SMART SHOPPING TROLLEY USING RFID READER AND NODE MCU

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ABSTRACT: Shopping supermarkets are one such place where most people are turning towards to purchase daily necessities such as food, clothes, toiletries, garden tools, household appliances, etc. in the contemporary scenario. It has become a high necessity due to public demand to create multiple varieties of places with advanced infrastructure to ease the customer needs. The Internet of Things has conducted many experiments in various applications such as smart homes, electronic medical frameworks, and wearable devices. these IoT have now being involved in creating smart shopping trolleys, as customers often face many problems and inconveniences while shopping in supermarkets which includes over time-consuming, less information on the product details, lack of a pre-defined list of items, and difficulty in random purchases

Keywords- RFID, Node MCU, LCD display

INTRODUCTION

The contemporary world shows far-reaching success in the field of internet and technological development. People invent more and more products to lessen human work and save time in all respects. Starting from nanotechnology to artificial intelligence, the world has seen greater inventions to suit and support labor works. In today's world, the population is growing rapidly, and there is a wide range of needs in various aspects of trading both for producers and customers. One such newest invention which supports them is being discussed in this paper. Customers who wish to buy different products at supermarkets invest more time to coordinate an effective purchase. As it is rightly stated, "Necessity is the mother of invention", one can wish for less time-consuming and an effortless purchase would always opt for better technological support. The automation of manual work and the technology advances in the world being co-related; a new system was invented to ease shopping in supermarkets. In this paper, we investigate and understand the method and significance of a smart shopping cart that uses smart and inexpensive IoT innovation such as an RFID reader and the NodeMCU. It can be used in places such as supermarkets, where the shopping trolley will be fitted with an advanced radio frequency reader mechanism to analyze and bill the shopping carts of the customers. It can help reduce labor costs and instill excellent shopping knowledge in customers. This structure does not force customers to wait in queues for billing, alternatively, it helps in viewing the items they purchased through a reader machine fitted in the shopping trolleys which helps them to make the invoicing process easier and more convenient, by which the process purchases either from a predefined list or a random cart will be pre-determined through the reader and the bill is transmitted to the billing counter through a server.
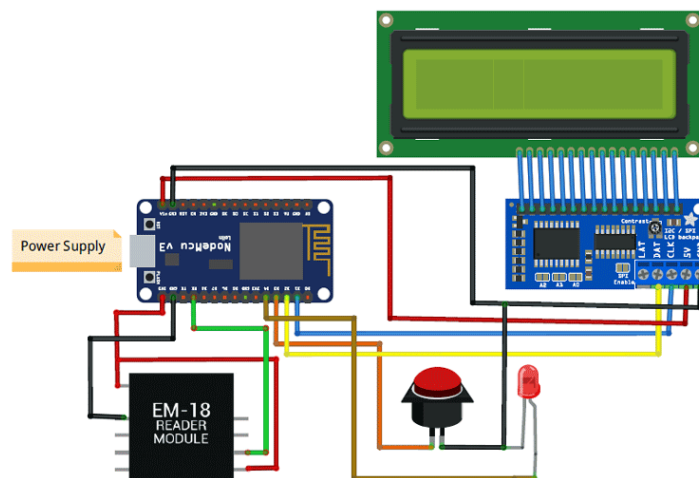
ALGORITHMIC WORKING

Fig.1: Circuit diagram of RFID with NodeMCU

Step1: Jumpstart the reader attached to the shopping trolley

Step 2: Select and place the product wished to purchase registered with the RFID tag into the trolley.

Step 3: The Radio frequency reader fixed into the trolley reads the tag information of the product.

Step 4: The Node MCU chip board constructed with the RFID tag reader sends these information of the products to the main store server through the WiFi module.

Step 5: The main server stores and update the data of every purchasing product in the database.

Step 6: At the end of the purchase, the total quantity of the product and accumulated into the server

Step 7: The list of final quantity of products gets displayed in the bill counter as stored in the main server.

Step 8: At the billing counter, the customer has to make the payment as per the invoice.

Step 9: The main server database is updated.

Step 10: Stop the RFID reader in the trolley and submit it to the store

COMPONENT DETAILS

What is IoT

Simply, any physical object connected with motion sensors and the internet, where the data are controlled and communicated through the internet servers. It is more like fabricating and controlling the physical hardware world through internet sensor operation.

What is RFID

Radio Frequency Identification (RFID) refers to a wireless frequency gadget made out of tags and readers which use radio waves at multiple frequencies and transfer data to servers. It has tags and readers; Tags, use radio waves to communicate their identity and different facts to close by readers, which is either passive or active.

What is Node MCU

Node MCU is open-source chipboard with Lua-based programming language firmware exclusively designed for IoT-based applications operated through ESP8266 Wireless frequency SoC module from Espressif Systems, and hardware which is based on the ESP-12 module. It is a WLAN SOC (system on a chip) created by Espressif Systems based on the ESP8266 - 12E WiFi module. *The major objective of the Smart shopping trolleys with RFID*

To read articles: The smart shopping cart should be able to accurately read articles that have been added to or removed from the shopping cart.

To track products: The server should track the status of the products in the store. By installing the RFID reader on the shelf, you can track items and update the item inventory on the server.

To conduct payment verification: Before the exit gate can scan all items in the smart shopping cart and check whether all items in the shopping cart have been paid on the server, the RFID reader has been installed. If an unscrupulous customer tries to exit the store without paying, the verification will fail.

SYSTEM DETAILS

Smart Cart with NodeMCU and RFID is a powerful device for product scanning, bill generation, and payment. It uses the RFID reader and the RFID tags of a NodeMCU, an LCD, buzzers, and more. To scan the RFID tags present on the product and to store them in the NodeMCU, any information received from the tags is used by the RFID reader. The reader will scan the product directly and, if the consumer would like to remove some product, the product must be re-scarred. Weight equipment can also measure weight if weight cannot be calculated by the RFID reader. Complete bill produced and shown on the trolley LCD and the billing section after the purchase. The product is bought. The customer must only pay the sum when he goes to the billing area. The full list of products in the cart is shown on the LCD. The system has no user interface;

instead of the WiFi module, NodeMCU is used. The intelligent business using the trolley app states that an integrated and unified billing system can be created which can be used in shops and supermarkets. Since the total sum is generated on the LCD, customers need not stand by the billing counters to pay their bill, and the customer just has to pay at the billing counter.

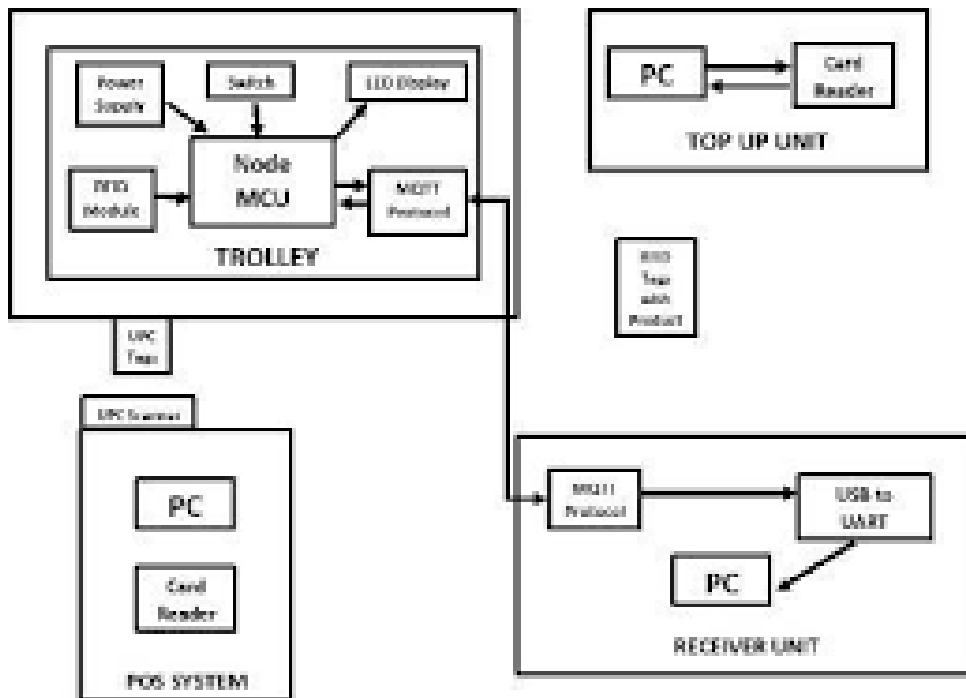**WORKING OF THE SYSTEM IN SHOPPING**

Fig. 3: Block diagram

PRE-SHOPPING

    1.   Enrollment

The shop must register all products before moving to the shelves. Prices, venue, and information Coupons would be stored in a server database instead of in the tags because such data can change over time, And server management is easier. THIS Tag design consists of manufacturer number, product Number, weight, date of expiry

    2.   Scanning RFID Tag

Frequency of radio Tags are used to classify and Tags Use radio signals to locate objects. They are a microchip and an antenna that sends a 'reader' signal. RFID: RFID Tags in barcode replacement have been recommended RFID tags can be read from the viewing pipeline and from a distance of only a few centi meters to over 100 meters since some regions use radio waves. It also allows A single identification number shall be given to individual products, Instead of just a code for a product. The distributors and These RFID tags should be used by wholesalers to monitor the Commodity package between warehouses and shops. In this setting, each one in the Futuristic Trolley System Passive Radio Frequency ID tag will include the product The Electronic Product Code is unique. This is what we are talking about. The Electronic Product Code contains information on i.e. the name and price of the commodity. Sooner or later If the buyer places the Smart Trolley product, the Radio Frequency ID reader scans the Tag producing the electronic product code Number. The data collected will be transferred to the microcontroller Where there is more processing.

    3.   Scanning Weight

The weight scanner can weigh the objects A cart that matches the right item to ensure the tag. It is possible to Support even with safety inspection: if a malicious user is removed before the RFID tags can be placed in a cart Detect it by adding additional uncounted weight. Here, here, The load cell is used for the weight scanner which is used to build an electric transducer signal whose magnitude is directly commensurate with the calculated power. In particular, this proposal makes use of a double bend beam load cell factor.

CONCLUSION AND SUGGESTIONS

This proposed paper signifies the need to improve the shopping experience and security concerns with a safe smart purchasing system that is based on RFID technology. The intelligent racks will track the articles on the racks by reading the RFID signals from the tags. The intelligent carts can read and collect information about the goods inside carts and can eventually verify the customer's purchase through checkout points. The Internet of Things is one of these systems which link different objects The Internet of Things is a technology like this that connects different objects in a network and is a milestone in the era of an intelligent society. Smart shopping technology allows consumers to shop effectively on their shopping cart. So we conclude that the automatic billing of goods employing RFID technology will in the future become a more viable choice. The device is efficient, compact, and performs very efficiently based on RFID technology. Our project redefined the buying process according to the customer's point of view. Obviously, with its precision, quick response, and durability, RFID has outsmarted barcodes. Our concept has removed the consumer practice of relying on the retailer for product details. Billing is stopped entirely, saving the client time and making it easier for the shopkeeper to handle. This prevents standing in queue for the customer as the trolley itself is accustomed with the RFID reader for billing and payment. Various parameters are shown, such as machine smart trolley parameters, such as product name, cost of the product, and weight.

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