson Ramon	Design Technologist/Tray module design and fabrication
Gregory Martin	Design Technologist/Reader configuration, firmware and software authoring
Matthew Bartol	UX Design/User interface consulting
Will Seidelman	UX Research/System requirements
Oleg Kantor	RF Systems Engineer/Antenna design and engineering consultant

Appendix B: Prototype Equipment

Item Description	Qty.	URL
Impinj Indy RS2000 Development Kit	1	https://support.impinj.com/hc/en-us/articles/206700898
Raspberry Pi 3	1	https://www.raspberrypi.org/products/raspberry-pi-3-model-b
Raspberry Pi touchscreen	1	https://www.raspberrypi.org/blog/the-eagerly-awaited-raspberry-pi-display
Raspberry Pi touchscreen case	1	https://smarticase.com
RFID Cable Antenna	2	http://www.supply-rfid.com/en/products/ rfid-antennas/locfield
Tray Enclosure	N/A	N/A