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RFID Based Smart Trolley With Automated Billing

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ABSTRACT:
In today's world, high-tech products are most likely to be used by everyone. Existing systems take a lot of people's time and energy. To get the job done faster, people prefer advanced blocks of automated intelligent systems. The smart trolley is one of the most advanced devices to process your purchases flexibly and easily without any delay. Customers do not want to stand in a long queue for a bill to be paid. In this case, you can pay your bill at the checkout without wasting time. Customers can pay their bill either online or offline, after completion of the purchase. The existing trolley does not have this adaptability at billing. To overcome this problem, it is recommended to use a smart trolley. The newly developed smart trolley consists of an ESP 32, RFID module. In addition to this checkout feature, smart trolleys allow managers to view the payment details as well. We can properly control the smart trolley without additional manual intervention.

Keywords: ESP 32, RFID Module, Bill generation.

I. INTRODUCTION:

The existing smart trolley is used by a few people due to its complexities like payment methods using membership cards. The existing trolley does not provide easy access for payment without master cards. smart trolleys were not installed in many stores due to their price. it is not only expensive but also maintenance is required for the servo motor designed smart trolley. The newly modelled smart trolley is designed to overcome all these problems by using a chargeable battery instead of a servo motor which is cheap as well. All the clients can use them as they are simple to access.

The proposed trolley does not require any master cards or login options for shopping. The proposed system is re-modelled by including the additional options and advanced components are replaced with older ones to reduce the cost of a smart trolley. Customers can easily operate the smart trolley while shopping. Products can be added and removed easily.

After completion of the shopping, the finalized bill will be generated on the screen after pressing the push button. Customers can be able to see the total price in addition to the full invoice. Whenever the customer purchase is done, the updated information about the transaction can be monitored by the owner's device. These newly developed Smart trolleys reduce the manual interaction for billing.

II. EXISTING SYSTEM:

Existing system runs on the microcontroller, RFID module, GSM module, LCD display. The existing shopping trolley works with the individual login system which makes the customers more difficult to use. Whereas, this system is not sure about the communication through Wi-fi module, Zigbee module, GPS and Payment can be done through master cards only. Despite this motor consumes more power and requires high maintenance.

III. PROPOSED SMART TROLLEY SYSTEM:

The smart trolley system is the advanced version of the trolley with special features for convenience to customers. The proposed system allows both online and offline payments. This system is designed with solar setup for power supply. The system we provide is designed with an RFID reader, and RFID tags are attached to all products in the mall.

RFID tag has a unique authentic code for a particular product, which is read by an RFID

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reader, and product Details are displayed on the screen. When the products are added and removed, the buzzer activates and confirms whether the product is considered or not. The proposed smart trolley scans the product and the price will be displayed on the screen, it also calculates the total price of the products. After the purchase, the owner can track the payment details.

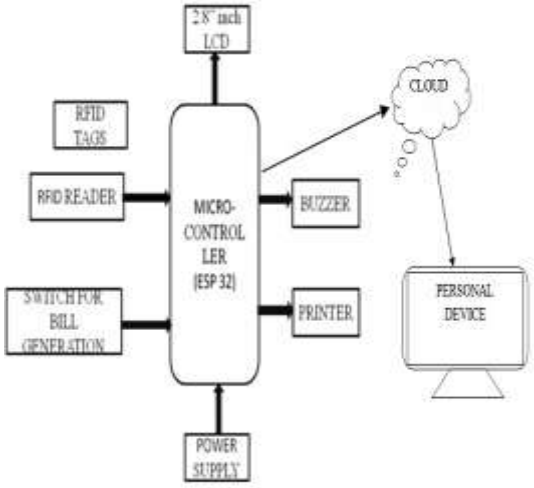

Fig.3.1: Block diagram of proposed system

Algorithm:

Step 1: Start and initiate the process.
Step 2: Scan the products and place them in trolley.
Step 3: Scanned products are displayed on the LCD screen provided.
Step 4: Can remove the products if not needed.
Step 5: After the shopping is done, press the push button provided.
Step 6: The finalized bill is displayed on the screen
Step 7: Bill can be paid through online or offline.
Step 8: Printer prints the invoice of the bill.
Step 9: Owner can monitor the bill details.

3.1. HARDWARE IMPLEMENTATION:

Firstly, a hotspot is connected to a proposed smart trolley system, which accesses the owner to monitor the payment details and helps in bill generation.

Screen displays the product details followed by a beep sound when the item is scanned through an RFID reader. Customers can see the bill details on the screen after the shopping is done. Components used to implement the design of the smart trolley includes ESP32, RFID reader, RFID tags, Liquid Crystal Display, Buzzer, Switch, Push button, USB port, Boost converter, Lithium battery, Solar panels.

A. ESP 32:

ESP32 is a series of low-cost, low-power system-on-chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. Microprocessor and includes built-in antenna switches, power amplifier, low-noise receive amplifier, filters, and power-management modules. These chips have different CPUs and capabilities, but all share the same SDK and are largely code-compatible. These modules are well suited for Wi-Fi and Bluetooth/Bluetooth. It has 2.4 GHz dual-mode Wi-Fi and Bluetooth development with 4 MB of flash. It is also compatible with Arduino, and Micro Python, and can be programmed with the Arduino IDE making your development easier. The 2.4 GHz Wi-Fi and Bluetooth dual-mode chip adopts low-power 40nm technology, which has the best power consumption and RF performance, safe and reliable, and easy to expand to various applications.

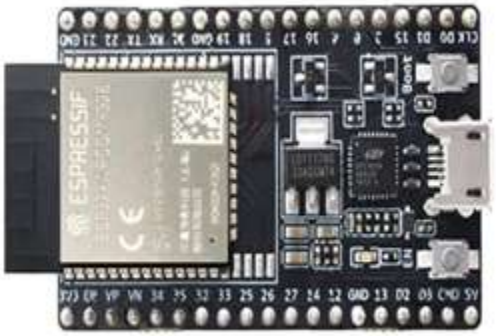

Fig.3.2: ESP 32

B. RFID MODULE:

RFID stands for radio frequency identification. RFID module comprises two main components, a tag and a reader or a transceiver. A tag is attached to the product, and a reader scans the tag. A tag is a passive device, it includes a microchip that can store and processes data and an antenna that can transmit and receive signals. A reader includes a radio frequency module and an antenna that generates a high-frequency electromagnetic field. A reader can do both writing and reading. When the tag is placed next to the reader, the reader produces an electromagnetic field. This makes electrons move and the chip gets active. The information in the chip gets back to the reader in the form of a radio signal. The reader receives the information and sends the data to the micro controller.

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Fig.3.3: RFID Module

C. 2.8 INCH TFT LCD:

TFT screen is a kind of liquid crystal display, each pixel dot is connected to the transistor and it has the characteristics of low power consumption, high quality, high resolution, and backlight. This 2.8" color LCD display has a narrow PCB display. The resolution is 320×280 pixels, and a four-wire SPI interface.

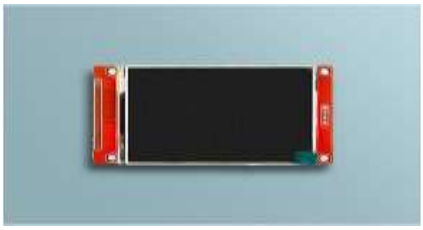

Fig.3.4: 2.8-inch TFT LCD screen

The architecture diagram of proposed smart trolley system is designed as shown below diagram.

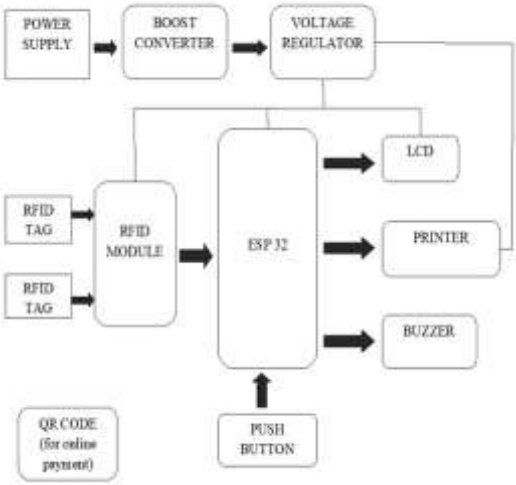

Fig.3.5: Architecture diagram

In the proposed smart trolley, all details of products are stored in a database on the server through the wifi module. RFID tags are attached to every product to identify the details of products. When the product is scanned by a reader, the product cost will be displayed on the screen. The invoice will be generated from the printer when the push button for bill generation is pressed. Customers can pay a bill online or offline. Bill details will be transferred to the owner of the mall in seconds.

Fig.3.6: Hardware setup

Fig.3.7: Connection diagram

3.2. SOFTWARE IMPLEMENTATION:

The circuit is developed in Arduino IDE software and a hardware system is built to obtain the expected output. As the RFID tags cannot be scanned through software as it is a real-time application. The software tool is used to progress the process in the microcontroller i.e ESP 32 for getting the expected results.

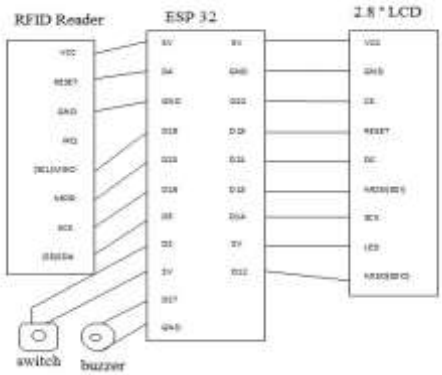

Fig.3.8: Schematic diagram

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IV. RESULT:

Once the product is scanned, the product is added to the trolley with a beep sound. This beep sound confirms whether the product is scanned and placed properly or not. Similarly, products can be removed from the list. Once the push button is pressed, the finalized bill will be displayed on the LCD screen and the data will be sent to the IOT web page where the owner can see the transaction details.

Fig.4.1:Result

Fig.4.2:Transaction completed

V. CONCLUSION:

The smart shopping trolley designed with new technology helps people to purchase efficiently. This design reduces the counter queue and manages the time for paying a bill at the counter, and the owner can be able to track the transaction details.

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