

## SMART SHOPPING CART USING RFID TECHNOLOGY

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### ABSTRACT

Nowadays, buying and searching at huge malls is turning into a daily activity in subway cities. We can see large rush at malls on holidays and weekends. The rush is even a lot of once there are special offers and discount. People purchase totally different things and place them in trolley. After total purchase one needs to go to cashier for payments. The cashier prepare the bill victimization bar code reader that could be a time overwhelming method and leads to long queues at charge counters. This paper targeted to minimize the Queue at a billing counter in a shopping complex. Smart Trolley 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. The hardware is based on NodeMCU, RFID Reader Module, RFID Card. 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 by customer to further optimize the shopping experience.

**Keywords:** RFID reader, RFID tag, LCD Display, Buzzer, NodeMCU

### 1. INTRODUCTION:

The advent of wireless technology along with the other communication techniques help in making e-commerce very popular. Modern futuristic product is the one that aids the comfort, convenience and efficiency in everyday life. In this project, we discuss an innovative concept of RFID Based Smart Shopping and Billing System. The main goal is to provide a technology oriented, low-cost, easily scalable, and rugged system for aiding shopping in person. The smart shopping trolley will help shorten the checkout lines thereby helping the customers at retail stores. The System consists of an RFID based trolley which communicates with the billing counter wirelessly using a WIFI module. Each trolley will consist of a similar type of hardware with unique trolley address. The developed system comprises of User Interface and Display Unit (UIDU) and Billing and Inventory Management Unit (BIMU). The customers will be able to scan the items themselves and the LCD screen on the shopping cart will keep updating the total. The billing counter can at any point of time inquire about the current items present in the trolley. This will turn out to be very beneficial for the retail stores as more people will enjoy the shopping experience and come more often to shop.

## 2. EXISTING SYSTEM

In existing system, customer will not know the amount of total purchase, until he went to the counter for paying bill. One can remove certain product, once he approaches to the counter, where he decides which product should be reverted back. To avoid these type of troubles, we develop a smart trolley, where one can know the total bill of the products purchased and bill amount is also sent to the billing section wirelessly.

## 3. PROPOSED SYSTEM

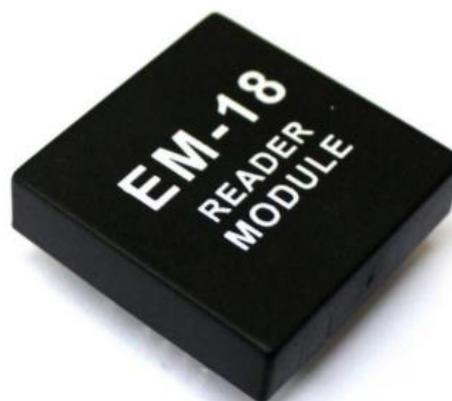
In the proposed system, we are using the RFID reader at the trolley side and every product in the supermarket has its unique RFID tag with unique ID. Once the customer drops a certain product in the trolley, then the tag attached to that product was read by the RFID reader and sent to the controller. The controller counts the product value and displays its value on the LCD screen of the trolley. Like that we can add any number of products of our need and check the total bill on the LCD screen. After completion of the shopping, one should press the upload button at the trolley side to send the bill amount to the counter section over the WIFI module. The bill amount was received by the receiver and send to the PC to display.

## 4. HARDWARE COMPONENTS

### 4.1 RFID READER MODULE

The EM-18 RFID Reader module operating at 125kHz is an inexpensive solution for your RFID based application. The Reader module comes with an on-chip antenna and can be powered up with a 5V power supply. Power-up the module

and connect the transmit pin of the module to receive pin of your microcontroller. Show your card within the reading distance and the card number is thrown at the output. Optionally the module can be configured for also a weigand output.



**Fig-1: RFID Reader Module**

### 4.2 RFID TAGS:

RFID tags are a type of tracking system that uses smart barcodes in order to identify items. RFID is short for “radio frequency identification,” and as such, RFID tags utilize radio frequency technology. These radio waves transmit data from the tag to a reader, which then transmits the information to an RFID computer program. RFID tags are frequently used for merchandise, but they can also be used to track vehicles, pets, and even patients with Alzheimer’s disease. An RFID tag may also be called an RFID chip. There are two main types of RFID tags: battery-operated and passive. As the name suggests, battery-operated RFID tags contain an onboard battery as a power supply, whereas a passive RFID tag does not, instead working by using electromagnetic energy transmitted from an RFID reader. Battery-operated RFID tags might also be called active RFID tags.



**Fig-2: RFID Tag**

### 4.3 16X2 LCD DISPLAY

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data.

Command register stores various commands given to the display. Data register stores data to be displayed. The process of controlling the display involves putting the data that form the image of what you want to display into the data registers, then putting instructions in the instruction register. In your arduino project Liquid Crystal Library simplifies this for you so you don't need to know the low-level instructions. Contrast of the display can be adjusted by adjusting the

potentiometer to be connected across VEE pin.



**Fig-3: 16X2 LCD Display**

### 4.4 NODEMCU

NodeMCU is an open-source LUA based firmware developed for the ESP8266 wifi chip. By exploring functionality with the ESP8266 chip, NodeMCU firmware comes with the ESP8266 Development board/kit i.e. NodeMCU Development board. Since NodeMCU is an open-source platform, its hardware design is open for edit/modify/build.

NodeMCU Dev Kit/board consist of ESP8266 wifi enabled chip. The ESP8266 is a low-cost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol. For more information about ESP8266, you can refer to the ESP8266 WiFi Module.

NodeMCU Dev Kit has Arduino like Analog (i.e. A0) and Digital (D0-D8) pins on its board. It supports serial communication protocols i.e. UART, SPI, I2C, etc. Using such serial protocols we can connect it with serial devices like I2C enabled LCD display, Magnetometer HMC5883, MPU-6050 Gyro meter + Accelerometer, RTC chips, GPS modules, touch screen displays, SD cards, etc.



**Fig-4: NodeMCU**

## 5. SOFTWARE REQUIREMENTS

### 5.1 ARDUINO IDE

The Arduino IDE is incredibly minimalistic, yet it provides a near-complete environment for most Arduino-based projects. The top menu bar has the standard options, including “File” (new, load save, etc.), “Edit” (font, copy, paste, etc.), “Sketch” (for compiling and programming), “Tools” (useful options for testing projects), and “Help”. The middle section of the IDE is a simple text editor that where you can enter the program code. The bottom section of the IDE is dedicated to an output window that is used to see the status of the compilation, how much memory has been used, any errors that were found in the program, and various other useful messages. Projects made using the Arduino are called sketches, and such sketches are usually written in a cut-down version of C++ (a number of C++ features are not included). Because programming a microcontroller is somewhat different from programming a computer, there are a number of device-specific libraries (e.g., changing pin modes, output data on pins, reading analog values, and timers). This sometimes confuses users who think Arduino is programmed in an “Arduino language.” However, the Arduino is, in fact, programmed in C++. It just uses unique libraries for the device.

## 6. PROJECT WORKING

A wireless smart-device (scanner) track the records of all the products that are brought i.e. an android application and the accountant system are linked with scanner. The smart cart can be implemented in the following way in the store.

### Stage I

Stocks from various suppliers arrive at the store. Products are added to the stock and are registered by using the product registration form, which has detailed information about the product like product id, product name, product price, product quantity, Brand name etc.

### Stage II

The customer arrives at the store: This is the initial stage in the process the customer who is arrived at the market will take the trolley and goes on for shopping .While the customers is scanning the items there are many of the things that happens internally in the system. In the trolley section there are different blocks present in it and also have its own unique performance. The main heart in our design is the NodeMCU it has all the instructions embedded in it for the scanner to scan it .these things happens in the trolley section which are listed below

Firstly the system is been assembled and power supply is given to the system .When the customer scans the products NodeMCU checks the address of the product and checks whether that address is present in its data base or not .If it is not present then it will not scan the product .And if it is present in its data base then it will scan the product and the customer can drop the product into the basket. Like this he can able take and scan the items of his wish .

**Stage III**

When the customer has done with the shopping, he/she will move forward along with the cart to the billing counter. Here near the billing counter also has the certain functions to be performed

Here the NodeMCU will have the Unique IP address so when the trolley arrives then the IP address for that trolley is been entered into the web page. Then he gets the total number of items present in the trolley then he gives to the billing device. The customer just should pay the money and leave the shopping mall. Accountant does the authentication of the customer by entering the unique cart number and verifies the products that he has brought. A billing detail of the purchased products

**7. ADVANTAGES**

- Easy to use and reduces man power.
- Safe, secured and needs low power.
- It is echo friendly; with this we can eliminate usage of paper.
- It very attractive and eye catching.
- Easy to shop
- Easy to use
- Flexible

**8. DISADVANTAGES**

- Materials like metal & liquid can impact signal.
- Sometimes not as accurate or reliable as barcode scanners.
- Cost – **RFID** readers can be 10x more expensive than barcode readers.
- Implementation can be difficult & time consuming.

**9. APPLICATIONS**

- It Can be utilized in dress showrooms.
- Grocery store
- All wholesale shopping malls
- Industrial application, etc

**10. CONCLUSION AND FUTURE SCOPE**

Smart shopping trolley application creates an automated central billing system in malls. By using the NodeMCU, the product information are directly sent to billing system. So that customers no need to wait in a long queue. It is trustworthy, highly dependable and time efficiency.

The proposed smart shopping trolley system will reduce the customers time in searching the location of the product. The customer just types the name of the product he/she want to purchase on android device. The trolley will automatically guide them to the location of the product.

**11. REFERENCES**

[1] Zeeshan Ali, Reena Sonkusare, "RFID based Smart Shopping: An Overview" in International Conference on Advances in "Communication and Computing " Technologies , Issue in 2014.

[2] Prasiddhi K. Khairnar, Dhanashri H. Gawali, "Innovative Shopping Cart For Smart Cities " in IEEE International Conference On Recent Trends in Electronics Information & Communication Technology (RTEICT), May 19-20, 2017, India.

[3] Mr.P. Chandrasekar, Ms.T. Sangeetha, "Smart Shopping Cart with Automatic Billing System through RFID and ZigBee" in IEEE S.A. Engineering College, Chennai, Tamil Nadu, 2014, India.

[4] Akshay Kumar, Abhinav Gupta, S. Balamurugan, S. Balaji and Marimuthu R., "Smart Shopping Cart" in School of Electrical Engineering, VIT University, Vellore IEEE, 2017.

[5] Ruinian Li, Tianyi Song, Nicholas Capurso, "IoT Applications on Secure Smart Shopping" in International Conference on Identification, Information and Knowledge in the Internet of Things, 2017.