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Implementation of Smart Shopping Trolley

Kavana G S[1], Inchara P[2], Gagana B S[3], Mrs. Sangeetha V[4]

[123]UG Students, Department of Electronics and Communication Engineering, K S Institute of Technology, Bangalore, Karnataka, India
[4]Assistant Professor, Department of Electronics and Communication Engineering, K S Institute of Technology, Bangalore, Karnataka, India

ABSTRCT

Recently researches and many developments were going in the field of automation and embedded systems to develop and reduce the work of the manpower in industry as well as in public domain areas like Railway station for automatic ticket collection, Metro bus, Flight etc. This system can be used to develop more automation in and to help the blind people, old age and handicapped person we proposed a technique named as automatic trolley carrier navigation and the billing system. This method can be implemented in all shopping malls, big clothing shop, house hold appliances shops etc. It avoids the people to stand in a big queue and automatic billing can be done. Moreover, it helps blind people, old age people, Handicapped Persons in the shopping malls make them to purchase in shopping malls by informing about the product, quantity, price and automatic billing etc. The use of RFID reader is to scan the RFID tag of all products to Identify the name, price, quantity of the products. Depending on the RF signal from the RFID - reader, it passes the information to the micro - controller and from that it identifies the product and, quantity, price of each product. The ultrasonic sensor is used to detect the any obstacles as well as the object.

Keywords: RFID reader IR sensor, ESP32 Microcontroller Head phone, Bluetooth.

1. Introduction

In shopping malls, people can find all different varieties of dresses, House hold items, different varieties of foods, vegetables and electrical appliances. Many persons like working woman, men everyone will show more interest in shopping. for blind persons, handicapped persons, old age shopping is the difficult task for them inside the shopping malls. Because they don't know the location of the product, whether it is available or not, current offers, they feel tired to stand in a queue for billing. So, they want others Persons to find the location, to navigate way inside the shopping mall, billings. Due to increase in population in people requirements also increased and in our modern world government is also suggesting for smart city development. And nowadays as small shopping malls also increased and present in every location to cater the needs of the people. Trolley consists of simply a RFID reader, Micro-controller, transmitting antenna. This automatic trolley helps the Handicapped, blind people and normal people at the time of shopping. In this system customer can hold a head set to query about the product and this query information is passed to the micro-controller and then it gives the brief information about product price and name etc. In this proposed method the customer takes the 'N' number of different product and place inside the trolley means it automatically identify the price and it tells the product details such as name, price, quantity and total price value. The proposed system is effectively designed by considering above aspects of mind. In this method we preferred ESP32 microcontroller to perform the smart operation in automatic shopping.

1.1. Literature survey

The automated shopping trolley for supermarket billing system implemented by Shahroz (2021), using the barcode technology the customers used to scans the products. The bill will be forwarded to the central billing system where the customer will pay them by showing a unique id. The limitation of barcode scanning needs line of sight for scanning and it ought to be fastened inside its boundary.

1. First paper - Cash register lines optimization system using RFID technology by Caspill ejo (2021), the system was developed for smart shopping using RFID. The RFID is utilized for scanning product and also the data is kept within the database that may be paid online or during a central bill. It also uses a web application to maintain entire shopping details. It requires maintenance of a web application server. No necessary steps are taken for the product that is accidentally dropped into the trolley by the client.
2. Secnod paper - IOT based intelligent trolley for shopping mall by Ahmad (2020), applied RFID technology for billing throughout purchase in shopping malls and IOT is employed for bill management by means that of ESP module. The payment details will be sent to the server by which the central billing unit will deal with the customers payment. The ESP module will be operating as a short distance Wi-Fi chip for wireless communication. But there is a drawback which includes constraints such as distance and interference. The server will be busy if customers are high and internet connectivity should be stable for finishing the process.
3. Third paper - Smart shopping trolley using RFID by Rajeshwari (2019), implemented smart way of a shopping trolley with RFID and Zigbee by which bill is generated by a scan of products Smart Shopping 2022-23 8 | Page in the reader and bill transmitted to central billing department by that bill may be paid at the counter that could be a major issue for the client.

4. Fourth paper - Smart shopping cart with customer-oriented service by Shivagurunathan (2020), they established an idea of an automatic billing system and programmed shopping trolley where they used face recognition for client authentication. It is not simple straightforward} method as face recognition of shoppers throughout shopping hours won't be easy and correct as malls can be crowded. Many errors are potential whereas using recognition for authentication.
5. Fifth paper - Smart RFID based Interactive Kiosk Cart using wireless sensor node by Yathish (2019), they used RFID technology for the smart automated shopping. They used a dedicated website for billing maintenance and for user interaction. Every user with the unique id accesses the web server for the bill payment and invoice information. Internet service is mandatory in this type of service. So the method could fail because of internet instability and server error issues may additionally occur due to high load

Components

Component	Quantity	Value
Microcontroller	1	ESP32
LCD Display	1	
Bluetooth module	1	HC05
Headphone	1	
IR sensor	1	
DC motor	2	
RFID Reader	1	
APR Voice playback module	1	ISD1820
Battery	1	12V DC

1.2. Methodology

1. ESP32 Microcontroller - ESP32 is a series of low-cost, low-power system on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs either a microprocessor in both dual-core and single-core variations, Xtensa LX7 dual-core microprocessor or a single-core RISC-V microprocessor and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules. ESP32 is created and developed by Systems.
2. Battery - A battery can be defined as an electrochemical device consisting of one or more electrochemical cells which can be charged with an electric current and discharged whenever required. Hear we use battery as power supply.
3. RFID reader is a device 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. Head phone headphones are a hardware output device that plug into a device speakers port.
4. Headphones allow you to listen to audio without disturbing people around you.
5. Voice playback module - This module is based on ISD1820, which a multiple-message record/playback device. It can offer true single-chip voice recording, no-volatile storage, and playback capability for 8 to 20 seconds.
6. IR Sensor - An infrared sensor is a device that detects infrared radiation in its environment and outputs

an electric signal. An infrared sensor can detect movement as well as to measure the heat of an object. The Infrared Sensor can detect infrared

7. DC motor - A DC motor is an electrical machine that converts direct current electrical energy into mechanical energy and helps in the movement of the wheels attached to the trolley.

1.3 Command

1. Press the start button – To start the function of the trolley.
2. Press the stop/billing button – To generate bill and move towards the exit point.
3. Grocery – To move the trolley towards the particular section we need to get the products from.

2. Block diagram

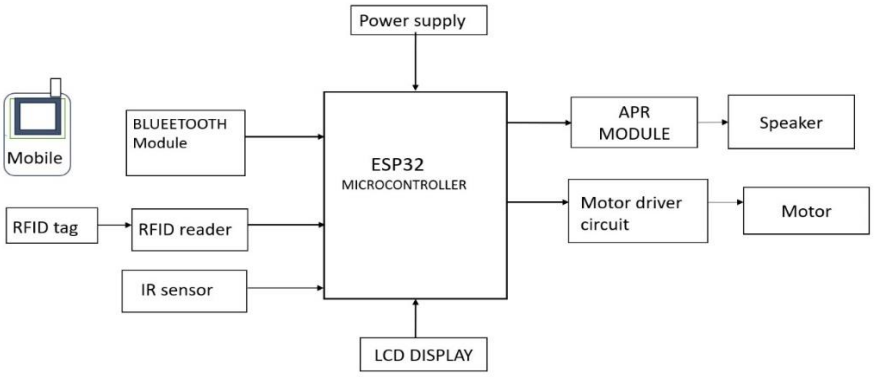

Fig. 1–SMART BLIND SHOPPING BLOCK DIAGRAM

2.1 Flowchart

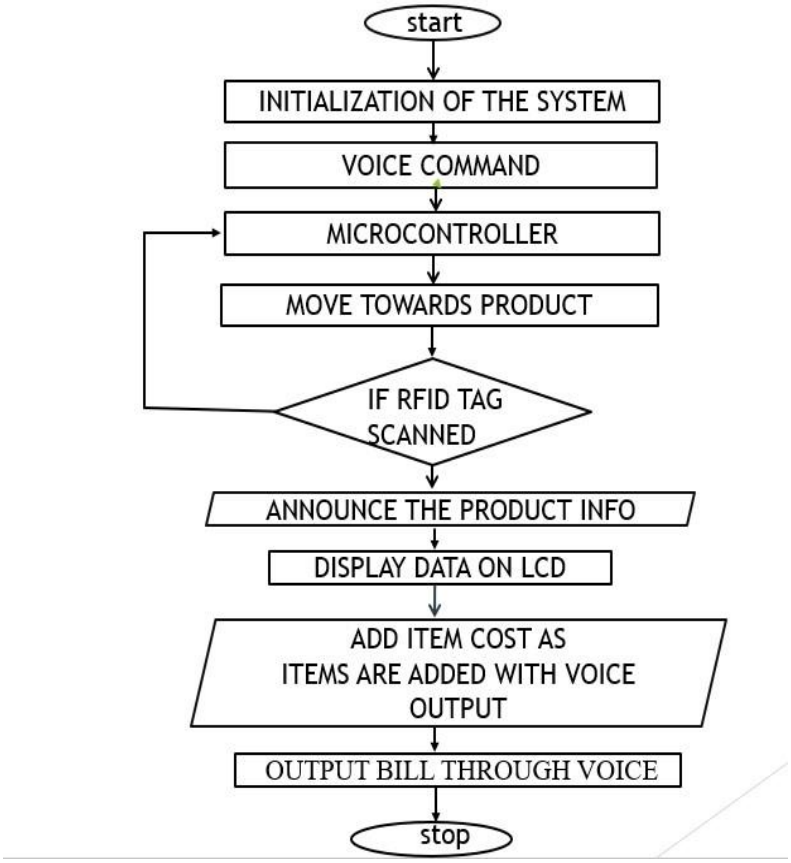

Fig 2 Flowchart Of Smart Blind Shopping Carrier

3. Implementation

In this proposed system of smart blind shopping kit is mainly developed for blind people, is not required to the help of friend's, shopkeepers or family members help for shopping. In this project a voice command is given through the Bluetooth required product and ESP32 microcontroller will gives the direction to reach the section and row of particular product in the supermarket. A pre-defined path is set for the trolley in a particular super market , the trolley will move as the path. RFID reader will gives the product information like price of the product, manufacture and expire date of the product and quantity of the product through the Bluetooth module connected to the microcontroller .

4.Conclusion

In this paper, we suggest an RFID-based secure smart retail system. Security concerns are considered in relation to a smart shopping system for the first time and RFID is used to improve the shopping experience for blind people without anyone's support. We meticulously outline the concept of the system and then build a prototype to test its functionality. We also provide performance evaluations and security analysis when creating a secure communication protocol. We believe that in the future, retailers will be covered with RFID technology, and our research is ground breaking in the development of a smart shopping system. Our future research will focus on improving the current system, including how to increase communication efficiency while keeping security features and how to reduce computational overhead at the smart cart side with voice command from the blind people for increased efficiency. The development of intelligent shopping carts that make use of RFID technology and automatic product information announcement enhances the shopping experiences of customers. Modern shopping carts that use technology offer up-to-date information on products and pricing while saving time and effort. The "smart blind shopping kit" is a technical advancement that aims to improve both the shopping experiences of sighted and visually impaired customers.

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