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IoT based Smart Cart System using RFID

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Abstract: ***This paper targeted to reduce the Queue at a billing counter in a shopping complex. The system does the same by displaying the total price of the product kept inside the cart. In this way the customer can directly pay the amount at the billing counter and leave with the commodities he/she has bought. It eliminates the traditional scanning of products at the counter and in turn speeds up the entire process of shopping, also with this system the customer shall know the total amount to be paid and hence can accordingly plan his shopping only buying the essential commodities resulting in enhanced savings. Since the entire process of billing is automated it reduces the possibility of human error substantially. Also the system has a feature to delete the scanned products to further optimize the shopping experience of the customer. The hardware for the test run is based on the Arduino platform and Xbee modules, as both are very popular in small-scale research and wireless automation solution.***
Keywords: RFID, Microcontroller, LCD, BLE, Wireless Communication, Embedded System.

I. INTRODUCTION

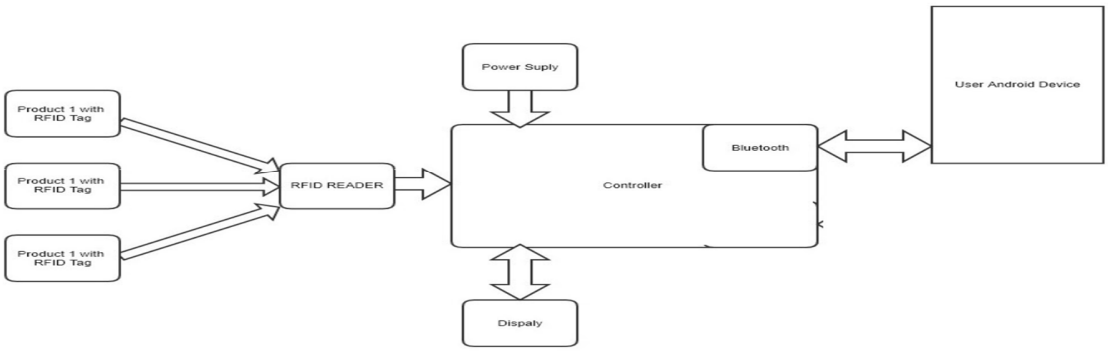
People tend to overshoot their budget when they are shopping at a big shopping center. Moreover they end up in long queues at the end of their shopping waiting for the products to be scanned and billed. The Smart Shopping Cart addresses the above problems with ease. It helps the customer in ensuring that he does not overshoot his pre decided budget and only buys the essential commodities actually needed by him, also the system aids in eliminating the long queues at the billing counter as the products are already scanned and the customer just has to pay the bill and bag the items purchased. The system is profitable for the shopping centers as it can help in reducing the number of billing counters and in turn will help in reducing employee costs significantly. The aim is to design a microcontroller-based shopping cart aiding the customers in their shopping and reducing the queue at the billing counter. The system must also have a feature to delete a purchased product in case the customer changes his/her mind. There is also a need of a centralized database which contains the cost of all the products in the shopping market.This paper helps in eliminating or reducing the above mentioned problems substantially.

II. EXISTING SYSTEM

All over India, currently at every shop or mall while purchasing any product, customer have to go to billing counter and there an employee of that particular shop or mall scan the RFID tag or barcode and then generate bill. After that we have to pay by cash or credit or debit card.

III. PROPOSED SYSTEM

In our proposed system, initially each user has to register and create account in smart cart android application. After creating account, while shopping customer has to link android application to smart trolly using Bluetooth.Now customer have to scan RFID tag of that product of which he/she is keen to purchase using RFID scanner of smart card embedded system. After scanning all products, bill will be generated on smart cart application and then we can pay amount of that particular bill by two ways, one is by cash on billing counter and other by online payment using smart cart application.



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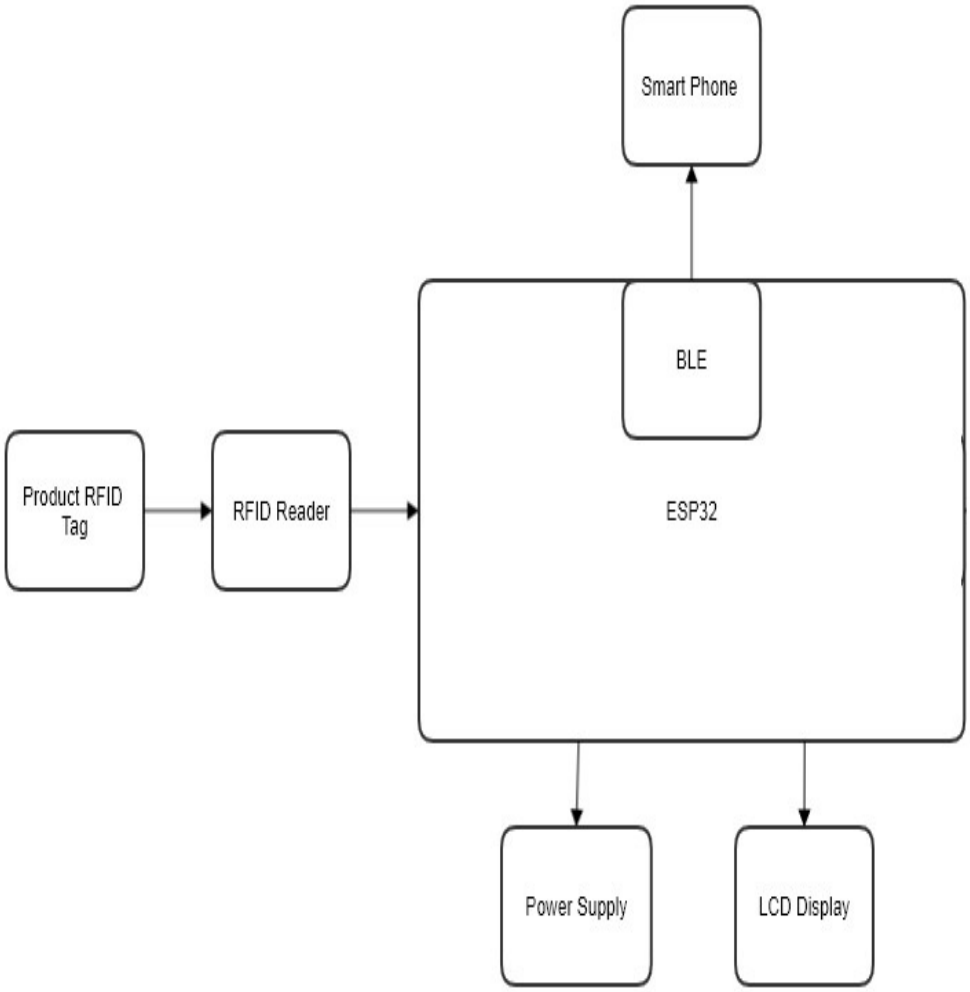
IV. COMPARISION AND ANALYSIS

We have found that this system is more reliable than current Ration Distribution System. Following Table I show this clearly:

Sr. No.	Existing System	Proposed System
1.	Payment of purchased products is at billing counter	Payment of purchased products can be done by ourself using smart cart application
2.	Time consuming	Less time is required
3.	More human resource is required	Less human resource is required
4.	Customer is totally unaware of purchasing and payment history	Customer can have all details about purchasing and payment history

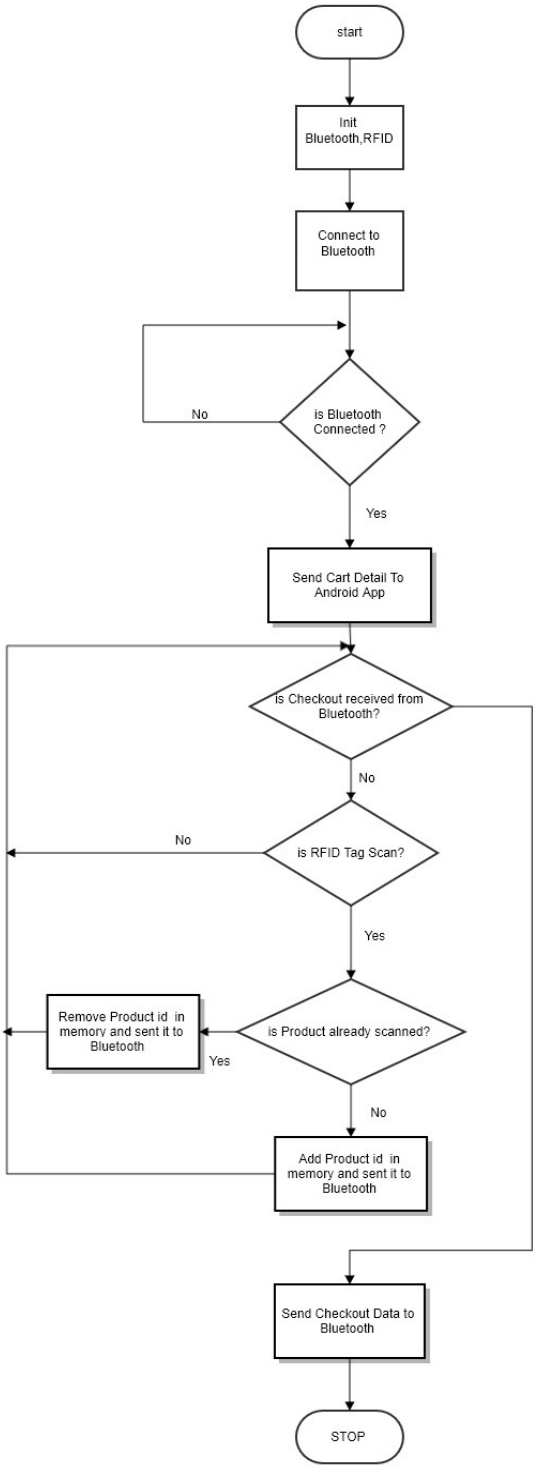
V. PROPOESD SYTEM DESCRIPTION & WORKING

Block Diagram



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Flow Diagram



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The working of proposed system is divided into following mentioned modules

A. RFID Interfacing

A RFID card reader is interfaced with the Arduino Uno present on the shopping cart so that the customer is able to scan the products he/she intends to buy. The card reader is also equipped with a buzzer which actuates whenever it detects a RFID card in its operating range.

B. Liquid Crystal Display (LCD)

The conventional 8 × 2 character LCD is used. This type of LCD is the most ideal display device which is used popularly with the Arduino microcontrollers. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. This LCD has two registers namely Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

C. RFID Tag and Reader

The RFID reader is attached to the shopping cart which detects any tag which comes in its vicinity. The tag has a unique number assigned to it. Once the reader reads the number it passes it to the XBee which further communicates it for further processing. The RFID reader is connected to the serial rxd (pin 0) of the Arduino UNO.

D. BLE Module

Bluetooth Low Energy (Bluetooth LE, colloquially BLE, formerly marketed as Bluetooth Smart) is a wireless personal area network technology designed and marketed by the Bluetooth Special Interest Group (Bluetooth SIG) aimed at novel applications in the healthcare, fitness, beacons, security, and home entertainment industries. Compared to Classic Bluetooth, Bluetooth Low Energy is intended to provide considerably reduced power consumption and cost while maintaining a similar communication range.
Mobile operating systems including iOS, Android, Windows Phone and BlackBerry, as well as macOS, Linux, Windows 8 and Windows 10, natively support Bluetooth Low Energy. The Bluetooth SIG predicts that by 2018 more than 90% of Bluetooth-enabled smartphones will support Bluetooth Low Energy.

VI. ACKNOWLEDGEMENT

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VII. CONCLUSION

This product has been designed and completed. Both the programming and the hardware design have been completed successfully and we have been successful in making all the functions work. The cart housing, all the components has been designed and the components are fixed into it.
There is also a scope of improvement, a feature where a customer can feed in the shopping list which will enable the customer not to miss out on any item.
In the current market, this shopping cart stands apart from the existing designs due to a variety of features. One reason is that it stands apart from the conventional method of bar code scanning where an item has to be in the line of sight whereas using RFID reader it just has to be in the vicinity and it would be detected. The cart will enable the customer to scan the items and get the total bill instantly.
This would reduce the checkout time of a customer from the billing counter. An added advantage for the shop owner is that there is reduced amount of man power required at the billing counter. Hence, the Smart Shopping Cart stands apart from existing designs.

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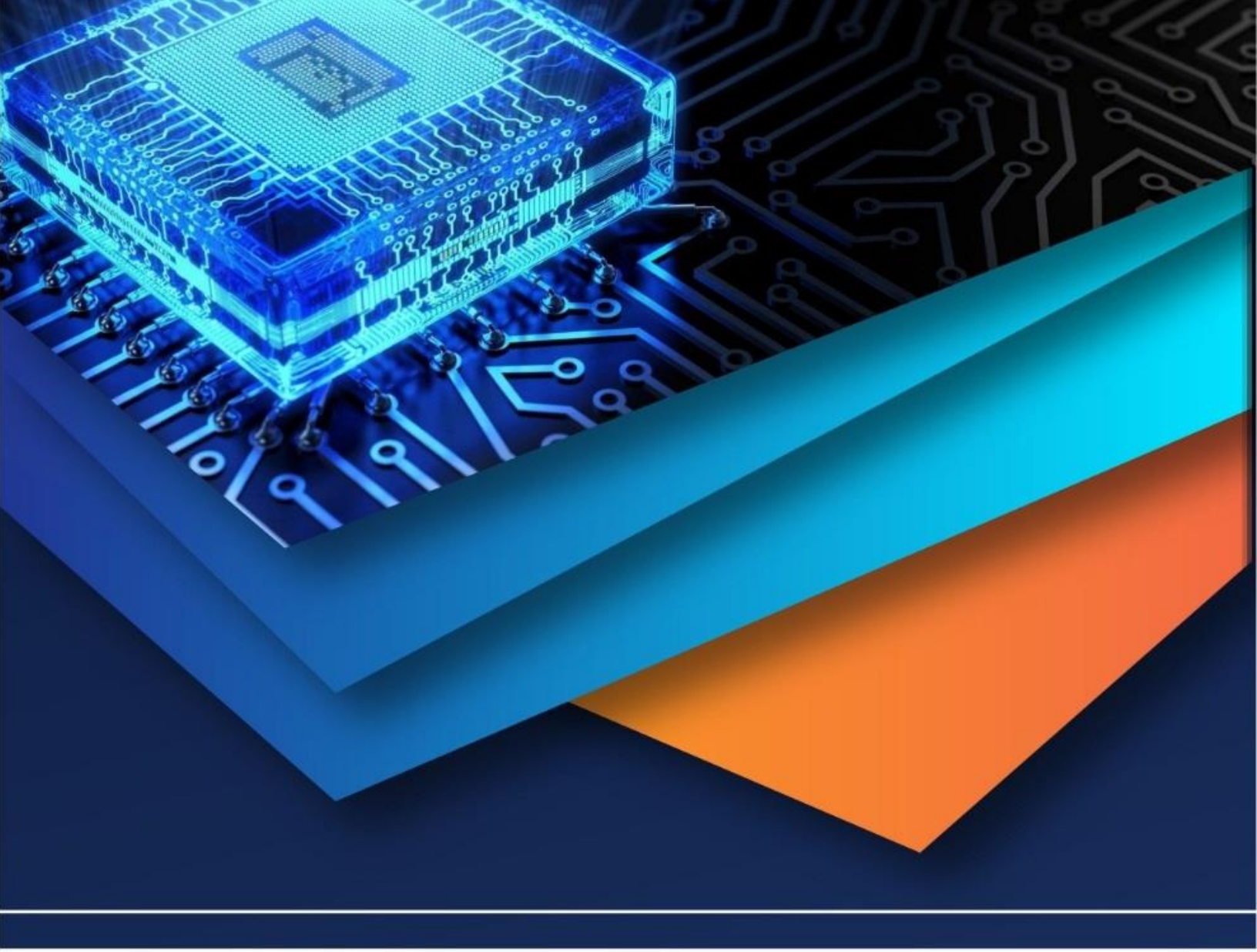
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