

AUTOMATION OF SHOPPING CART USING PIR SENSOR

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Abstract - Especially, it becomes more crowded on holidays. People purchase different items in the malls and puts them in the trolley. At the cash counter billing process is done using bar code scanner. This is very time consuming process. To avoid this we are developed a system which is called as Automation of Shopping Cart using Smartphone. In this system we are using RFID tags instead of barcodes. This RFID tags will be on the product. Whenever the customer puts a product into trolley it will get scanned by RFID reader and product price and cost will be display on LCD display. Like this the process goes on. The trolley follows us without any human effort. We are using a GSM transmitter which will be at trolley which is used to transfer the data to Mobile. In Smart Trolley app, the amount will be sent and the payment will be done using mobile. If a person interrupts other than the user there is collision sensor to indicate.

Key Words: Trolley, LiFi, GSM Module, RFID tag, RFID Reader, GSM Transmitter, ZigBee.

1. INTRODUCTION

The barcode system is no longer the best way to business operation. Customers are tired of waiting in long, slowly moving checkout line in departmental stores, especially, in holidays. Now a days people are much attracted by the online trading because of tedious time consuming process at billing counter. People purchase different items in the malls and puts them in the trolley. At the cash counter billing process is done using bar code scanner. With the decrease of prices through efficiencies of technology and large-scale production of semiconductor wireless components, there has been a search for new markets in which semiconductor chips can be used. This has led to the use of RFID also known as smart tags. RFID stands for Radio Frequency Identification. Nowadays, if a consumer would like to buy something at a shopping mall, consumers need to take the particular items from the display shelf and then queue up and wait for their turn to make payment. The time taken for consumers to wait for the customers in front of the queue to scan every single item and then followed by making payment will definitely take plenty of time. Most consumers will worry the amount of money brought is not enough to pay for all the things that wanted to be bought until it comes to our turn to pay at the cashier. If the technology of RFID is implemented consumers will be able to get information of all the items at shopping mall, total up the prices of items as

they shop, and save unnecessary time which is wasted unnecessary at the cashier. Currently available method in shopping malls is barcode method. In this method there are barcode labels on each product which can be read through specially designed barcode readers. A barcode reader (or barcode scanner) is an electronic device for reading printed barcodes. Like a flatbed scanner, it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones. Additionally, nearly all barcode readers contain decoder circuit to analyze the barcode's image data provided by the sensor and sending the barcode's content to the scanner's output port.

2. LITERATURE REVIEW

Zubin Thomas, Nikil Kumar and D. Jyothi Preshiya(2016) had proposed that Automatic Billing System using Li-Fi Module will be the effective way to reduce the human effort. LiFi is cellular wireless networking (re)using lights. Specifically, light emitting diodes (LEDs) are used in LiFi as visible light transmitters. They proposed about the billing done by the Lifi device. The Lifi is a costly device which is not to be practically implemented in all malls, whereas the RFID is used instead of LiFi.

Mr.P. Chandrasekar and Ms.T. Sangeetha(2014) proposed that automated billing system using RFID and ZigBee communication. Here, each product of shopping mall, super markets will be provided with a RFID tag, to identify its type. Each shopping cart is designed or implemented with a Product Identification Device (PID) that contains microcontroller, LCD, an RFID reader, EEPROM, and ZigBee module. Purchasing product information will be read through a RFID reader on shopping cart, mean while product information will be stored into EEPROM attached to it and EEPROM data will be send to Central Billing System through ZigBee module. From this, the idea of using a PIC Microcontroller instead of Zigbee has been utilized.

Udita Gangwal, Sanchita Roy, Jyotsna Bapat(2013) proposed that Smart Shopping Cart for Automated Billing Purpose using Wireless Sensor Networks. In that, WSN for developing a Smart Shopping System which automates the entire billing procedure. The system which is developed is highly reliable, fair and cost-effective. It is reliable and fair because of the effectiveness of WSN combined with a highly Image Processing technique. The system also has energy constraint

as it uses a passive sensor and it reduces the communication requirement. The GSM technique is made use from this proposed.

S.Nandhini, P.Premkumar(2014) proposed that Automatic Toll Gate System Using Advanced RFID and GSM Technology. In that, the frame composing and working flow of the system is described and data information is also easily exchanged between the motorists and toll authorities, thereby enabling a more efficient toll collection by reducing traffic and eliminating possible human errors. Here the vehicle information is got through the RFID whereas we use RFID for the scanning of products.

H.G.Rodney Tan, C.H.Lee, V.H.Mok proposed that Automatic Power meter reading using GSM network. In that, GSM Power Digital Meter (GPM) is installed in every consumer unit and an electricity ebilling system at the energy provider side. The web portal is used in the power meter reading wherein we use a mobile application for the trolley.

3. HARDWARE IMPLEMENTATION AND DESIGN OF TROLLEY

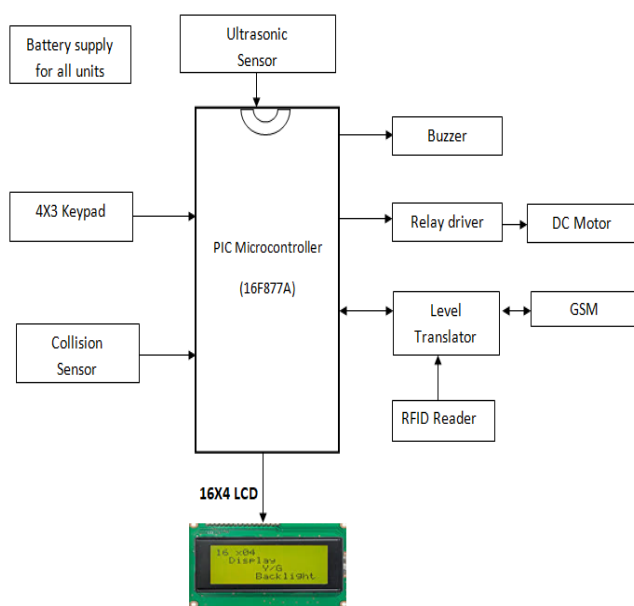


Fig.1.Hardware Implemetation

The Fig.1 consists of the PIC Microcontroller with the specification of 16F877A.It also consists of Ultrasonic Sensor,Relay driver,Collision Sensor,RFID Reader and a battery for all the units.The microcontroller is connected to the keypad for the user.A relay driver connected with the dc motor is interfaced with the microcontroller.And the RFID reader to the level translator for the identification.There is a collision sensor connected with microcontroller for the indication of any interruption.The battery supply is given to the respective circuits.

3.1 PIR Sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use . They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.



Fig.2. PIR Sensor

3.2 PIC Microcontroller

A PIC microcontroller (Fig.3) is a processor with built in memory and RAM and can be used to control the projects (or build projects around it). So it saves building a circuit that has separate external RAM, ROM and peripheral chips.

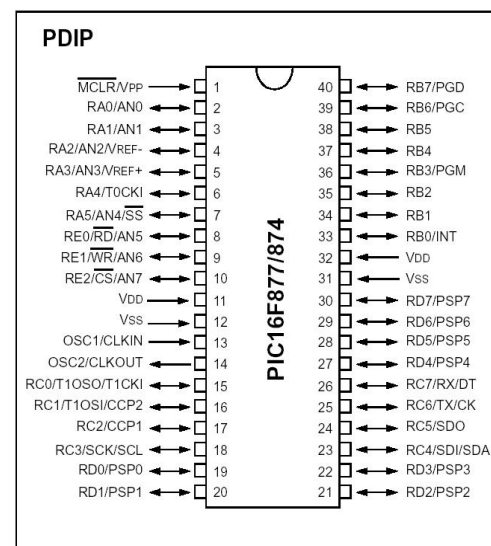


Fig.3.PIC Microcontroller

3.3 RFID Reader

A radio frequency identification reader (RFID reader) is a device (Fig.4) used to gather information from an RFID tag, which is used to track individual objects. Radio waves are used to transfer data from the tag to a reader. RFID is a

technology similar in theory to bar codes. However, the RFID tag does not have to be scanned directly, nor does it require line-of-sight to a reader. The RFID tag must be within the range of an RFID reader, which ranges from 3 to 300 feet, in order to be read. RFID technology allows several items to be quickly scanned and enables fast identification of a particular product, even when it is surrounded by several other items.



Fig.3.RFID Reader

3.4 RFID Tagger

RFID tagging is an Identification system that uses small radio frequency identification devices for identification and tracking purposes. An RFID tagging system includes the tag itself, a read/write device, and a host system application for data collection, processing, and transmission. An RFID tag (as shown in Fig.4) sometimes called an RFID transponder. It consists of a chip, some memory and an antenna.



Fig.4. RFID Tagger

3.5 16X4 LCD Display

LCD 16x4 display(Fig.5) which is built in with ST7066 controller IC; its default interface is 6800 4/8-bit parallel, 5V power supply. These LCD display 16x4 modules are also available in SPI and I2C interface by using RW1063 controller IC.



Fig.5. 16X4 LCD Display

3.6 GSM Module

In GSM SIM800C(Fig.6),the Modem is with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip(MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply.



Fig.6. GSM Module

3.7 4X3 Keypad

Basically, the 4x3 keypad contains push buttons that are arranged in four rows and three columns produce twelve characters as shown in the figure. Sometimes this called as "4x3 switch matrix" due to the arrangement of switches in a matrix form. The internal construction of these keypads includes metal dome contacts and conductive rubber.



Fig.7. 4X3 Keypad

4. ARRANGEMENT ARCHITECTURE

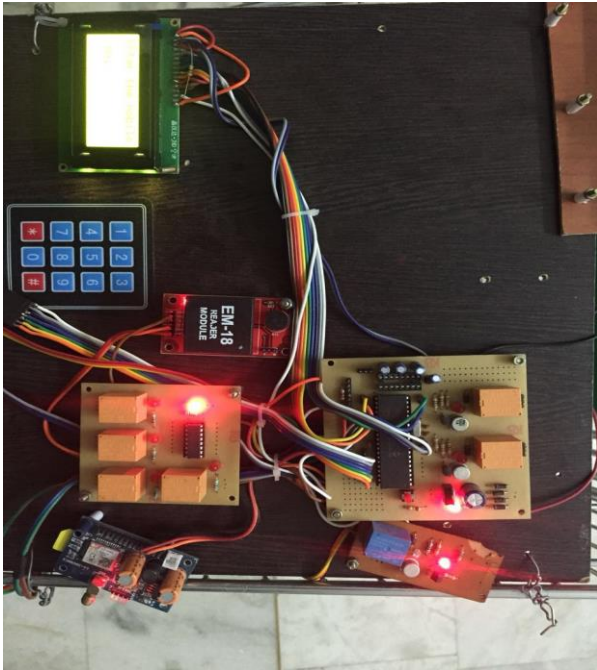


Fig.8.Arrangement Architecture

The arrangement (Fig.8) consists of the parts which are explained in the above Design of Trolley. The main part is the PIC microcontroller which is connected to the keypad, relay driver, and a GSM module for the process.

5. FEATURES OF THE PROPOSED SYSTEM

The inconveniences caused by the existing system is such as the working staff is needed to bill each item, the need to push the trolley throughout the mall etc., can be overcome by using Smartphone based Trolley(Fig.9) the trolley has a RFID technology which scans the product while the product gets into the trolley, the user gets a confirmation through the Mobile app and confirms it. In the trolley if any product needs to be removed from the trolley, the user just by pressing the star(*) button can take away the product. A message will be sent to the Smartphone confirming the product has been taken. For this kind of removing we have kept a sliding door like structure. Whenever the user presses the star(*) button the door opens slowly, so that we can take that product.

6.Result and Discussion

The fig.9 shows the real time implementation of the trolley. The project has been successfully finished. The trolley follows the user continuously, if another person interrupts there is a collision sensor to indicate there is an interruption.



Fig.9. Result

7. Conclusion

The automation of shopping cart is a technique by which the user can be hassle-free during shopping's on a crowded time. Also, the trolley can be used in airports where the heavy luggage's need not be pushed all along whereas it will follow us so that human power can be reduced.

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