

# Smart Trolley Billing System

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**Abstract:** Originally we used to induce bill in the paper format and also latterly we use the technology. The barcode scanner was used to read and overlook the barcodes. But latterly, we concentrated on the smart trolley billing system using RFID label which is a digital storehouse device that's used for identification and the information recording. A anthology can pierce or read the data into the RFID markers through the electromagnetic induction. A stoner can only use the RFID label without the power consumption. When the client bought the product, he she firsts overlook the RFID label of the product using the RFID anthology and put into the trolley. While copping the products client needs to overlook the RFID label of the product, a price of the product is taken and stored in the system's memory. When a person goes for shopping in any boardwalk also he she takes trolley and after completed the shopping he she has to go to the counter for billing. Billing is done with barcodes which is veritably time consuming process. In this technology, we bear surveying each and every item grounded barcode markers attached to that item. It has to done by man power since we need to overlook each marker manually. And another disadvantage is that barcode can not read from long distance. So, our main end is to design automatic billing system which grounded on Radio frequency Identification.

**Keywords:** NodeMCU, Automatic Billing, RFID tag and reader, Database.

## I. INTRODUCTION

We are in the world of Internet of Things (IOT) and all physical interactions are here objects came true. It created a new revolution in all our systems. It created many argue about data management, wireless communication and real-time decision making. At first we did the invoice on paper and then we used technology Bar code. The scanner was used to read and scan barcodes. Later, however, we focused on the smart cart an invoicing system that uses an RFID tag, which is a digital storage device used for identification and data storage. The reader can access or read the information on the RFID tags by electromagnetic induction. The user can only use the RFID tag without power consumption. When a customer buys a product, they first scan the product's RFID tag product with an RFID reader and place it in the shopping cart. When you buy products. The customer needs to scan the RFID tag of the product, the price of the product is taken and saved in system memory. When a person goes shopping in any mall, he takes in the cart and after the store he went to the counter to pay the bill. Billing is done using barcodes, which is a very time consuming process. In this technique, we require by scanning barcode labels attached to each product. This will have to do human power because we manually scanned each tag. And the second minus is this barcode cannot be read from a distance. So our goal is to design an automatic billing system which is based on radio frequency identification.

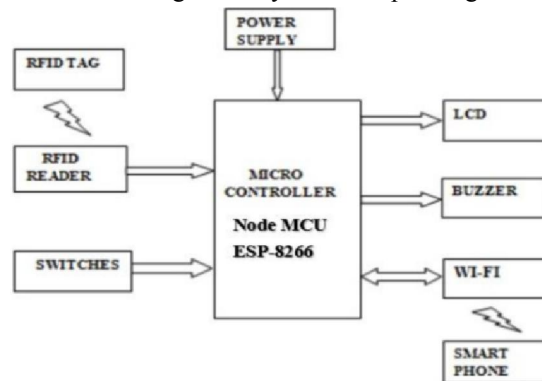
## II. LITERATURE REVIEW

People were constantly imagining and building to help innovate their needs from the ground humanity The main reason for these innovations is limited things and did normal tasks faster and easier. Mission with people was observed to consume a significant amount of time go to the store and buy products needs In the old days, we used ma nual billing pen and paper, then we started using barcodes system, but after a few years it also began to be things like LOS (line of sight), growing queue etc. So to solve this problem is the concept of smart shopping with RFID technology. Paper [1] describes an intelligent implementation shopping cart using radio frequency identification using RFID sensors, Arduino microcontroller, Bluetooth module and mobile application. Where the mobile phone is connected to the shopping cart and application is already installed, data is shared using Bluetooth of arduino microcontroller and mobile and then with the server. Paper [2] Frame is used to facilitate the line Shopping center using RFID module. RFID the reader finds out

from the RFID tag placed on the object when the product falls into the shopping cart. In the event that the customer he has to remove any item then he should remove it from the carriage. Subtitles are displayed on the LCD screen deleted item such as name, price and absolute number and the invoice is sent using the Xampp server to the till.

### III. PROPOSED METHODOLOGY

All A customer enters into a shopping mall. On entering, she/he first picks up a trolley. Each trolley is associated with a RFID reader and a barcode reader. The functioning of the system is explaining below:

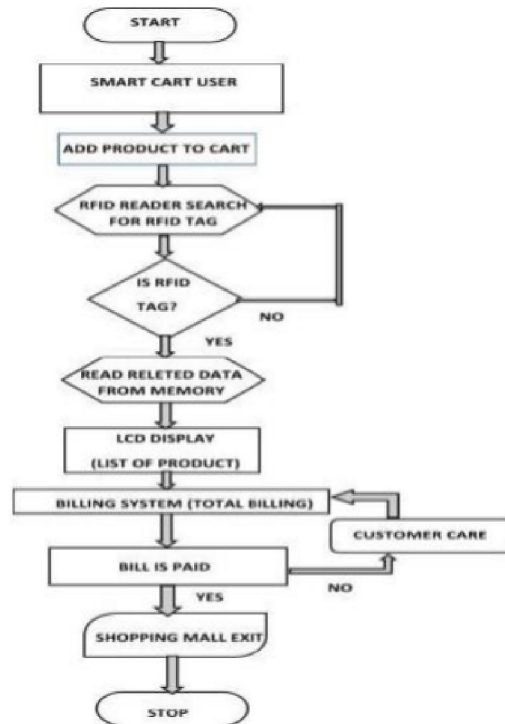


1. When the customer purchase a product, she/he first scans the RF tag of the product using the RFID reader and then places it into the trolley .While the customer is scanning the RF tag of the product, a price of the product is taken and stored in the system's memory
2. Information stored in system's memory is compared with the lookup table. If matches are found then cost, name of respective product gets displayed on the LCD.
3. Here we have used IR sensor for counting purpose. This works as the IR sensor continuously emits IR rays. If we put a product in a trolley ant at that time there is obstacle for IR rays, then it would result in interruption in counting of products in trolley. This recorded data is stored in arm processor.
4. Counting is mainly done for security purpose. If in case while wandering round the mall someone removes the RFID tag and puts the product in trolley then counting the no of items helps to get information of items purchased. Thus counting is done but there is no addition of cost respective product in bill. This shows the increase in number of products but not increase in bill.
5. If an unwanted product is removed from trolley then it decreases the number of products as well as bill. Double entry of product deletes the product name with respective to cost of product.
6. After completion of shopping, a key is pressed indicating final billing of all the products. Thus the final information of all products the final billing is done by VS software on computer.
7. There is a barcode system in our project. It is impossible to stick the RFID tag to some product like coconut, vegetables etc. Hence in such cases conventional scanning of barcode is more sophisticated than RFID technique.

### IV. ALGORITHM AND FLOWCHART

The detailed flowchart of the billing process of the system is depicted:

- Step 1: Start the process.
- Step 2: Place the products in trolley.
- Step 3: Display product's information on LCD.
- Step 4: Remove product if not needed.
- Step 5: After shopping, press the buzzer.
- Step 6: Updates the billing Information.
- Step 7: IR sensor will activate.
- Step 8: After this, products cannot be taken out from the trolley.
- Step 9: Bill can be paid through online or offline.



### V. COMPONENTS REQUIRED

For the development of the system there are some following requirements:

1. Node MCU
2. RFID reader and RFID tag
3. IR sensor
4. Database
5. Liquid Crystal display
6. Buzzer and Switches
7. Power adapter and QR code.

#### 5.1 Node MCU

The NodeMCU (Node Microcontroller Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.



#### 5.2 RC522

The RC522 RFID module based on the MFRC522 IC from NXP It usually comes with an RFID card tag and a key fob tag with 1KB of memory. And the best part is that it can write a tag that means you can store any message in it. The RC522 RFID reader module is designed to create a 13.56MHz electromagnetic field and communicate with RFID tags.

The reader can communicate with a microcontroller over a 4 -pin SPI with a maximum data rate of 10 Mbps. It also supports communication over I2C and UART protocols. The module's operating voltage ranges from 2.5 to 3.3V, but the good news is that the logic pins are 5-volt tolerant, so we can easily connect it to an Arduino or any 5V logic microcontroller without using a logic level converter. They are also called PCD (Proximity Coupling Device) and PICC (Proximity Integrated Circuit Card).



**5.3 RFID Card Tag and a Key Fob Tag**

Every RFID system consists of three components: a scanning antenna, a transceiver and a transponder. When the scanning antenna and transceiver are combined, they are referred to as an RFID reader or interrogator. There are two types of RFID readers -- fixed readers and mobile readers. The RFID reader is a network-connected device that can be portable or permanently attached. It uses radio waves to transmit signals that activate the tag. Once activated, the tag sends a wave back to the antenna, where it is translated into data. The transponder is in the RFID tag itself. The read range for RFID tags varies based on factors including the type of tag, type of reader, RFID frequency and interference in the surrounding environment or from other RFID tags and readers. Tags that have a stronger power source also have a longer read range.

There are two main types of RFID tags:

- Active RFID: An active RFID tag has its own power source, often a battery.
- Passive RFID: A passive RFID tag receives its power from the reading antenna, whose electromagnetic wave induces a current in the RFID tag's antenna.



**5.4 LCD (JHD162A)**

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multisegment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc. The LCDs have a parallel interface, meaning that the microcontroller has to manipulate several interface pins at once to control the display.





### 5.5 Jumper Wires

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn't get much more basic than jumper wires. Jumper wires typically come in three versions: male-to-male, male-to-female and female-to-female. The difference between each is in the end point of the wire. Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things into. Male-to-male jumper wires are the most common and what you likely will use most often.

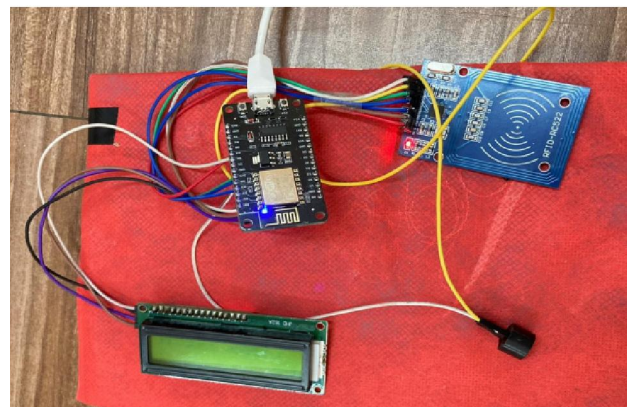
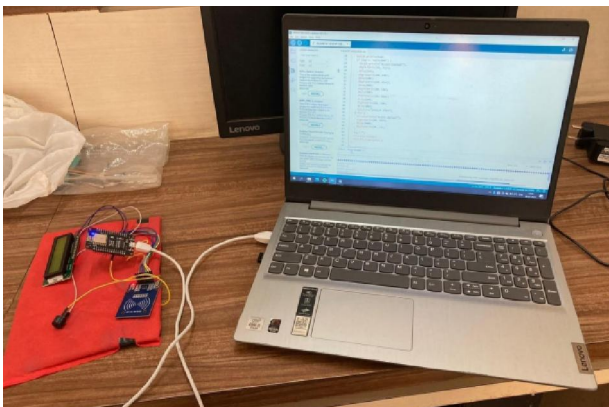


### 5.5 Buzzer

There are many ways to communicate between the user and a product. One of the best ways is audio communication using a buzzer IC. So during the design process, understanding some technologies with configurations is very helpful. An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound.



## VI. OUTPUT

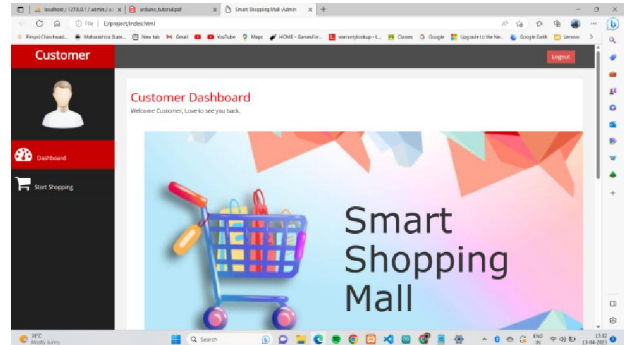
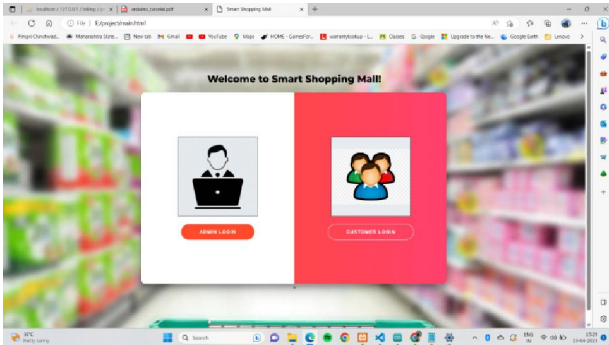


Arduino IDE for Hardware Communication Connection with Node MCU ESP-8266

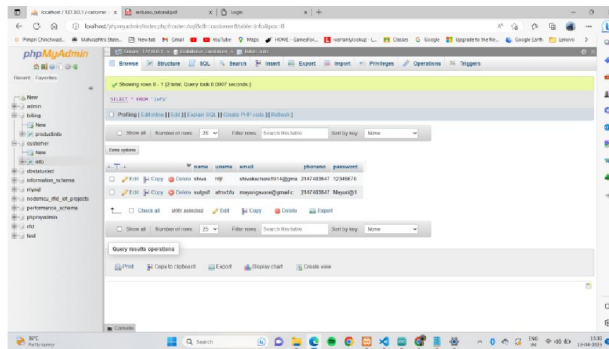


Product Added

DOI: 10.48175/IJAR SCT-9220



**User Interface**



**Database**

**VII. CONCLUSION**

By means of this paper we intent to simplify the billing process, make it swift & increase the security using RFID technique. This will take the overall shopping experience to a different level. Different parameters such as the system parameters of smart trolley like products name, products cost, product weight etc. are continuously display Thus with the help of the conclusion we can say that

1. Automatic billing of products by using RFID technique will be a more viable option in the future.
2. The system based on RFID technique is efficient, compact and shows promising performance.

**VIII. FUTURE SCOPE**

We have to update the details of the product items in the memory unit of trolley time to time.

1. We take the help of Internet of Things and some software with the help of which all information will be updated regularly.
2. Also, with the help of optical sensor, motors, and motor drivers, we will make trolley in such a way that it will follow the customer which purchasing items and it maintains the safe distance between customer and itself.

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