

Review of “IoT-Based Smart Shopping Cart Using Radio Frequency Identification”

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I. SUMMARY

In this paper the researches develop an Internet of Things (IoT) based system to automate the process of purchasing items from a retail store. Their proposed test case is a grocery store in which all the items are tagged with a radio frequency identification (RFID) tag. To purchase an item the customer would simply need to place the item inside their custom shopping cart.

The automation is achieved by including on every shopping cart a microcontroller, an RFID reader, and a Bluetooth transmitter. When an item (with RFID tag) is placed in the cart the RFID reader, which is continuously scanning of tags will report a new product ID to the microcontroller. The microcontroller in turn uses the Bluetooth transmitter to send the product ID to a custom android app. The app communicates with store specific backend server over WiFi to manage inventory and the payment process.

The authors assert that this solution can significantly improve the customers shopping time as well as inventory management for the store.

II. PRAISE

In light of the authors poor communication, discussed further in the *criticism* section, they do a good job of visually presenting their prototype. The flow chart style used to represent data flow (and protocol) between the various components cleanly encapsulates their design. Likewise, Figure 3 contains a full wiring guide for the microcontroller to the RFID scanner and Bluetooth transmitter. From these helpful diagrams someone should be able to re-implement their IoT prototype. Ease-to-follow is a benefit for an academic paper.

Their design choice to use a phone as an intermediate layer between the microcontroller and backend is a smart design choice because Bluetooth interface will likely not be phased out of use anytime soon. And the server connection being generated by the phone means as long as phones can connect to the internet using any protocol the app can be updated to accommodate. Had they enforced a specific protocol off the microcontroller they run the risk of that protocol becoming obsolete or unsupported by the backend server.

III. CRITICISM

This paper is lacking a critical evaluation of performance metrics. They assert benefits to their design for time savings, inventory management, and cost but they never follow those claims up by demonstrating that their system actually performs to those metrics.

The RFID scanner the authors suggest using has a reading range of 0-60mm. Which means the object being place in the cart needs to held extremely close to the sensor before being place in the basket. The authors write the paper as if simply placing an item in the basket is enough to scan the item, whereas the 60mm range means before placing an item in the basket the customer must first “scan” the item using a similar motion to self checkout. This is a way hurts the performance of their system. Secondly, that same solution of a low range RFID scanner could be resolved but including a more powerful/longer range reader. However doing so would hurt the cost and power metric of their system.

This paper is also hurt by a poor presentation of ideas. It is filled with improper sentences which makes communicating their technical ideas far more difficult than it needed to be. The especially shines through in the introduction section, larger parts of this section are unnecessary to the problem and could be trimmed.

IV. REFERENCES

- [1] M. Shahroz, M. F. Mushtaq, M. Ahmad, S. Ullah, A. Mehmood and G. S. Choi, "IoT-Based Smart Shopping Cart Using Radio Frequency Identification," in *IEEE Access*, vol. 8, pp. 68426-68438, 2020, doi: 10.1109/ACCESS.2020.2986681