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Radio Frequency Identification Based Ration Distribution System

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Abstract- Ration card plays a vital role for the household details such as to get gas connection, family member details, it acts as address proof etc. In this paper, we have proposed a smart ration card system using Radio Frequency Identification (RFID) Technique and IoT to prevent the malpractices and corruption in the current ration distribution system. In this system conventional ration card will be replaced by a unique RFID tag. This RFID tag will be verified at the fair price shop for the authentication of the user. The user's identity will be verified by microcontroller which is connected to an Amazon Web Services (AWS) database. For added security One Time Password (OTP) is also sent to user's registered mobile number which needs to be entered in the system. If user is found to be authentic then monthly quota of the ration available for the user is displayed. After successful transaction the database will be updated stating the ration content delivered to the user. This system will require very less human efforts for operation and is also very secure. By implementing this system government can keep track of all the delivered ration content very easily.

Keywords- RFID; IoT, Microcontroller, AWS, OTP

1. INTRODUCTION

Ration cards are an official document entitling the holder to a ration of food, fuel, or other goods issued by the Government of India. They are primarily used when purchasing subsidized foodstuffs (wheat, rice, sugar) and kerosene. They are an important subsistence tool for the poor, providing proof of identity and a connection with government databases. India's public distribution system (PDS) is based on the ration card, which it uses to establish identity, eligibility, and entitlement.

PDS also known as ration distribution system is an Indian food security system. It is one of the government's largest economic policies in India. The main purpose is to provide subsidized food and non-food items to India's poor people. This scheme was launched in India on June 1947. This system distributes commodities such as wheat, rice, sugar, and kerosene, through a network of Fair Price Shops (FPSs), also known as ration shops, established in several states across the country. A Government-owned corporation, Food Corporation of India procures and maintains the PDS.

The distribution of ration is directly controlled and monitored by both the central government and the state government authorities. While the central government is responsible for procurement, storage, transportation, and bulk allocation of food grains, state governments hold the responsibility for distributing the same to the consumers through the established network of FPSs. The process of allocating and identifying families below poverty line, issuing ration cards, supervising and monitoring the functioning of FPSs is done by State Governments. Under PDS scheme, each family below the poverty line is eligible for 35 kg of rice or wheat every month, while a household above the poverty line is entitled to 15 kg of food grain on a monthly basis.

In current ration distribution system of India there are many limitations and malpractice at various levels, which needs to be improved. Most of the ration shopkeepers keep fake ration cards with them. Due to fake ration cards, the dealer receives the extra ration from higher govt. authority and he sales it into the open market at higher price to earn some extra profit. Mostof the time people are not aware of the subsidized rates given by the government. So the dealer might sell ration at higher rates than recommended by the government or he might manipulate the entries of buy/sell register. Moreover, the quantity of ration that is being allocated might differ significantly from the actual allocated ration quota. The consumers will not be aware of the actual allocation of ration quota and the rates imposed to the ration items. In this way, in the current situation we are facing challenges because of malpractice and corruption in public ration distribution system. As of today, there is no effective digital system through which government can maintain and track online record of ration distribution among its citizens.

To overcome the drawbacks of current PDS, we would like to introduce a new concept that involves the use of Radio Frequency Identification Technique (RFID) & Internet of Things (IOT) to digitalize the ration distribution system. In this project we use AWS which may also refer to Cloud computing. Cloud computing acts as a storage database, and also provides many other services like OTP services. We use Mongo DB software to create the database. Mongo DB saves the data in group as a single document instead of saving it in tables of individual rows it is saved in JSON (JavaScript Object Notation) format. It is a lightweight data interchange format. It uses independent programming language. Hence itis a reliable format. We can make changes very easily the codes to create database are very simple to understand.

This system presents an efficient method for the consumerto buy the products in the ration shop. The consumer need to flash the Smart Ration Card (SRC) at the RFID reader. If the SRC is found to be authentic then a random One Time Password (OTP) is sent to the consumer's registered mobile number which has to be entered into the SRC system. If the correct OTP is entered the system shows the quantity of subsidized items allotted to the consumer. Also the quantity available at the FPS is displayed. After the purchase is validated by the employee the consumer gets a text message mentioning the purchase details. The government database is updated immediately after every transaction made by the consumer.

2. LITERATURE SURVEY

RFID technology emerged some time back and was not used that much because of lack of standardization and high costs. Latest technologies have brought costs down and standards are being developed. Today RFID is mostly used as a medium for numerous tasks including managing supply chains, tracking livestock, preventing counterfeiting, controlling building access, and supporting automated checkout. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped withsets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits by Y.A. Badamasi [1].

The main purpose of this work is in reducing the queuing delays in major supermarkets or other shopping centers by means of an Electronic Smart ration System which will introduce an intellectual approach to billing process through RFID technology by Yerlan Berdaliyev, Alex Pappachen James[2].

RFID based automatic ration shop is novel approach inpublic distribution useful for more efficient, accurate, and automated technique of ration distribution. Public distribution system also called rationing distribution system is one of the widely controversial issues that involve malpractices Shelar, Mahadev S. Patil [3].

Passive tags are more commonly used then active tags for retail purposes, because oftheir lower price and smaller size. A passive tag consists of a microchip surrounded by a printed antenna and some form of encapsulation, plastic laminates with adhesive that can be attached to a product or a small glass vial for implantation. The tag reader powers and communicates with passive tags. The tag's antenna conducts the process of energy capture and ID transfer. A tag's chip typically holds data to identify an individual product, the product model and manufacturer by Bichlien Hoang, Ashley Caudill [4].

Discusses a system in which RFID tag is used that carries family member details and the customer needs to show this tag at the ration shop. The quantity available to consumer is displayed on display. The user authentication is done using thumb impression on the biometric machine. The information about the delivered ration is sent directly to government and consumer via SMSP by Anshu Prasad, Aparna Ghenge, [5].

Another system uses RFID tag that carries the family member details and the customer needs to show this tag to the RFID reader. The microcontroller connected to the reader checks for the user authentication. If the user is found authentic then the quantity of ration to be given to the customer according to the total number of family members is displayed on display device. They claimed that this smart ration card is free from theft as the information about the delivered ration is sent directly to the government without. manual feeding using Global system for Mobile Communication (GSM) technique by Mohit Agarwal, Manish Sharma [6].

Order to overcome problems present current PDS the consumers were provided with smart ration cards. The consumer can buy whatever he wants by just flashing the ration card at the RFID reader at the ration store. The user authentication is done by sending a random password text to the user's mobile which has to be entered in a keypad by K. Bala Karthik [7].

In this system the smart ration card is given to consumer in form of RFID tag. After scanning the card he user is needed to enter the quantity of the items. Along with RM7 processor they used Solenoid valve in kerosene dispenser and DC motor in grain dispenser. They stated this project would create the transparency in Public Distribution System (PDS) as the work becomes automatic by Abdul H. Ansari, KetanG. Badgujar [8].

RFID based automatic ration distribution system is an approach in public distribution system useful for more efficient, accurate and automatic technique of ration distribution. The present ration distribution system has drawbacks like inaccurate measurement of goods, low processing speed, large waiting tine and material theft. In this paper proposed system is based on RFID and the proposed system replaces the manual work in ration shop Kumbhar Aakanksha , Kumavat Sukanya[9].

Ration Card is one of the important documents for every Indian family. Every family is given facility by government to receive food grains against a card. But there is lot of corruption involved in TPDS such as black marketing of the subsidized food grains as many families do not claim their quota of food grains and many families claim the quota of other families. As a solution to above problems this paper proposes a system which is highly scalable Ration Distribution System based on embedded system by Neha Sharma, Ayushi Gupta,Vinod Ghadge[10].

Arduino

Fig. 1. Arduino Mega 2560 board.

The arduino microcontroller board with Atmel microcontroller is used as the main processing unit of the smart ration card system. The Arduino is an open source prototyping platform. People with knowledge and skills can use the Arduino board to process input from different sensors and output the processed data into different motors, displays, speakers or other electrical devices. Arduino board designs use a variety ofmicroprocessors and controllers. The boards are equipped withsets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.

RFID Technology

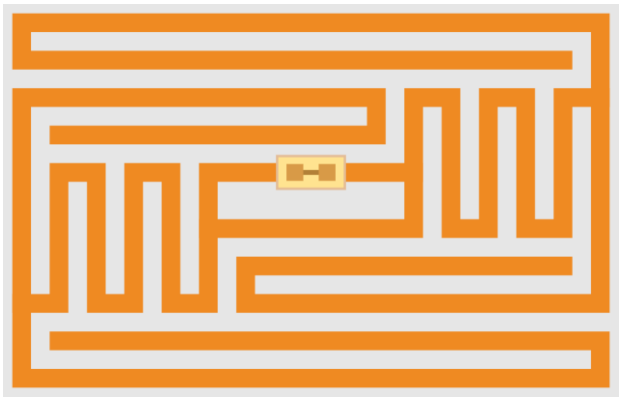

Fig. 2. A passive RFID tag .

Radio-frequency identification (RFID) technique uses electromagnetic fields for automatic identification and tracking of tags attached to various objects. The information intags is electronically stored. To track products in a manner similar to using bar codes for product identification RFIDtechnology can be used, but RFID also carries some additionalbenefits. Unlike barcode readers RFID does not require line of sight to read the tag, has a longer read range than bar code reader, and tags can store more data than bar codes. RFID readers can be used to simultaneously communicate with multiple tags.

RFID tags are of two types, active tags, which contain an internal power source, and passive tags, which obtain power from the signal of an external reader. Passive tags are more commonly used then active tags for retail purposes, because of their lower price and smaller size. A passive tag consists of a microchip surrounded by a printed antenna and some form of encapsulation, plastic laminates with adhesive that can be attached to a product or a small glass vial for implantation. The tag reader powers and communicates with passive tags. The tag's antenna conducts the process of energy capture and ID transfer. A tag's chip typically holds data to identify an individual product, the product model and manufacturer.

Wi-Fi

We are using another important technology in our system called as Wi-Fi. Wi-Fi is a technology for wireless transmission of data. It is based on the IEEE 802.11 standards.Devices such as personal computers, video-game consoles,phones and tablets, digital cameras, smart TVs, digital audio players and modern printers use the Wi-Fi technology. Using Wi-Fi access point or wireless local area networks the Wi-Fi compatible devices can connect to the Internet. A Wi-Fi access point has a range of about 20 meters (66 feet) indoors and a greater range outdoors. Most commonly the Wi-Fi technology operates on the 2.4 gigahertz UHF and 5 gigahertz SHF radio bands. We are using Wi-Fi shield for connecting the system to AWS.

A. Software Tools

a. MongoDB
It is a free and open-source cross-platform document-oriented database program. Classified as a NoSQL database program, MongoDB uses JSON-like documents with schemas. It is developed by MongoDB Inc., and is published under a combination of the GNU Affero General Public License and the Apache License.It supports field, range queries, regular expression searches. Queries can return specific fields of documents and also include user-defined JavaScript functions. Queries can also be configured to return a random sample of results of a given size. Fields in a MongoDB document can be indexed with primary and secondary indices.

b. RoboMongo
It is a visual tool which helps to manage DatabaseMongoDB. It is a part of free open source software supporting all of three operating systems: Windows, Linux, Mac OS.

3. EXISTING SYSTEM

In present situation, the consumer must buy ration using ration card from the ration shops. When get commodities from the ration shop, consumer need to submit the ration card and further sign in the ration card for record the details. In some ration shop instead of sign they will verify through biometric process and quantity of ration will depends upon the ration cardtypes. After the shopkeeper will issue the ration through weighting system with the help of human intervention. In such cases having drawbacks, firstly is weight of the commoditiser grains may be inaccurate in quantity because of human mistakes while

weighting the materials. Second is not maintaining data of dispensed materials details in the ration shop. The shop keeper will entries false or wrong data of dispensed materials. Making profit by selling materials at the market at high price.

4. PROPOSED SYSTEM

A. FLOW CHART

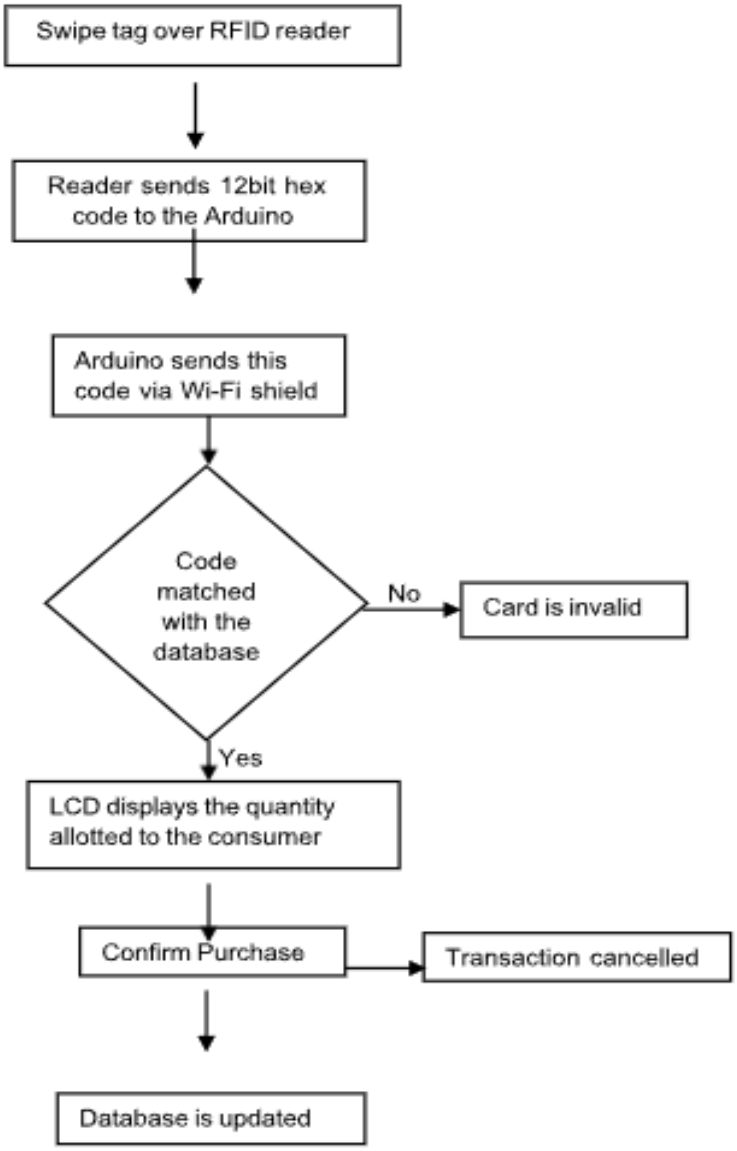

Fig. 3. Flow Chart of Smart Ration Card System

When RFID tag is swiped over the RFID reader module, the reader reads the information from the module and the unique 12bit hex code is accessed. This unique code is then matched with the database and if the consumer's information is found inthe database then the quantity of the ration allotted to the customer is displayed on the LCD display. The purchase has to be confirmed using the keyboard. After confirming the purchase the database is updated.

5. WORKING

A. Input

When the Smart Ration Card in the form of RFID tag is swiped over the RFID reader the reader transmits the unique 12bit hex code of the tag to the Arduino. The RFID reader generates electromagnetic waves and radiates them. When the tag comesin contact with these waves, some part of the waves containing unique hex code is reflected back to the reader.

B. Processing

Processing work is done by the Atmel Atmega 2560 microcontroller present on the Arduino. Arduino matches the hex code scanned by the reader with the database. Arduino is connected to local server via Wi-Fi. The database contains all the information about consumers such as the quantity of subsidized items, current subsidized rates etc.

C. Displaying Information

The 20x4 LCD is used for displaying the information to the consumer. If the consumer is found to be authentic then the items and quantity available to the consumer with their rate is displayed on the LCD display.

D. Data Input

A 4x4 keypad is used for entering required data in the system. In the final step the consumer have to confirm the purchase using the keypad. After the purchase is confirmed the FPS owner handovers the ration content to the consumer. Subsequently the database is also updated.

6. EXPERIMENTAL RESULTS

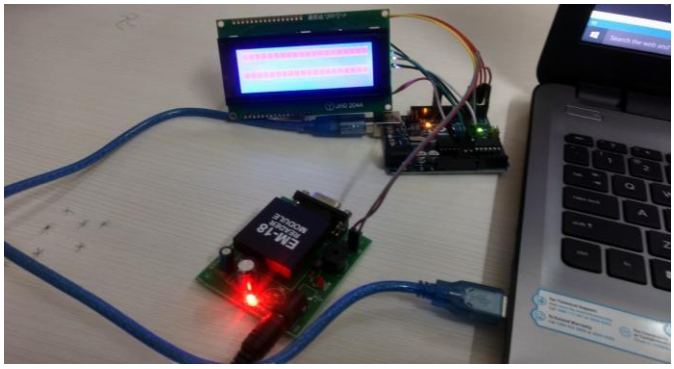

Fig. 4. Smart Ration Card System in Development

The Smart Ration Card system we are working on is shown in fig. 5. Till date we have successfully interfaced 20x4 LCD, RFID reader, Keypad and Wi-Fi module with Arduino Mega 2560.

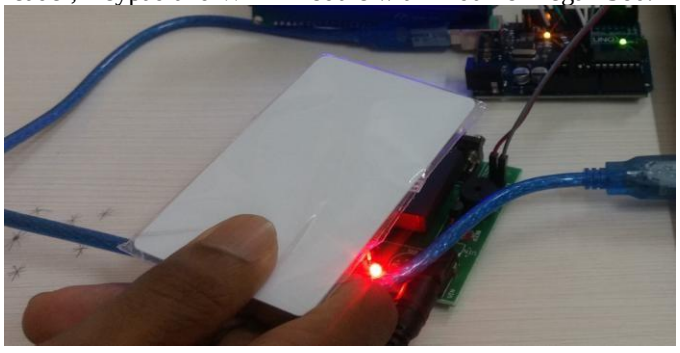

Fig.5. A Passive RFID tag being swiped over reader

The fig. 5 shows a RFID tag being swiped over RFID reader module. We are using passive RFID tags here, if required active RFID tags can also be used.

Fig. 6. Consumer number and name getting displayed

After the microcontroller finds the user is present in database consumer number and consumer name is displayed on LCD. Fig. 6 shows the LCD screen showing consumer information.

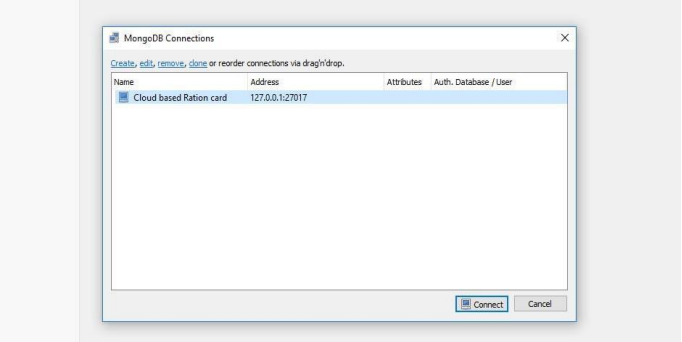

Fig. 7. RoboMongo Connection

Fig. 7 shows the screenshot of RoboMongo interface with a database called as Cloud Based Ration Card. The RoboMongois used to create database in MongoDB. The JSON format is used to write the documents in the database.

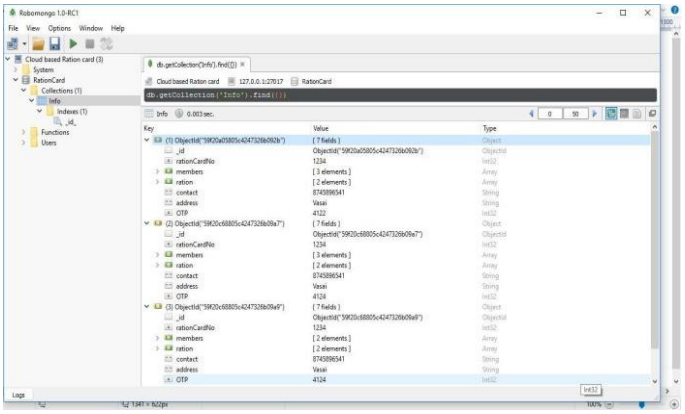

Fig. 8. RoboMongo Database

Fig. 8 shows screenshot of the database we have created using RoboMongo. It consist of consumer information. It has various fields such as id, ration card no, family members,ration content, contact and address. More users can be added easily in this database whenever required.

7. CONCLUSION

The Smart ration card system proposed in this paper uses RFID technology and Cloud services. This system successfully eliminates the errors due to manual monitoring of ration data as all the data is automatically updated in the cloud based database. Also this system will enable the government to keep track of the consumers and their transactions. Although the system will reduce the security issues and malpractices present in the current PDS the starting cost of the system is high. To access the database and authentication of user requires internet connectivity which can be a problem in remote locations.

8. FUTURE WORK

To further enhance this proposed system we can also develop aweb interface where consumers can log in and check their pasttransactions. This system helps to keep track of ration content but the weighing of the content is still manual. To avoid human errors in the weighing of ration content we can add mechanical devices to automatically measure the ration content requested by the consumer.

9. REFERENCES

[1] Y.A. Badamasi, "The working principle of an Arduino", in Electronics,Computer and Computation (ICECCO), 11th International Conference on Information Communication Embedded Systems, pages 1–4, 2014.

[2] Yerlan Berdaliyev, Alex Pappachen James, " RFID-Cloud Smart Cart System", IEEE Intl. Conference on Advances in ComputingA Communications and Informatics (ICACCI), Sept. 21-24, 2016.

[3] Vinayak T. Shelar, Mahadev S. Patil , "RFID and GSM based Automatic Rationing System using LPC2148", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 4Issue 6, June 2015

[4] Bichlien Hoang, Ashley Caudill, "RFID", IEEE Emerging Technology Portal, 2006 - 2012.

[5] Anshu Prasad, Aparna Ghenge, Sonali Zende, Sashikala Mishra, Prashant Godakh, "Smart Ration Card Using RFID, Biometrics and SMS Gateway", IEEE International Conference on Inventive Communication and Computational Technologies(ICICCT), 2017

[6] Mohit Agarwal, Manish Sharma, Bhupendra Singh, Shantanu, " Smart Ration Card Using RFID and GSM", IEEE 5th International Conference- Confluence The Next Generation Information Technology Summit, 2014

[7] K. Bala Karthik, "Cloud-Based Ration Card System Using RFID And GSM Technology", International Journal of Engineering Research & Technology (IJERT), Vol. 2 Issue 4, April – 2013

[8] Abdul H. Ansari, KetanG. Badgujar, Monali R. Rathi, Shital R. Tambe, "Automation in Rationing System Using GSM and RFID Technology", International Journal Of Engineering, Education And Technology, Volume 3, Issue 2, 2015.