International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 03 | Mar 2019 www.irjet.net p-ISSN: 2395-0072

RFID Based Shop Billing Machine using Raspberry Pi

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Abstract - *Abstract - Today's world thrives making human life easier than it already is with every passing moment. Creating a smart billing machine that takes care of comfort while shopping is another step taken in the same direction. RFID and barcodes are similar in that they are both data collection technologies, If compared, RFID technology is found to be more comprehensive than barcode technology. Barcode scanner requires line of sight whereas RFID can be read without the line of sight. It is possible to read RFID tags from a greater distance. An RFID reader can access the information of the tag from a distance of around 300 feet, whereas barcode technology cannot be read from a distance of more than 15 feet.*

Key Words*: *RFID*, Raspberry Pi, *Python.

1. INTRODUCTION

Electronic Commerce has become extremely popular with the rise in wireless technologies and other communication techniques. Purchasing and shopping in big malls are becoming a daily activity in metro cities. There is a huge rush in such places during weekends and holidays. People purchase different items and put them in the trolley. After completion of purchases, one needs to go to the billing counter for payments. At the billing counter, the cashier prepares the bill using bar code reader which is a very time-consuming process and results in a long queue at the billing counter. A smart product is the one that aids comfort, convenience, and efficiency in everyday life. In this paper, we discuss an innovative concept of Intelligent Smart Shopping and Billing. The key idea here is to assist a person in everyday shopping in terms of reduced time spent while purchasing a product. The main goal is to provide a technology-oriented, economical, easily scalable, and rugged system for ease of his activity. The barcode technology needs the direct line of sight to read; sometimes it is unable to scan as well. So this problem will be overcome by using RFID technology. The aim of the project is to create a convenient and user-friendly environment for the customers. It also aims to intelligently coordinate all appliances communicating together, thereby ensuring greater comfort of purchasing things. In our approach, the RFID tags will be given to the customers. And the material they require will be written to the card. And once they have done with shopping, they will go to the billing system where the reader will generate an appropriate bill. The results of this project will be the Bill will be generated by just putting the RFID card on the reader which is interfaced with Raspberry Pi.

Table 1.1.1 Specifications of System

Sr .No.	Description	Specification
1	Raspberry Pi	3B+
2	Explore NFC	Reader & Writer
3	RFID Tag	Passive
4	Display	7”
5	Software	Python 3.7

2.1 ARCHITECTURE

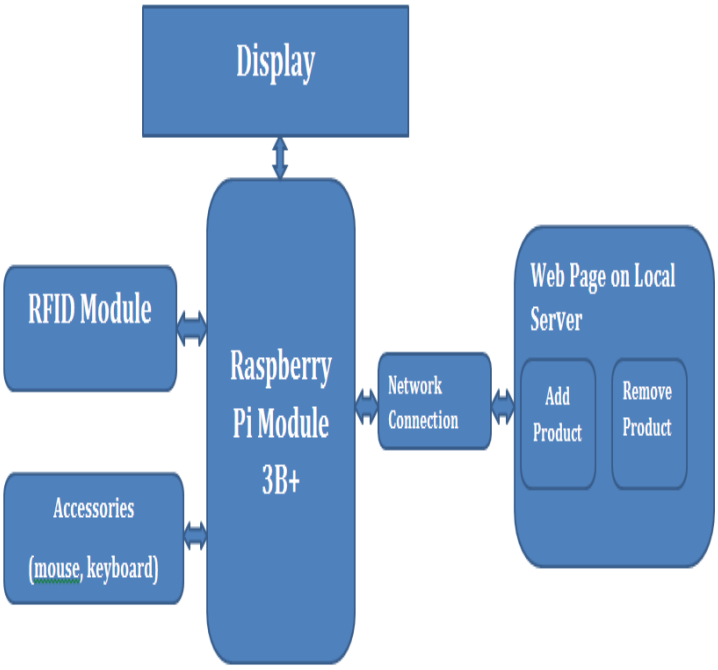

FIGURE 2.1 BLOCK DIAGRAM OF SYSTEM

2.2 DETAILS OF ARCHITECTURE

2.2.1 RASPBERRY PI

Raspberry Pi is a compact size board which has various ports to interface other peripherals like mouse, keyboard, HDMI port, USB ports. It does not include any of the peripheral. We can call it a "Single Board Computer". So, just by connecting those peripherals, they can communicate with Raspberry Pi according to our requirement. The Raspberry Pi which we are using operates on 1.4 GHz of frequency. The maximum power is 6.7 W and the minimum is 1.5 W. It supports Linux, Raspbian and Windows 10 IOT care operating systems.

2.2.2 RFID Module

For communication of two devices i.e. RFID card and Raspberry Pi, the Reader and Writer interface is Explore NFC card. NFC stands for Near Field Communications. These are mainly used for contactless payments, RFID based attendance systems etc. NFC is a peer to peer technology which works on short-range wireless systems which operates at 13.56 MHz and the approximate baud rate is 106 kbit/s to 424 kbit/s. By fetching the data written on the RFID card, we can generate the bill by using some software interfaces.

2.2.3 RFID Tags

RFID is nothing but Radio Frequency Identification. RFID uses electromagnetic fields to identify and track tags attached to objects. The tags contain electronically saved information. There are two types of RFID cards. The first is passive and the second is active card. The passive tags do not need any power supply for its operation; whereas active tags need the power supply for reading and write operations.

2.2.4 Display

The display is there for a user interface. For the purpose of adding and removing the purchased items, it will be easier to use display. We are using the touchscreen capacitive display which is of 7". We have to take care that the drivers of a display must be available unless the display will not work properly.

2.2.5 Software

Any embedded system needs some program to operate in a required manner. For the raspberry pi, Raspbean is the operating system and for the programming of raspberry pi, Python 3.7 is used. Python is a high-level general purpose programming language. Created by Guido van Rossum and first released in 1991, Python has a design philosophy that emphasizes code readability, notably using significant whitespace. It provides constructs that enable clear programming on both small and large scales. Van Rossum led the language community until stepping down as the leader in July 2018

3.1 Key Steps of the system

FIGURE 3.1 Key Steps Of The System

The system is designed in such a way that, the person who wants to buy the product will be given a RFID card. The shopkeeper will insert one by one items on the card just by putting the tag on the RFID Module. The customer will keep this card with him till he leaves the shop. At the time of billing, that card will be again put on the reader and the final bill will be generated.
For this particular operation, we will access web page which will be available on one web page.
By using the network connections, we will be able to determine the sale of the shop. Also the requirement of particular goods in shop. Thus because of this, we will be able to calculate the sale and purchase ratio.

4. CONCLUSION

This paper gives the detailed design of the Automatic Shop Billing Machine using Raspberry Pi and RFID Module.

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