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AIOT BASED SMART SHOPPING CART

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Abstract: **The every shopping store there will be a regular trolley, which is used for carrying products. However, using a regular trolley is good but after selecting the products customer will be waiting for a long time in the billing section. Instead of that, customers can use a smart trolley for an easy billing process through an application. It works through an RFID tag and receiver to scan the product, LCD display is used to display the product in the trolley and it will list all the products which the customer has chosen and the total amount. It can be paid through a mobile application. The major problem faced by visually impaired people is finding the products in the store, so the trolley has been infused with Bluetooth navigation to identify the product details. The proposed system is an attempt to automate, the billing process in a shopping mall and would be advantageous for the customer as well as for the shopkeeper in multiple ways.**

I. INTRODUCTION

The concept of smart devices has revolutionized many industries, including the retail sector. Smart shopping trolleys are an emerging technology that aims to transform the traditional shopping experience by offering customers a more convenient and engaging experience. Smart shopping trolleys integrate various technologies such as IoT, Arduino, LCD display, buzzer, and RFID sensor, to automate several shopping-related tasks and provide a better customer experience. The traditional shopping trolley lacks advanced features that can make the shopping experience more convenient, secure, and efficient. Customers often have to manually add and remove products from their trolley and rely on signage to learn about promotional offers or product details. With the integration of IoT technology, the shopping trolley can be transformed into a smart device that can automate several shopping-related tasks and provide a better customer experience.

The proposed smart shopping trolley design includes an Arduino-based microcontroller unit that controls the various sensors and display units installed in the trolley. The RFID sensor is used to detect the products added to the trolley, and the LCD display provides information about the product, its price, and other details. The buzzer can be used to notify the customer about the added product or any promotional offer available for the product. The smart shopping trolley can also be equipped with a GPS module that can help customers navigate the store and find their desired products quickly. The cart can also be connected to the store's inventory management system, providing real-time updates on product availability and inventory**.** The proposed smart shopping trolley design offers a more convenient, efficient, and engaging shopping experience for customers, while also helping stores to improve their inventory management and promotional efforts.

II. LITERATURESURVEY

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III. PROPOSED SYSTEM

Smart shopping trolleys are modern shopping carts that have been equipped with advanced technology to enhance the shopping experience for customers. These trolleys are designed to make shopping more convenient, efficient, and personalized. Some of the key features of smart shopping trolleys include barcode scanners, touch screens, RFID readers, and sensors.

OBJECTIVES:

The main objectives of the proposed system:

- To create a smart shopping trolley.
- To make shopping more convenient, efficient, and personalized.
- To give recommendations based on their previous purchases.
- To to better understand customer behavior and preferences

WORKINGPRINCIPLE:

The RFID-based smart shopping trolley using Arduino works by using RFID technology to identify and track the products added to the trolley, and the Arduino board processes the data and displays the information on the trolley's display screen. The system automates the billing process and provides various payment options, making the shopping experience seamless and hassle-free. The Arduino board can also use Wi-Fi or Bluetooth interfacing with Wi-Fi module to connect to other devices, such as a mobile app or a cloud-based server, to provide additional features and functionalities.

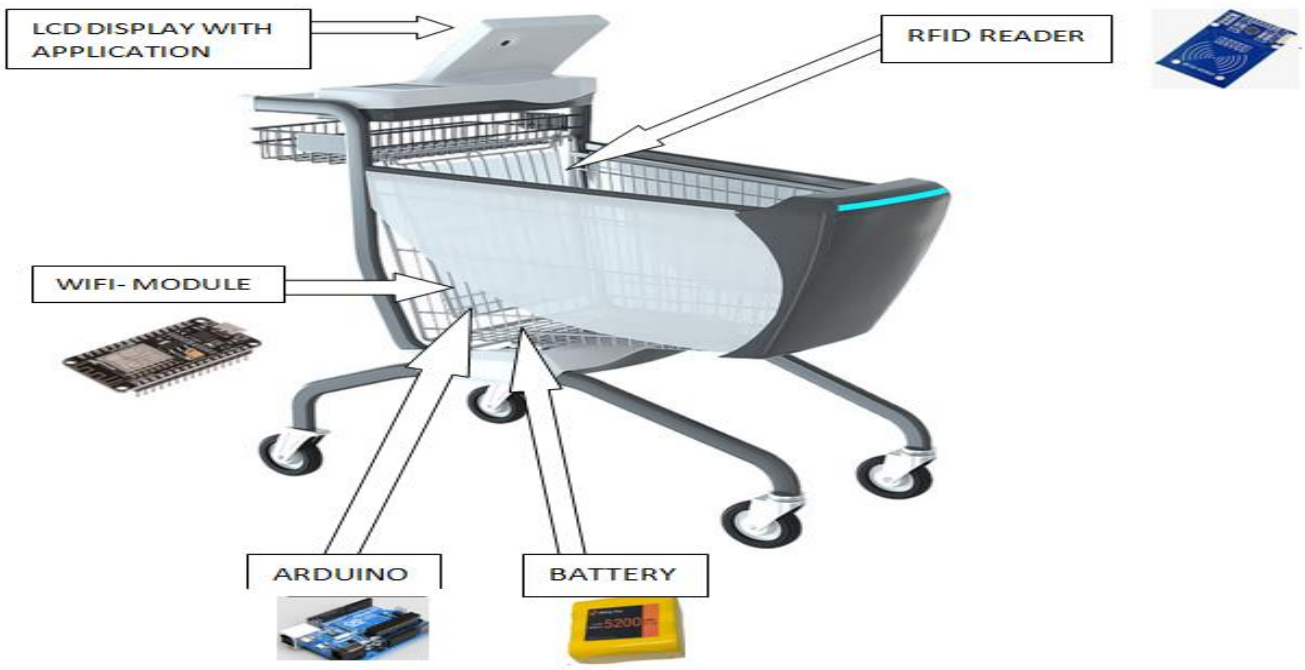

Fig.1-Block Diagram of Proposed System

ADVANTAGES:

- Time saving
- Improve shopping experience
- Reduce theft
- Contactless payment
- Product recommendation

IV. SYSTEM DESIGN AND IMPLEMENTATION

HARDWARE REQUIRED:

- **Arduino UNO**

  Open-source electronics platform arduino is based on software and attacks that are simple to use. Arduino has been used in thousands of different systems and operations due to its easy-to-use interface. The Arduino software is user-friendly for novices and flexible enough for more experienced users. Windows, and Linux.

- **LCD Display**

An LCD (Liquid Crystal Display) is a flat-panel display technology that uses liquid crystals to produce images. It is a type of screen commonly found in televisions, computer monitors, smartphones, and other electronic devices.

- **BUZZER Sensor**

A buzzer sensor usually consists of a small electromechanical device, such as a piezoelectric element or an electromagnetic coil. When an electrical signal is applied, the device produces a mechanical vibration that generates sound waves, creating the audible tone.

- **ESP8266 Module**

ESP8266 is a wifi SOC (framework on a chip) created by Espressif Frameworks. It's a highly integrated chip made to fit in a small package and offer complete internet connectivity. The module enables communication between the components.

- **RFID Reader**

The An RFID (Radio Frequency Identification) reader is an electronic device that is used to read and transmit data from RFID tags or labels. RFID readers use radio waves to communicate with the RFID tags, allowing for the identification and tracking of objects or people.

RFID readers can operate at different frequencies, including low frequency (LF), high frequency (HF), and ultra-high frequency (UHF), with each frequency offering different ranges and data transfer rates. They can also support various communication protocols, such as EPC (Electronic Product Code) and ISO (International Organization for Standardization).

- **RFID Tag**

An RFID (Radio-Frequency Identification) tag is a small electronic device that contains a microchip and an antenna. It is used for identification and tracking purposes in various industries, including retail, logistics, and healthcare

SOFTWARES REQUIRED:

- **Android Studio**

Android Studio is an Integrated Development Environment (IDE) developed by Google for creating Android applications. It is based on the IntelliJ IDEA software and is the official IDE for Android app development.

Android Studio provides a complete development environment for building, testing, and debugging Android apps. It includes a code editor, a visual layout editor, an emulator for testing apps, and various tools for managing dependencies, signing APKs, and more.

Android Studio supports various programming languages such as Java, Kotlin, and C++, and allows developers to create apps for various Android devices, including smartphones, tablets, wearables, and TV

- **JAVA Language**

Java is a general-purpose programming language that is designed to be platform-independent and portable, meaning it can run on any computer or device that has a Java Virtual Machine (JVM) installed.

Java is an object-oriented language, which means it is based on the concept of objects and classes. It also has a strong emphasis on security, which is why it is commonly used for developing applications that require a high level of security, such as financial systems and government applications.

Java has a rich set of libraries and APIs, which makes it easy to develop complex applications quickly. It also has a large and active community of developers who contribute to the development of the language and provide support and resources for other developers

- **PYTHON Language**

Python is a high-level, interpreted programming language that was first released in 1991 by Guido van Rossum. It is designed to be easy to read and write, with a simple and intuitive syntax, making it an ideal language for beginners and experienced developers alike.

Python has a large and active community of developers who contribute to the development of the language and provide support and resources for other developers. It has a vast collection of libraries and frameworks that can be used to build complex applications quickly.

- **Arduino IDE**

The Arduino IDE (Integrated Development Environment) is a software platform that is used to develop and program Arduino microcontroller boards. It provides a user-friendly interface for writing and uploading code to the board, and allows developers to easily create interactive electronic projects.

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- **Smart cart Application**

The Smart cart application is used to view the products that are available in trolley and to purchase the products through application by scanning GPay or Paytm.

INTERFACING ARDUINO UNO WITH OTHER IOT DEVICES:

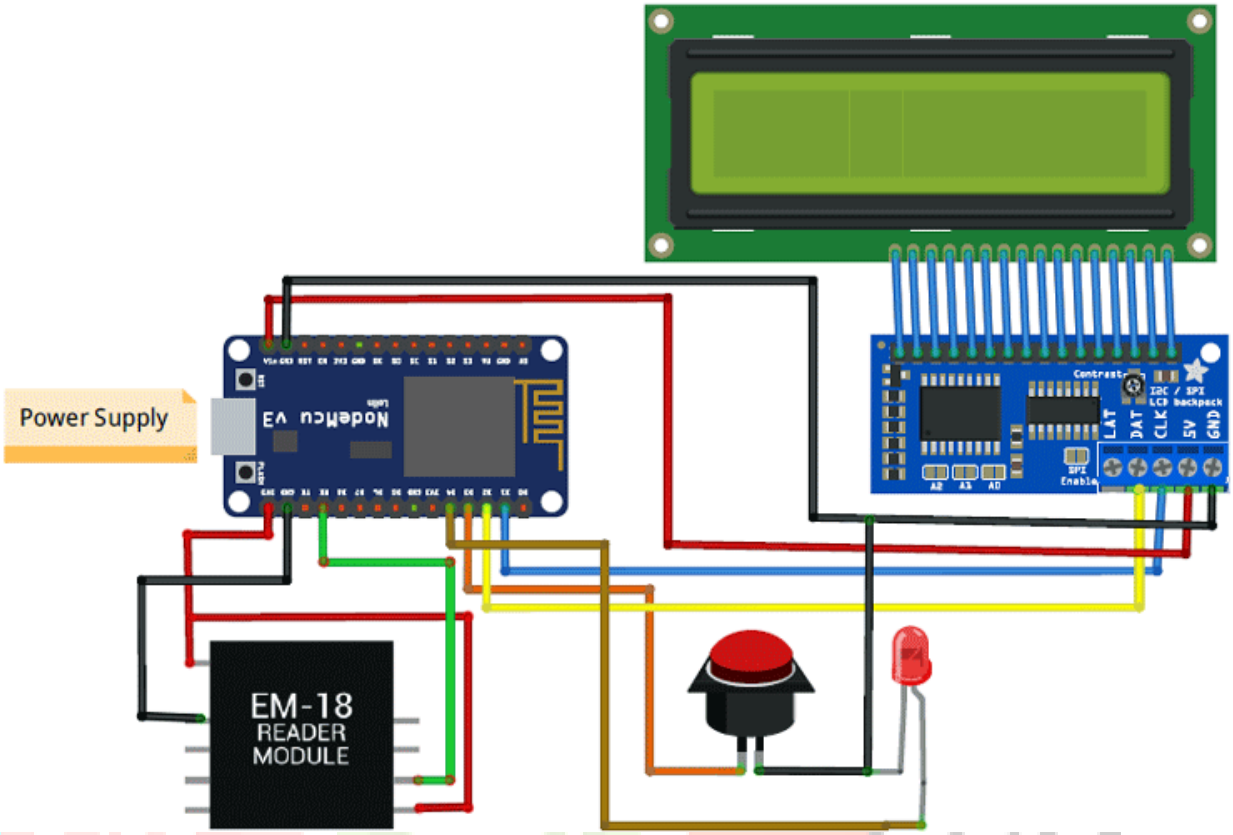

Fig.2-ARDUINO INTERFACING Diagram

FLOW DIAGRAM:

A flow diagram contain step-by-step process that used in smart shopping cart.

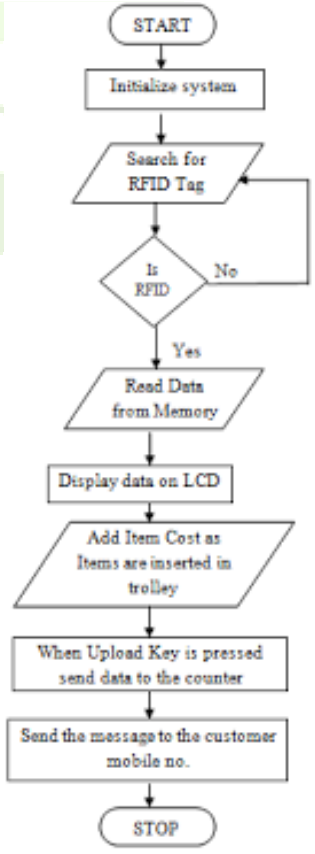

Fig.3-DataFlowdiagram

SMART CART:

A smart cart application for an RFID-based smart shopping trolley would allow shoppers to scan and track the items they add to their trolley, as well as providing other features to enhance the shopping experience.

The basic functionality of the application would involve the use of RFID tags on each item in the store, and an RFID reader on the shopping trolley. When a shopper adds an item to their trolley, they would scan the RFID tag using the reader, and the item would be added to their digital shopping list in the application. The application could also provide additional features, such as:

- Product information: Shoppers could scan the RFID tag to view detailed information about each product, such as ingredients, nutritional value, and reviews.
- Shopping list: The application could keep track of the items in the trolley and provide a running total of the cost of the items.
- Navigation: The application could provide a map of the store and a route to the items on the shopper's list.
- Promotions: The application could display promotions and discounts on items in the store, based on the shopper's list.
- Checkout: The application could allow shoppers to pay for their items through the app, reducing the need for a physical checkout.

V. RESULT

STEP 1:

Arduino UNO board is interfaced with RFID Reader, LCD Display, ESP 8266 and Buzzer . The shopping cart proto type of the proposed system is shown in Fig.4.

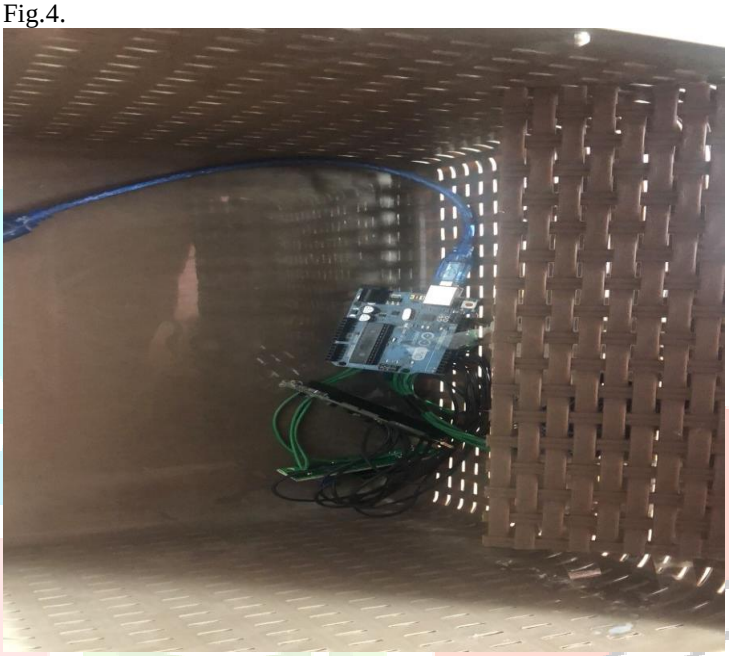

Fig.4 Arduino with Sensors

STEP 2:

The Fig.5 shows the Smart cart application of the front page.

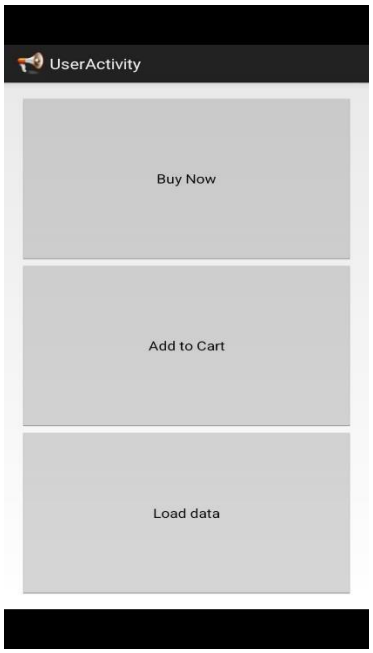

Fig.5 Front page of the smart cart application

STEP 3:

The ESP 8266 module sends the loaded RFID tag product name to the application as shown in Fig.6.

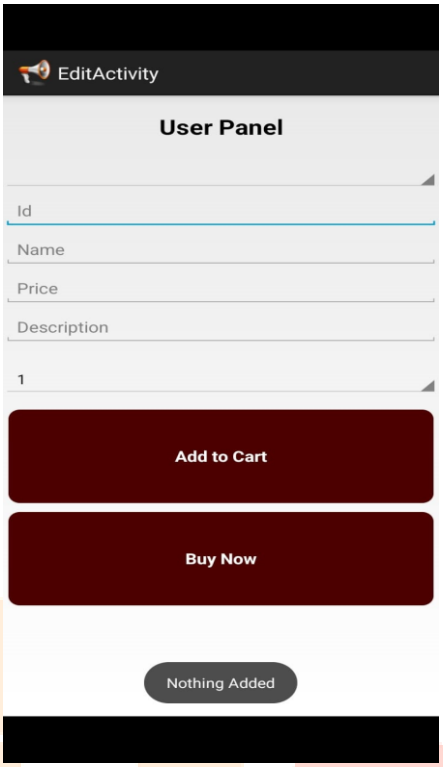

Fig.6 Add to cart page

STEP 4:

A purchase details page of the smart cart application as shown in Fig.7.

Fig.7 purchase details page of the application

STEP 5:

A QR code page will appear to make your transaction, the product you have purchased as shown in given Fig.8.

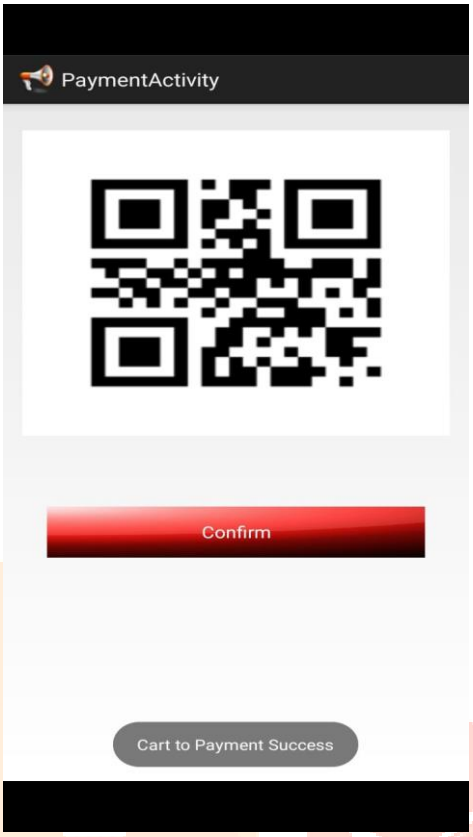

Fig.8 QR Code page

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VII. CONCLUSION

RFID-based smart shopping trolleys are a technological innovation that has the potential to revolutionize the shopping experience. These trolleys can improve the efficiency of the shopping process by making it more convenient and time-efficient for customers, as well as providing valuable data for retailers to analyze customer behavior and preferences. The implementation of RFID-based smart shopping trolleys has the potential to benefit both customers and retailers. With the ability to track products and manage inventory in real-time, retailers can provide better service to customers, reduce waste, and optimize their supply chain operations. At the same time, customers can enjoy a more seamless shopping experience, reducing the time spent at checkout and providing more personalized product recommendations. The widespread adoption of RFID-based smart shopping trolleys will require significant investment in infrastructure and technology. Retailers will need to invest in RFID-enabled products and update their point-of-sale systems to accommodate this new technology. They will also need to invest in data analysis capabilities to take advantage of the wealth of customer data generated by these trolleys. Despite these challenges, RFID-based smart shopping trolleys represent a promising new frontier in the retail industry. By leveraging the power of technology, retailers can deliver better experiences to customers while improving their bottom line. As the technology continues to evolve and become more accessible, we can expect to see more widespread adoption of RFID-based smart shopping trolleys in the years to come.

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