



# Automated Ration System with Database Management

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**Abstract**— Public Distribution System (PDS) is one of the largest poverty alleviation programs in India. Its primary objective is to provide essential commodities at subsidized rates to the poor people. Basic commodities such as rice, wheat, kerosene are distributed through fair price shops (FPS), which involves a lot of manual work. Also there is no any proper record of the distribution of the products. As FPS involves manual work there are a lot of illegal activities taking place. As a result distributors are free to mark invalid entries, to supply inadequate goods to customers. The beneficiaries are unaware of the availability of the ration and due to this they need to stand in queue for hours to collect the ration. This project focuses on smartening of the conventional ration distribution system. The current complicated system is replaced with an online database management system. The cloud server will keep all the records of the customers as well as the distributors. There is a machine like automated teller machine (ATM) provided at each FPS, which is used to distribute the ration to users. RFID card is used to identify the user. The complete transaction of ration distribution is done through a microcontroller based system. Hence the beneficiaries can get allotted ration at proper price and at proper quantity. FPS's stock details are also monitored by an admin. The users will be notified of the availability of ration and a certain group is convoked to collect the ration. This project will help to digitize the conventional ration distribution system and will bring transparency in PDS.

**Keywords**— PDS, ration, RFID, GSM, fingerprint, GUI screen, SQL database management.

## I. INTRODUCTION

Public distribution system (PDS) is food security and food distribution system formed by the Government of India for providing food grains at affordable rates to poor section of population in the country. The system is jointly managed by central and state government. PDS intend to provide the basic food grains i.e. wheat, rice, sugar and kerosene oil to beneficiaries at subsidized rates. In this system, central government purchase the grains directly from farmers at minimum support price and forward required stock from FCI buffers to state government at central issuing price, state government which actually manages PDS at ground level may add state benefits in its area.

The amount of ration and its price depends upon type of card i.e. APL (Above Poverty Line), BPL (Below Poverty Line) & AAY (Antyodaya) card. Government agencies decide card type for a family depending upon family income and region. Ration card contains family details and purchase history. It is also considered as a proof for identification and residence of an individual. Amount of ration to be allocated depend upon number of members in family. The rate varies according to type of card. APL (group B) card (orange color) is issued to the people having income greater than 50,000 and commodities are provided to them per family member at subsidized rates as shown in table 1. BPL (orange color) card is issued to the people who satisfy BPL criteria set by Govt. of India, and commodities are allocated to them per family member as shown in table 1. For baseless people the government has started Antyodaya scheme and yellow card is issued to them. And commodities are allocated to them per ration card as shown in table 1.

TABLE 1 Ration card types and allotted ration

Type of Card	Commodity	Ration per Member	Price(₹)
APL	Wheat	3 Kg	2
	Rice	2 Kg	3
	Kerosene	1.5 lit	14
BPL	Wheat	3 Kg	2
	Rice	2 Kg	3
	Kerosene	1.5 lit	14
AAY (per card)	Wheat	21 Kg	2
	Rice	14 Kg	3
	Kerosene	5 Kg	14

In the current system fair price shop works at ground level to distribute the ration to beneficiaries. The current ration distribution is totally based on manual work. To get the monthly ration one need to submit the ration card, the details of purchase like amount and total price along with date are entered in the card and in the purchase register of distributor. This manual system has two drawbacks- the ration given to customer may be inaccurate in terms of weight because of error introduced by human involvement and secondly, if the beneficiary does not buy the materials for any month,

the distributor may sell remaining stock to open market retailers at higher rates without any prior intimation to higher authorities, and get self-benefited by doing fake entries in the register.

According to the survey done by Planning Commissioning of India [6], PDS is not completely effective in fulfilling the required demand of increasing population. The current system is more biased towards the developed regions and is unable to reach at each and every segment of country. The system does not have access to regions that are under-developed which in turns unequal growth rate in country. In present implemented system it is difficult to check validity of issued card, whether a card is bogus or genuine. Also there is no monitoring at ground level i.e. at fair price shops; dealer may to convert the good quality grains received from F.C.I. stock with inferior quality. Dealer is free to make fake entries in register and sell the remaining stock in open market.

The major drawbacks of the currently implemented system can be overcome by introducing automation at every level of the system. The proposed system in our project which will help the government authorities to monitor the flow and ensures that any other gets benefited except the needy ones

The system uses smart cards instead of traditional ration cards and thumb scanner for authentication with the help of microcontroller. This ensures that right person receives correct amount of allotted ration.

With the help of online database system the distributors won't be able to alter the records of stock and customer details, as new entries can only be done through a central administrative authority which monitors stock flow of distributor through a database at server side. Users get notified through SMS about ration distribution timing and details of ration they have received.

## II. LITERATURE SURVEY

Shubham Mahesh Wari, Mukesh Tiwari [1] proposed a Smart Public Ration Distribution System. They have used RFID cards for authentication and OTP for security of user. An OTP is sent to user with the help of GSM (SIM900). They have managed user database using MS-SQL DBMS. The whole system is built around ARM7 microcontroller i.e. LPC2148 (works on 32 bit ARM instruction set).

Sana A. Quader Peramapalli, Dr. R. R. Dube [2] presented a Smart Card e-Public Distribution System. In which smartcard, fingerprint authentication, and UID number (AADHAR) is used as user's identification is. UID number is entered using keyboard and LCD is used as display device. They have provided the facility of online payment with the help of user's account details. The system is built around ARM7 Microcontroller.

A. N. Madur, Sham Nayse [3] worked on Automation in Rationing System using ARM7. In this system, user is authenticated from database using RFID card and

password. The proposed system is provided with online payment facility, automatic distribution of goods using ARM7, weight sensor and valve. After the transaction customer's account will be updated and an update notification will be sent to customer's mobile number through GSM module.

Kumbhar Aakansha, Kumawat Sukanya, Lonkar Madhuri, Mrs. A. S. Pawar [4] worked on Smart Ration Card System Using Raspberry-pi. The proposed system uses Raspberry-pi to compare user number stored in My-SQL database with scanned smart card number. After successful authentication the user enters required values through keyboard and after transaction, all details of transaction will be sent to user's registered mobile number through GSM module and the database will be updated accordingly.

R. Yuvasri, Mrs. R. Sudha, A. Vithya, V. Arthi, K. Thamarai Selvi presented a Smart Rationing System [5]. The proposed system contains user identification using smart card, LCD as display device to display customer name, account details etc. The whole system is built around PIC microcontroller. An update message will be sent to customer through GSM.

## III. PROPOSED SYSTEM

### A. System architecture

The proposed system is basically divided into two subsystems- the server and the distribution machine. The distribution system is an ATmega328/P based embedded system which is used for user authentication, validation and notification. The server will keep all the records. It also manage some activities such as user identification, updating of the database. The admin can login into the system to access the server data. The complete block diagram of the system is illustrated in fig. 1.

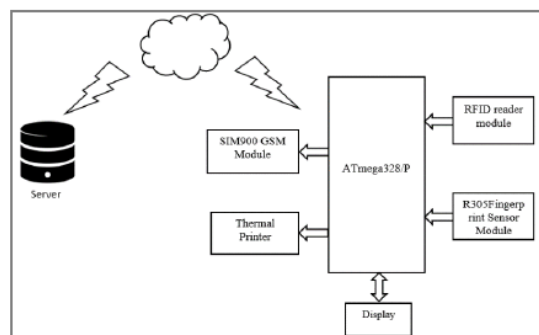


Fig. 1 System block diagram

Initially all ration customers need to register at FPS of their region. The FPS distributor will take registration and forward it to higher authority for verification along with necessary documents. The registration consists of collecting personal information such as number of persons in family, income, contact number, fingerprint of all members etc. After the registration each family is

provided with a smart card of unique number which will be used to purchase the ration.

Smart card is basically a RFID (Radio Frequency Identification) card. Here passive RFID card is used. The EM18 reader module is used to read these RFID cards. These cards consists of small antennas and are capable of accumulating approximately 2000 bytes of data. The Reader module continuously transmitting 125 kHz electromagnetic waves. Antenna inside the cards is power up and reflect these EM waves. When card is brought near to the reader module a unique 12 digit hexadecimal number is read by the reader module. This unique number is used to identify the customers.

Only the members of family are allowed to collect the ration. To ensure this fingerprint authentication is used. The authentication process involves fingerprint scanning and fingerprint matching. After scanning of fingerprint the microcontroller will compare the fingerprint with the stored fingerprints in the database. This is very important because it assures that the allotted ration will be reached to only to family members.

The SIM900 GSM module is used to send an SMS of successful transaction and notification. Thermal printer is used to print slip after transaction.

R305 fingerprint sensor which has an in-built buffer to store image template file in the RAM space of module. The fingerprint template data is stored in this buffer with a unique number assigned to each. Both enrollment and matching of fingerprint data can be done through this device. For enrollment one need to enter its fingerprint twice, a template will get generated after processing both data and gets stored in the buffer of module. Matching involves comparison of scanned fingerprint template with stored templates, this can done be to validate i.e.1:1 (one to one) or to find record in database i.e.1: N (one to many).The stored template can be assigned with an unique number at the time of enrollment. System will return the same unique number if template is found in its records. This unique number is retrieved from SQL database to authenticate the user.

## B. Flow chart

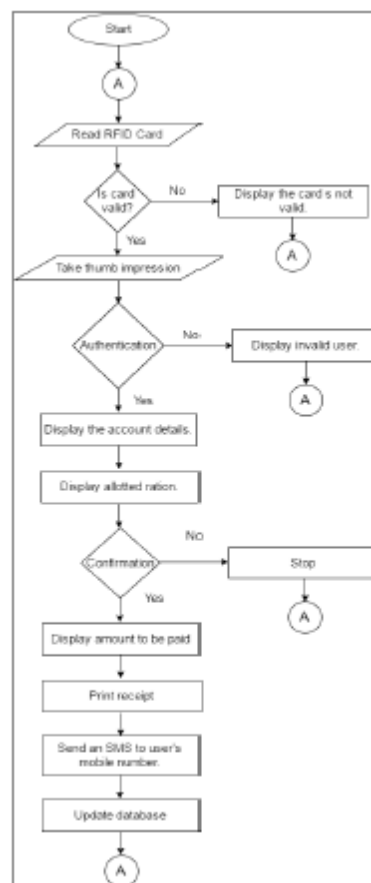


Fig. 2Flow chart

To collect the monthly allotted ration, each user has to scan his smart card. User can also use their card number.

The microcontroller will compare the card number with the database and if record found then the system will ask for user's thumb impression. The server will fetch all fingerprints of respective family members. The scan fingerprint is compared with the fetched fingerprints. If match found then the allotted ration is displayed. If the user continue then the amount to be paid is displayed. After successful transaction a confirmation an SMS sent to registered mobile number. A receipt is printed which contains information of allotted ration, amount and the name of the person who has collected the ration. The database is updated accordingly.

## C. Website Architecture

The website consists of three different levels of login

1. User login
2. Distributor login
3. Admin login

The Website acts as a bridge between the server and these three levels.

User can login into his account to see the collected ration details. User can also request to make changes in his account details to distributor through his login.

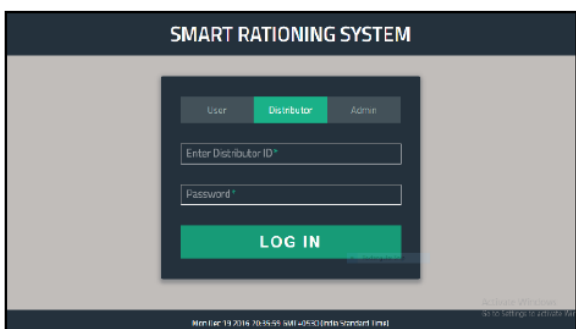


Fig. 3 Website Interface

Distributor login is involved in following activities:

- Send an SMS notification to collect the ration.
- Make registration of new family.
- Modify user details.
- Check stock.
- Read admin notifications.

Admin login is involved in following activities:

- Monitor ration stock of distributors.
- Decide commodities.
- Decide card type wise amount of allocation of ration.
- Decide cost.
- Approve request to add new user.
- Add new distributor.

#### D. Distribution machine interface

The system interface is based on Android API 16 (application programming interface). It has an UI similar to that of an ATM machine. The interface is also designed in regional languages. This simple UI is used for authentication as well as to complete the transaction of getting the ration.



Fig. 4 Welcome screen

Fig. 4 shows the welcome screen of the distribution machine. This is the starting screen of the machine. The user need to scan smart card to the RFID reader provided on the machine. Then RFID reader will verify that card. User can also use virtual keyboard to enter the card number.



Fig. 5 Thumb scanning

After verification of the smart card the system will ask for the user's thumb impression. The purpose behind this biometric verification is to ensure that only family members can get the ration. The thumb impression will be compared with thumb impressions of all family members of that family.

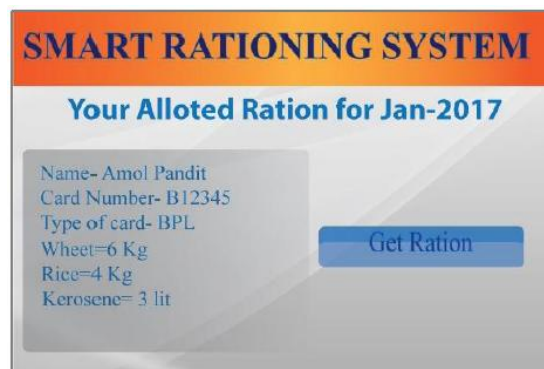


Fig. 6 Allotted ration

When the fingerprint authentication is successful, monthly ration for that card will display. This includes details of commodities along with its quantities. The user can get the ration by touching 'Get ration' button.



Fig. 7 Transaction completed screen

#### IV. CONCLUSION

Using the proposed system we can bring transparency at each level of the rationing system thereby eliminating problems such as goods theft and black marketing to a greater extent. This user friendly system would enable the users to know their exact allotted ration of the month. The remaining stock of distributor would be monitored by admin which will get subtracted from allocated ration for next month; the new entries will get verified from higher authorities. Hence the distributor is totally confined to his job provided by higher authorities only. The SMS notification would bring reliability for customer as they will come to know the ration arrival and delivery time slot through it.

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