

SMART ASSISTANCE TROLLEY

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Abstract - Shopping in supermarkets require a great deal of effort and a very time consuming process. The purpose of this Smart Assistance Trolley is to ease the shopping in this busy world. The components of this application includes a Microcontroller, Liquid Crystal Display, Radio-frequency identification (RFID) Reader, Remove-Button(Key), Universal Asynchronous Transmitter & Receiver (UART) and Zigbee module which is used to run the process. Whenever the Product is dropped into the Trolley the RFID will scan the Products and display the cost of the products in LCD, the remove button which is placed in the trolley is used to replace or remove the products. The serial Communication method which is used to Transmit and Receive the data between the Microcontroller and the RFID. Whenever the products are removed from the trolley, automatically the product count and the cost of the particular product will be decreased automatically. The Zigbee module which is used to transmit and receive the data between the Microcontroller (PIC 16F877A) and the Personal computer. This should be in a repetitive manner.

Key Words: Trolley, Transmit, Receive, Zigbee, Cost, Remove, Microcontroller (PIC 16F877A).

1. INTRODUCTION

By the debut of wireless technology, electronic commerce has developed to such an extent to provide convenience, comfort, reliability, accuracy and efficiency in day-to-day life in the modern world. The main purpose of this paper is to provide centralized and automated billing system using RFID and ZigBee communication. Each product of shopping mall, supermarkets will be supplied with an RFID tag, to identify its type. Every cart contains PID (Product Identification Device). Specifically, PID contains a microcontroller (PIC 16F877A), LCD, an RFID reader, and Zigbee Device to transfer the data from the Microcontroller to the Personal Computer.

2. MODULE DESCRIPTION

2.1 STEP DOWN TRANSFORMER

Power supply is a reference to a source of electrical power. A 230v,50Hz Single phase AC power supply is given to a Step Down Transformer to get 12v supply. This voltage is converted to DC voltage using a Bridge Rectifier. The converted pulsating DC voltage is filtered by a 2200uf capacitor and then given to 7805 voltage regulator to obtain constant 5v supply. This 5v supply is given to all the components in the circuit. A RC time constant circuit is

added to discharge all the capacitors quickly. To ensure the power supply a LED is connected for indication purpose

2.2 BRIDGE RECTIFIER

A bridge rectifier makes use of four diodes in a bridge arrangement to achieve full-wave rectification. This is a widely used configuration, both with individual diodes wired as shown and with single component bridges where the diode bridge is wired internally.

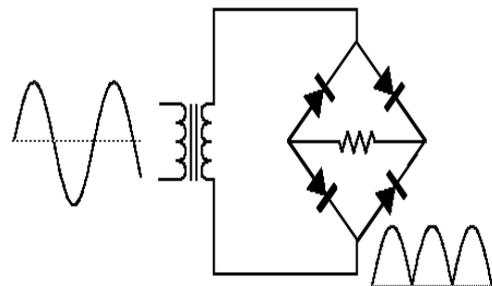


Fig -1: A bridge rectifier

2.3 MAX232

The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. The drivers provide RS-232 voltage level outputs (approx. ± 7.5 V) from a single + 5 V supply via on-chip charge pumps and external capacitors. The receivers reduce RS-232 inputs (which may be as high as ± 25 V), to standard 5 V TTL levels. These receivers have a typical threshold of 1.3 V, and a typical hysteresis of 0.5 V.

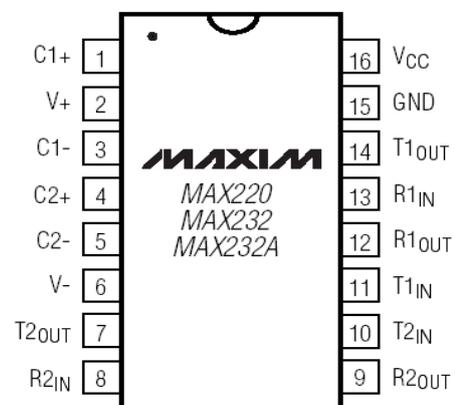


Fig -2: MAX232 Pin diagram

2.4 PIC16F877A MICROCONTROLLER

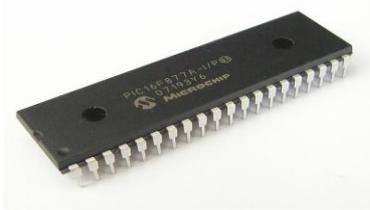


Fig -3: PIC16F877A

The PIC (Peripheral Interface Controller) microcontroller PIC16f877a is one of the most renowned microcontrollers in the industry. This controller is very convenient to use, able to write-erase as many times as possible because it uses FLASH memory technology, the coding or programming of this controller is also easier. It has a total number of 40 pins and there are 33 pins for input and output. An EEPROM is also featured in it which makes it possible to store some of the information permanently like transmitter codes and receiver frequencies and some other related data. The cost of this controller is low and its handling is also easy. Its flexible and can be used in areas where microcontrollers have never been used before as in coprocessor applications and timer functions etc. As it has been mentioned before, there are 40 pins of this microcontroller IC. It consists of two 8 bit and one 16 bit timer. Capture and compare modules, serial ports, parallel ports and five input/output ports are also present in it.

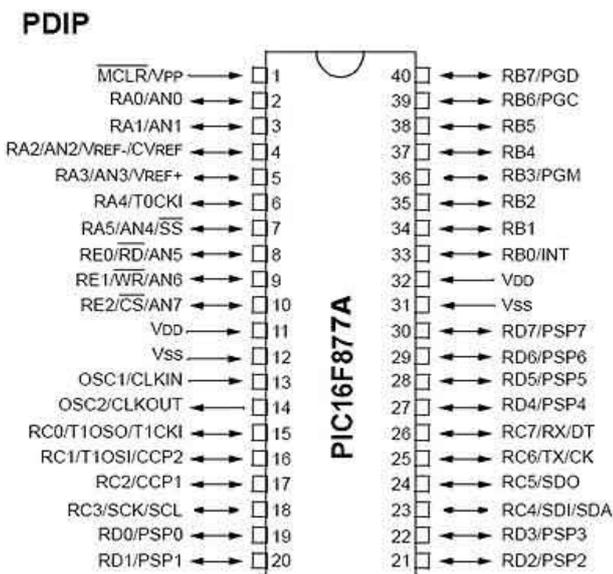


Fig -4: pin configuration and description of PIC16F877A

2.5 BUZZER

A buzzer or beeper (BUZZERS) is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which

button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. In Smart Assistance Trolley System, when a customer forgets to read a product or indulge in malicious activities or if the product has been expired the buzzer will alert by a ringing or buzzing sound.



Fig -5: A Buzzer

3. ARCHITECTURE OVERVIEW

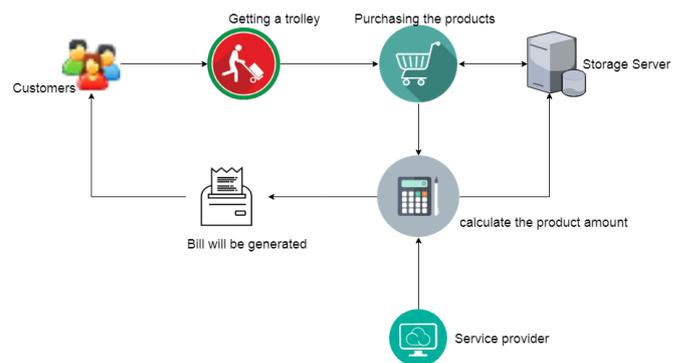


Fig -6: Architecture Overview

4. IMPLEMENTATION

4.1 RFID READER



Fig -7: RFID tag

Radio-frequency identification (RFID) is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tag contains electronically stored information which may be read from up to several meters away. Unlike a bar code, the tag does not

need to be within line of sight of the reader and may be embedded in the tracked object.

4.2 LIQUID CRYSTAL DISPLAY

A liquid crystal display (LCD) is a type of display technology that makes use of liquid crystals that open or close when stimulated by an electric current. LCD is considered a major innovation in display devices and is frequently used in mainstream electronics like microwave ovens, laptop computers, smartphones and televisions. LCD technology is preferred to other display technologies because it is lighter, thinner and uses less power. The LCD shows the details of the product that have been scanned such as total cost of products purchased by the customer, expiry date and whether it includes any offers or not.

5. FEATURES

5.1 SERIAL COMMUNICATION

A universal asynchronous receiver/transmitter (UART) is a type of "asynchronous receiver/transmitter", a piece of computer hardware that translates data between parallel and serial forms. A UART is usually an individual (or part of an) integrated circuit used for serial communications over a computer or peripheral device serial port. UARTs are now commonly included in microcontrollers. A UART is used to convert the transmitted information between its sequential and parallel form at each end of the link. Each UART contains a shift register which is the fundamental method of conversion between serial and parallel forms.

5.2 ZIGBEE

ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4-2003 standard for Low-Rate Wireless Personal Area Networks (LR-WPANs). The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking. ZigBee is a low-cost, low-power, wireless mesh networking standard. ZigBee is intended not to support powerline networking but to interface with it at least for smart metering and smart appliance purposes

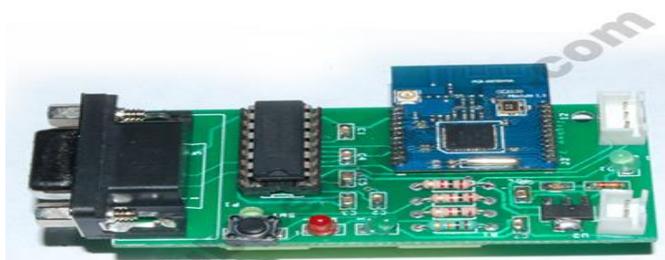


Fig -8: A Zigbee device

6. CONCLUSION

Taking into account the changing trend in retail shopping, we come to a conclusion that the Smart Assistance Trolley is most certainly a definite necessity for the Retail marketing industry to step up their portfolios, cope up with the advancement in technology and save time and manpower. The proposed Smart Assistance Trolley System intends to assist shopping in-person which will minimize the considerable amount of time spent in shopping as well as to time required in locating the desired product with ease.

7. REFERENCES

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