SMART RATION CARD SYSTEM USING RFID & IOT

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Abstract: *The significance of a ration card is crucial for household information, including obtaining a gas connection, learning about family members, and establishing an address. In order to stop fraud and corruption in the current ration distribution system, we have developed a smart ration card system employing RFID technology and the Internet of Things (IoT). In this scheme, an individual RFID tag will take the place of the traditional ration card. The fair price shop will check this RFID tag to confirm the user's identity. A microcontroller linked to a Firebase database will confirm the user's identification. If the user is confirmed to be real, the user's monthly quota of the available ration is shown. Following a successful transaction, the database will be updated with information about the user-received ration material. This technology is extremely secure and will take very little human effort to operate. The government can easily keep track of all the provided ration content by employing this approach.*

Keywords: *RFID tag, RFID reader, LCD Display, IoT, Node MCU, Firebase.*

I. INTRODUCTION

One of the most disputed topics connected to malpractice is the PDS (Public Distribution System)[1], which is also known as the ration distribution system. Rice, ragi, sugar, red gram dal, wheat, and cooking oil are regularly provided to those living below the poverty line (BPL) on a monthly basis through the Public Distribution System of India. The old ration card, which is often used by the government to supply food grains and other items to a specific class of people in society at a discounted rate, is replaced by the smart ration card. The project's goal is to effectively automate the process of item distribution. The project aims to halt fraud and inconsistencies produced in distribution stores. Here, the system needs to accomplish the following: Verify beneficiaries' Smart Ration Cards; prevent anomalies in the distribution of food; notify recipients' mobile devices via SMS notice; maintain inventory in the distribution center.

II. EXISTING TECHNOLOGIES AND RELATED WORK

There are numerous shortcomings and fraud at all levels in India's current ration distribution system, which has to be rectified. The majority of ration store owners carry false ration cards with them. The dealer receives more rations from higher government officials as a result of phoney ration cards, and he sells them on the open market for a higher price to make some extra money. Most of the time, people are not aware of the government's subsidized prices. Therefore, the dealer might offer food at prices higher than those advised by the government, or he might fiddle with the buy/sell record entries.

Additionally, the amount of ration being allocated may be very different from the real ration quota that is being allocated. The real ration quota allotment and the tariffs applied to the ration items won't be known to the consumers. In this way, the problems we are currently experiencing are a result of fraud and corruption in the public rationing system. There is currently no efficient digital system that allows the government to keep and track online records of the distribution of rations among its population. The civil supply department has already implemented the biometric system but is now using the intelligent retinal imaging system (IRIS) technology to recognise legitimate ration card holders for the distribution of goods through fair-priced stores under the public distribution system.

A novel idea is presented that involves digitalizing the ration distribution system using RFID[2][3][4] and the Internet of Things (IOT)[1] in order to address the shortcomings of the current PDS. Firebase is used in this project, which is another name for cloud computing. A storage database is provided by cloud computing, along with many other services, including OTP services. This data transfer format is compact. Independent programming languages are used. Thus, it is a trustworthy format. The codes used to create databases are fairly easy to grasp, making updates quite simple.

This approach [5] offers the consumer an effective way to purchase goods from the ration shop. The Smart Ration Card (SRC)[6] must be flashed by the consumer at the RFID reader. The system displays how many subsidized items have been allocated to the consumer if the SRC is determined to be genuine. Additionally, the FPS displays the quantity that is available. The customer receives a text message with the purchase details after the employee confirms the transaction. Each time a consumer makes a transaction, the government database is promptly updated.

NODEMCU ESP8266

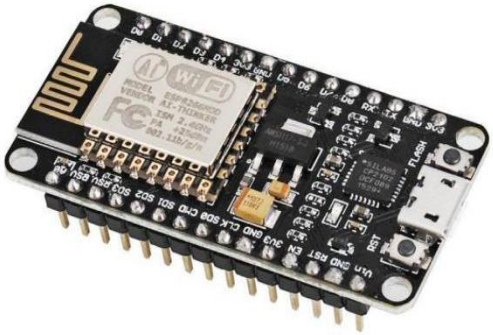


Fig. 2.1 ESP8266 WI-FI module

The NodeMCU (***N***ode ***M***icro***C***ontroller ***U***nit)[7] is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (Wi-Fi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.

RFID Technology

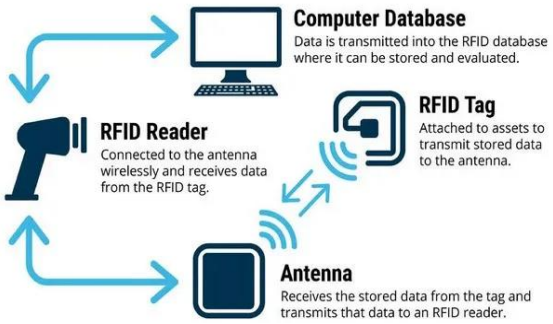


Fig. 2.2 A passive RFID tag

For automatic recognition and tracking of tags attached to various items, radio-frequency identification (RFID) technology[8][9] uses electromagnetic fields. Tags contain electronically recorded data. RFID technology can be used to track things in a way that is comparable to employing bar codes for product identification, but RFID also has certain unique advantages. RFID tags[10][11] may hold more data than bar codes and, unlike barcode scanners, do not need to be in direct line of sight in order to be read. Multiple tags can connect with RFID scanners at the same time.

RFID tags come in two flavours: active tags, which have an internal power source, and passive tags, which get their energy from an outside reader's signal. Due to their lower cost and smaller size, passive tags are more frequently employed in retail settings than active tags. The components of a passive tag are a microchip enclosed by a printed antenna and some type of encapsulation, such as plastic laminates with adhesive that can be applied to goods or a tiny glass vial for implantation. Passive tags are used to power and communicate with the tag reader[12]. The procedure of energy capture and ID transfer is carried out by the antenna of the tag. Typically, a tag's chip contains information to identify a specific product, the product model, and the maker.

III. PROPOSED METHODOLOGY

The main goal of the suggested strategy is to lessen forgeries from ration shops while also making it simple for people to receive their supplies. help decrease manual labor as well. In the proposed system, an RFID-based smart ration card system will be created that allows users to enter their information online. Additionally, there is no manual labor. When a user requests a ration, he or she presents the smart ration card, which is then scanned to determine whether the user is legitimate or not.

Advantages of Gadget over existing Technology:

- Portable Can be easily carried anywhere
- Reduced Cost
- Wi-Fi Enabled
- Easy monitoring

A. BLOCK DIAGRAM

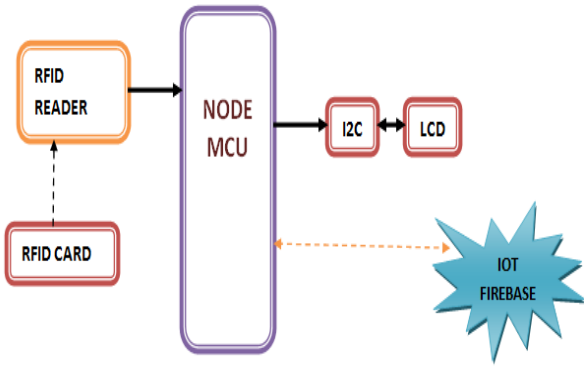


Fig: 3.1 Block Diagram of Smart Ration Card System

B. WORKING

Fig. 3.1 depicts the block diagram of the smart ration card system. From the block diagram above, it is clear that the project makes use of a NODE MCU controller. The IoT Firebase[13][14], LCD, and RFID reader are all controlled by the controller. The customer must present the ration RFID tag card to the RFID reader kit in order to purchase any ration items.

The reader will be able to identify the single number that the user will have. The microcontroller will receive the recognized RFID number and use it to compare the input number with the database. Name, address information, the card's expiration date, and other facts are encoded into

the controller so that it can identify the information arriving from RFID by comparing it to the database. Once the user has been recognized, the microcontroller will determine whether the user has already purchased the monthly ration item. If not, the LCD panel will show the ration item that will be distributed. The user must first enter the information for the item he wants to buy before the items can be distributed[15][16].

In this setup, the transmitting pin of the RFID reader is coupled with the reception pin (RX0) of the NODE MCU. The NODE MCU's transmission pin (TX1) and receiving pin (RX0) are connected to the Wi-Fi shield's transmitting pin and receiving pin, respectively. The system is connected to the Firebase through the internet using a Wi-Fi shield. A 5V, 1A dc adapter is used as the power source because the node MCU requires a 3.3V, 1A dc supply. The RFID module can also be powered by a 5V, 1A dc source. Consequently, the RFID module is connected to a second 5V, 1A dc adapter. As a ration card, the RFID tag is employed. An 8-bit hex code is produced when the tag is swiped through an RFID reader.

C. FLOW CHART

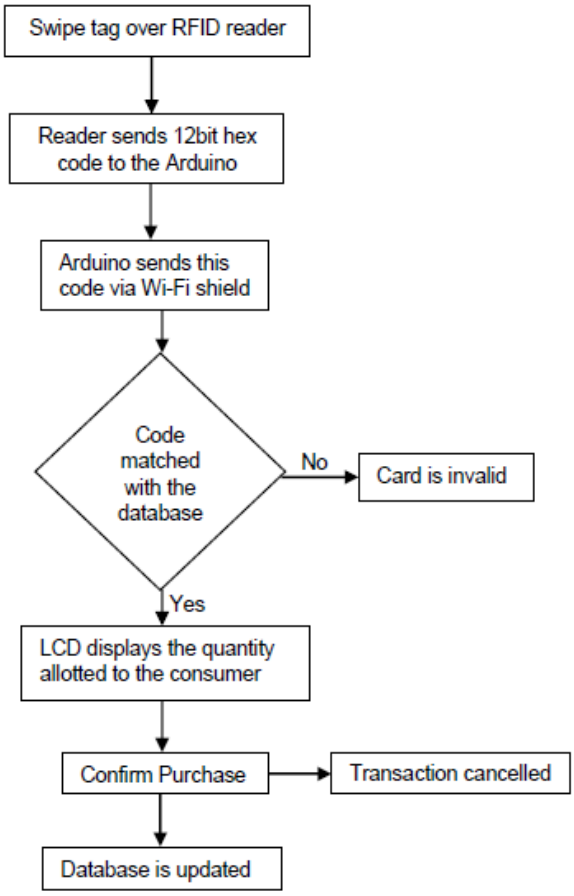


Fig. 3.2 Flow Chart of Smart Ration Card System

The RFID reader module reads the data from the RFID tag when it is slid over it, and it also accesses the RFID tag's distinctive 12-bit hex code. When this special code is compared to the database, the amount of the client's allowed ration is shown on the LCD display if the database contains information on the customer. The database is updated after the purchase is confirmed.

IV. RESULTS

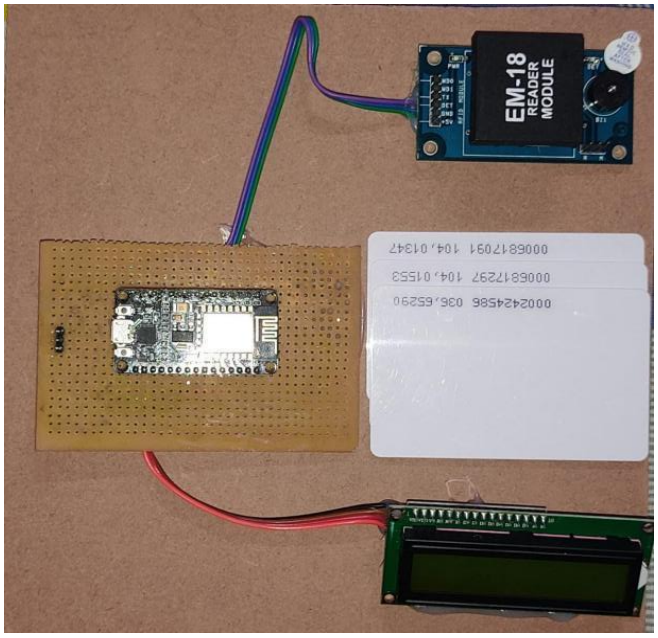
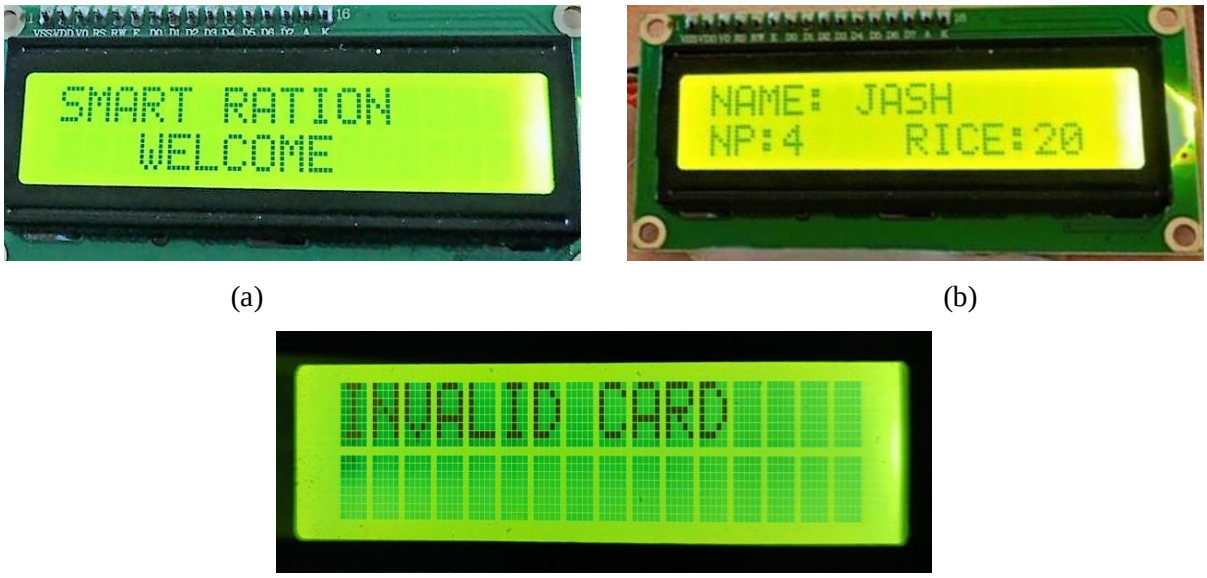


Fig. 4.1 Smart Ration Card System in Development

The proposed smart ration card system is shown in Fig. 4.1. A 16x2 LCD and an RFID reader are successfully connected to a Node MCU-ESP8266.

Fig. 4.2 A Passive RFID tag being swiped over reader

In Fig. 4.2, an RFID tag is swiped over an RFID reader module. The RFID tags used in the proposed system are passive; however, active RFID tags may also be employed.



(a) (b)

(c)

Fig.4.3 Consumer number, name getting displayed, and invalid card

The consumer's name and product information is displayed on the LCD once the microcontroller confirms that the user is present in the database. Fig. 4.3 (b) shows the LCD screen showing consumer information. Fig. 4.3 (c) shows if the user is not present in the database, it displays an INVALID CARD on the LCD.

V. CONCLUSION AND FUTURE SCOPE

In this work, a smart ration card system that makes use of cloud services and RFID technologies is proposed. As all the data is automatically updated in the cloud-based database, this method effectively reduces errors caused by manual monitoring of ration data. Additionally, the government will be able to monitor customer activity and transactions thanks to this system. Although the system will reduce the security flaws and fraud found in the current PDS, its initial cost is significant. A web interface is provided so users can log in and view their previous transactions, further enhancing the suggested system. This approach aids in tracking the contents of rations, but hand weighing is still required. It incorporates mechanical equipment to automatically measure the ration content desired by the consumer in order to prevent human error in ration content weighing. Internet connectivity is necessary for user authentication and database access, which might be difficult in remote areas.

VI. REFERENCES

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