IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 7.39 ⁜ Vol. 11, Issue 4, April 2022

DOI: 10.17148/IJARCCE.2022.11437

Smart Trolly With-Automatic Billing System Through RFID Using ATTINY

Akash Gadekar[1], Ankita Pimpalkar[2], Bharti Meshram[3], Gudiya Dhaliwal[4], Dr. V. G Girhepunje[5]

[1-4]UG Students, Electronics and Telecommunication Engineering, Priyadarshini College of Engineering, Nagpur, India

[5]Professor and Head of Dept. Electronics and telecommunication Engineering, Priyadarshini College of Engineering, Nagpur, India

Abstract: In the world of Internet of Things (IOT), interactions among physical objects have become a reality. Day by day items would now be able with outfitted of computing power and communication functionalities, permitting objects everywhere to be associated with one another. This has bought a new uprising in industrial, financial, environmental systems and triggered great challenges in data management, wireless communications and real-time decision making. Biggest IOT applications is the Smart shopping cart. The Smart Shopping system comes with the smart embedded device with RFID reader for scanning the RFID tag of products, the LCD display for displaying the bill, a data modem module for manipulation and sending data to the billing unit using wireless communication.

Keywords: Smart Trolly, Smart Trolly with Automatic Billing using RFID, Smart Trolly With Automatic Billing System through RFID using ATTINY

I. INTRODUCTION

- Now a days shopping at big malls is becoming a daily activity in metro cities. The huge rush at mall on holidays and weekends.
- Sometimes at shopping we overshoot the budget. More-over we end up in long queues, end up waiting the product scan and billed.
- The Smart Shopping Cart addresses the above problems with case. It helps the customer in ensuring that he does not overshoot his pre-decided budget and only buys the essential commodities actually by him, also the system aids in eliminating the long queues at the billing counter.
- One of the biggest IoT application is the smart shopping cart. The Smart Shopping- system comes with the smart which is an embedded device with RFID reader for scanning the RFID (Radio Frequency Identification) tag of products, an LCD display for displaying the bill, a ESP8266 wi-fi module for manipulating and sending data to server and a GSM module foe wireless communication.

II.PROPOSED SYSTEM

The proposed system consists of following units:

1. GSM Interfacing.
2. ESP8266 Wi-Fi Module.
3. E-RFID Reader.
4. Arduino IDE.
5. Firebase cloud.
6. Memory.

1. GSM Interfacing: The GSM module establishes the communication between the device and the ESP8266.
2. ESP8266 Wi-Fi Module: The ESP8266 is used to transfer the information from the RFID reader to the cloud as the product information is to be compared with the product list in database.
3. E-RFID Reader: The RFID reader is attached to the shopping cart which detects any tag which comes in its vicinity.
4. Arduino IDE: The RFID reader is attached to the shopping cart which detects any tag which comes in its vicinity. Arduino IDE is used to push the cloud into the ESP8266 for computations.

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5. Firebase cloud: Cloud storage for the firebase is a powerful, simple and cost-effective object storage services built for Google scale. All the information about the products is stored in database in the cloud.

6. Memory: When larger amounts of static data is to be stored (such as in USB flash drives) in a specific type of EEPROM such as flash memory is more economical than traditional EEPROM devices. EEPROMs realized as arrays of floating-gate transistors. EEPROM is user-modifiable, it reads only memory (ROM) that can be erased and reprogrammed repeatedly through the application of higher than normal electrical voltage generated externally or internally in the case of modern EEPROMs.

Requirement Analysis

- **Hardware**
- LCD Display
- RFID Tags
- Interrogators (or readers)
- Mini Thermal Printer
- RF DATA MODEM (RF LINK).
- Step down transformer:
- Rectifier Unit
- Input Filter.
- Output Filter.

1. LCD Display: LCD (Liquid Crystal Display) screen is an electronic display module and it has wide range of applications. A 16x2 LCD, it can display 16 characters per line and there are 2 such lines. In this LCD, each character is displayed in 5x7-pixel matrix. It has two registers and they are Command and Data. The command register stores the command instructions given to LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing the screen, setting the cursor position, controlling display etc. The data register stores the data which is to be displayed on the LCD. The data is the ASCII value of the character which is to be displayed on the LCD.

2. RFID Tags: RFID tags are affixed to assets. Each has a unique numerical identifier so differentiation is possible. For supply chain operations, it is common for the tag identifier to contain the Serialized Global Trading Identification Number (SGTIN) of the item to which it is affixed. This allows differentiation of identical items.

3. Interrogators (or readers): An interrogator, more often called as reader. It is a radio frequency transmitting and receiving device used to communicate with an RFID tag. The device was named an interrogator because it cross examine the tags. The term "reader" is a more conversational term, but is sometimes misleading in many of the devices also have the ability to encode, or write information to an RFID tag. A reader basically acts as a sensor. it senses what tags are within its range and is designed to interface with an information process system, which we'll explain more about below.

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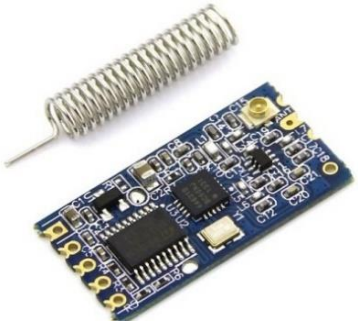
4. Mini Thermal Printer: A mini printer can be interface to any micro-controller project. Just send data to it serially and it will print it. Thermal printers are also known as receipt printers. Thermal printers are also known as receipt printers, they gives the receipt when we go to the ATM or grocery store. This printer is ideal for interfacing with a microcontroller, you simply need output from your microcontroller to print text, barcodes, bitmap graphics, even a QR code.

5. RF DATA MODEM (RF LINK): On the basis of proven Silab's SI4463 RF Chip and STM8 MCU on single module making it easy to use with serial UART data. Its wireless working frequency band is 433.4-473.0MHz, multiple channels can be set, with the stepping of 400 MHz, and there are totally 100 channels.



6. Step down transformer: The step-down transformer is used to decrease the supply voltage of 230v ac from mains to lower values, as the various IC's used in this project is to reduced voltages. It consists of primary and secondary coils. To decrease or step down the voltage, the transformer is designed to contain fewer number of turns in its secondary core**.**

7. Rectifier Unit: A diode bridge is an instrumentation of four diodes connected in a bridge circuit. It provides the same polarity of output voltage of any polarity of the input voltage. It is most common application, for conversion of alternating current (A.C) input to direct current (D.C) output, it is called as a bridge rectifier.

8. Input Filter: Capacitors are used as filters. The ripples from the dc voltages are removed and pure dc voltage is obtained. This filter is fixed before the regulator. Capacitors used here are of the value 470uF

9. Output Filter: This filter is fixed after the Regulator circuit to filter any of the possibly found ripples in the output received finally. Capacitors used here are of value 10uF.

III.WORKING OF SYSTEM

The aim of project is to design a smart shopping cart which helps of RFID based technology. ATTINY Microcontroller is used in this project. RFID reader and LCD display is interfaced with it. Project is basically divided into two parts, one is Smart Trolley unit and another one is billing unit.

RFID reader mounted on the trolley unit and RF tags are mounted over the products covers or enclosures. Prices of products already entered into the data base of microcontroller corresponding to the RF tag ID. Whenever buyer select any product and drop it to the trolley then the RFID reader automatically senses the price of it and at the same time display it

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on the LCD. When he select another product and drop it into the trolley same function will be executed and get recorded on the memory.

At the end of shopping he need to go to the billing counter. At counter there is another unit equipped with RF Data Link and Mini Thermal Printer. Whenever he presses the finish button, the total invoice amount transferred to that billing unit. Billing unit also consist of Microcontroller along with thermal printer, finally invoice automatically get printed by using that thermal printer.

IV.PROJECT APPLICATION

1) It helps the customer in ensuring that he does not overshoot his pre decided budget.
2) The system aids in eliminating the long queues at the billing counter.
3) The Smart Shopping Cart has RFID reader to scan the product where the product details are stored in the Firebase Cloud. And LCD which displays the total bill.
4) The Smart cart also eliminates the tedious process of scanning the products at the counter as this process is already done by the customer during the shopping itself.
5) It helps shoppers manage shopping lists, pay for items, and find products in the store.

V.CONCLUSION

This would lessen the checkout time of a customer from the billing counter. The Smart trolley added an advantage for the shop owner , that it reduced amount of man power required at the billing counter.

Hence, the Smart Shopping Cart stands apart from existing designs.

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