

SMART RATION DISTRIBUTION SYSTEM USING RFID

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Abstract- Public distribution system also known as ration distribution system is considered a gaping contentious issue that involves corruption and illegal smuggling of commodities. With no distinctive technology concerned for automation of the task, all the tasks are hand-operated by FPS (Fair Price shop) agent and hence inviting irregularities in the system. There might result in the situation where a beneficiary is sold partial commodity entitled to him with the undistributed commodity directed to open market by FPS agent for his personal profit. In this paper, we propose a system that substitute the hand-operated tasks in ration distributed system with automated system that requires an installation at all the FPS which can be done with simplicity. In the proposed system we replace ration card with smart card. RFID tag holds a unique ID that is issued for all the BPL bearers. For authentication we use RFID (Radio Frequency Identification) based Smart Card and the Biometrics (R303A). To keep the government incorporated in the process, we suggest connecting the system installed at FPS to the centralized database supervised by the government and hence establishing direct communication between beneficiary and government.

Keywords - RFID Reader, Smart Card, Biometrics (R303A), Public Distribution System, Fair Price Shops, BPL Card, AAY Card.

INTRODUCTION

Prasanna Balaji.R[1] says, the history behind introduction of the PDS in India is rooted in famines and food scarcities during the entire period of British colonial rule in India. S.Sukhumar, K.Gopinathan, S.Kalpanadevi, P.Naveenkumar, N.Suthanthira Vanitha[2] Says, India's Public Distribution System (PDS) with a network of 4.78 Lakh Fair Price Shops (FPS) is perhaps the largest retail system in the world. Major problems due to this system are the inefficiency in the targeting of beneficiaries and the resulting leakage of subsidies.

In this division, we present a concise introduction to Ration distributed system using Smart Card. Ration distribution an initiative by the Government of India under Ministry of Consumer Affairs, Food and Public Distribution intend for the distribution of commodities to destitute at fair price. In the projected system we use RFID Technology. One of its parts, a RFID tags hold a unique ID is issued to all the BPL card bearers. Here RFID tag (Smart Card) and the biometrics serves the purpose of authentication. Information and the fingerprint impression of the head of the family and one of the family members are cached in the centralized database whose access is only legitimized for a government authority. The first of the two authentication steps needs the beneficiary to swipe the Smart Card against RFID Reader installed at the FPS and the second step towards an authentication is that he/she should scan the fingerprint of his/her thumb against biometric. On matching his/her fingerprint with the id stored in the device, an appropriate fingerprint id interface with database to checks for valid beneficiary's information. Once authenticated, updated information is obtained by automated ration system concerning the existing subsidies for the beneficiary onto the main interface. A beneficiary is permitted to take only those subsidies on products apportioned to him/her by government according to the available database inventory. After every transaction made by the beneficiary, centralized database is immediately updated and he/she will be sent a SMS (Short Message Service) specifying the quantity of commodity bought by him/her. With implementation of the projected system prime issues like bribery, uneven distribution and other difficulties faced by beneficiary can be terminated.

EXISTING SYSTEM

The present PDS works in a multiple level where the responsibilities are shared between centre and state. The task of procuring or buying food grains such as wheat and rice at minimal cost is the responsibilities of centre. Allocation of the grains to each state in carried out by centre. While the state government are responsible for the identification of household eligible to avail the facilities. The process runs as follows, the grains are transported by the centre to every state's central depot, after which the allocated food grains are delivered to respective FPS through state government. Finally FPS being the end point sells the entitled commodities to beneficiaries.

In the existing system, tasks like product distribution, Ration Card entry, product weighing and delivery of the product are carried out manually by FPS agent. However a present system has diverse drawbacks involved, developing irregularities in the system. Some of the irregularities include replacing actual products dispensed by the government with meager quality products and supplying the same for the beneficiaries, diverting food grains to open market to make profit, false entries in the stock registers that FPS agent needs to maintain and false announcement of deceit in food grains.

PROPOSED SYSTEM

Rahul J. Jadhav and Dr.Pralhad K. Mudalkar[3] proposed, the smart card based system in which report integrates the idea to automation instead of manually manage public distribution system. The manual preservation of records for issuance of food grains at the Fair Price Shops aids in creating an encouraging environment for the FPS owners to disclose in malpractice. As a result, this new e-PDS system can reduce the possible errors created by human and provide accurate information of public distribution system at any point.

The proposed system replaces the manual work in FPS. The prime objective of the designed system is the automation of FPS to provide transparency. The proposed automatic FPS for public distribution system is based on RFID technology and biometric authentication technology that replaces conventional ration cards. The RFID tags are issued to a beneficiary instead of conventional Ration Cards. Beneficiary's information along with the finger print impression of the head of the family and one of the family members is stored in the centralized database which is only updated or accessed by the government authority. Beneficiaries have to scan the RFID Smart Card against RFID reader after which he/she should scan the fingerprint of his/her thumb against biometric, and then an appropriate fingerprint id checks for valid beneficiary's information in the database, after successful verification of the beneficiary, information is fetched onto the main interface, and beneficiary needs to enter type of commodity as well as quantity of commodity using keypad. After delivering proper commodity to him/her, the beneficiary is sent the SMS (Short Message Service) about the commodities bought by him. The below mentioned figure 1 demonstrate the flow of the system.

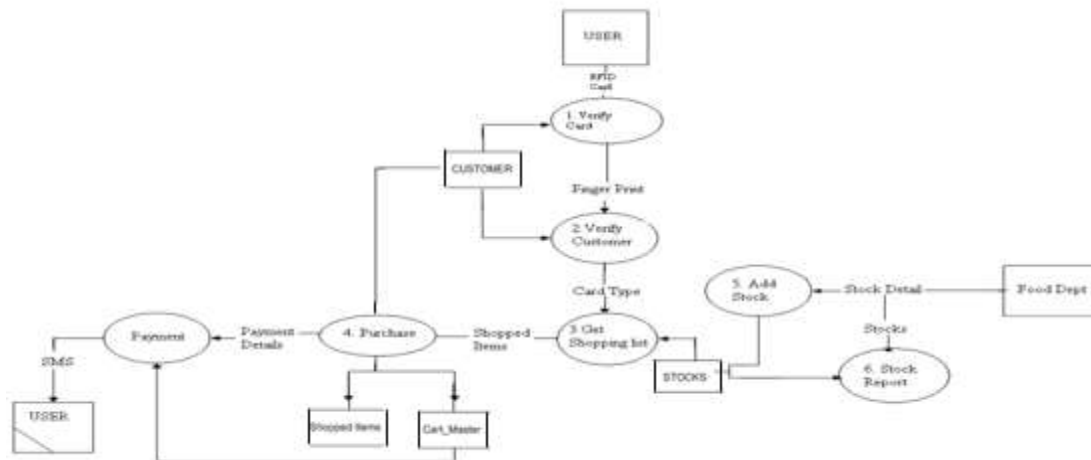


Figure 1: Dataflow diagram

ARCHITECTURAL DESIGN

Architectural design consists of six components such as beneficiary, RFID reader, biometric verification, monitor and database. On arriving to FPS with the valid Smart Card entitled to him/her, a beneficiary is validated using two ways authentication, that is, first step includes swiping the smart card against RFID reader. And scanning the thumb against a glass plate of a biometric device is the second way of authentication. The corresponding Finger print id functions fetching the beneficiary's data from the database. The figure 2 represents architectural diagram of smart ration distribution system.

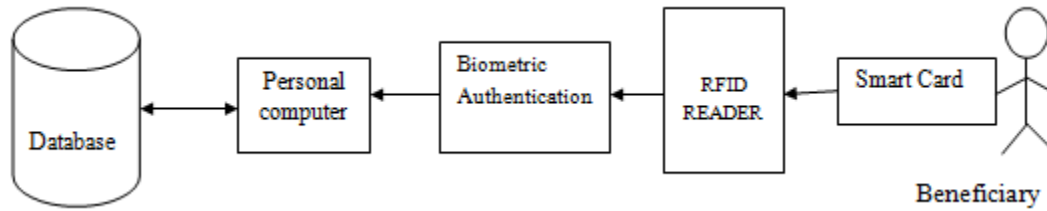


Figure 2: Architectural Diagram

METHODOLOGY

Following are the modules used by the system

I. Login Module

[A. Conklin](#), [G. Dietrich](#), [D. Walz](#)[4] says, The concept of a user id and password is a cost effective and efficient method of maintaining a shared secret between a user and a computer system.

In this module, the system registers beneficiaries details that includes their name, address, fingerprint, date of birth, age, contact number for sending SMS alerts, count of family members and category of the card to which the family belong, with all the information being uploaded in the database.

II. RFID Card Verification Module

Mandeep Kaur, Manjeet Sandhu, Neeraj Mohan and Parvinder S. Sandhu[5] says, Radio frequency identification (RFID) is a generic term that is used to describe a system that transmits the identity (in the form of a unique serial number) of an object or person wirelessly, using radio waves. Kashinath Wakade, Pankaj Chidrawar, Dinesh Aitwade [6] proposed a system in which a simple PDA device with RFID tag used as an e-ration card in place of a standard ration card. This PDA device is similar to the ticketing machine used by bus conductor and the e - ration card is similar to swipe card. The user has to use this card instead of a book of ration card to get ration from the dealer.

RFID being a part of Automatic Identification and Data Capture (AIDC) technologies is considered to be a fast and reliable means of identifying objects. RFID based Smart Card verification module consists of two prime components, they are interrogator and transponder. The interrogator (RFID Reader) is needed to broadcast the signals through its antenna and the transponder (tag) will be activated after it receives the signals from the interrogator. Figure 3 gives the pictorial representation of RFID technology.

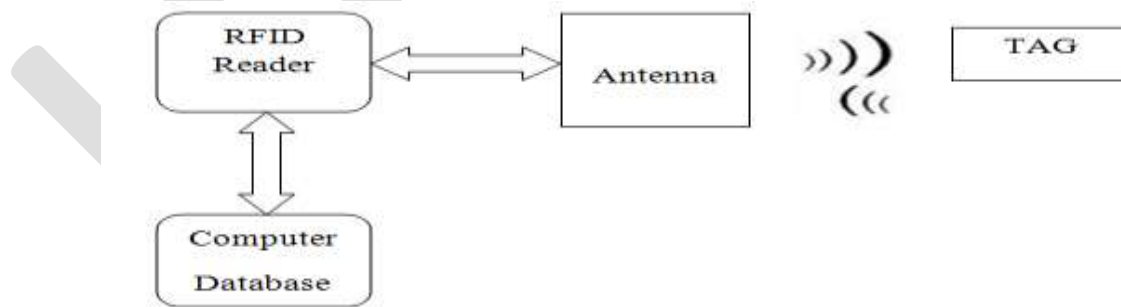


Figure 3: RFID based Smart Card verification

It operates as follows:

- The RFID reader sends a broadcast signal to detect the RFID tag (Smart Card).
- Data stored within an RFID tag's microchip is read.
- RFID reader's electromagnetic energy should be received by tag's antenna.
- Using the power harvested from the reader's electromagnetic field, the radio waves are sent back to the reader by tag.
- The reader picks up the tag's radio waves and interprets the frequencies as meaningful data.
- This data is then matched with the database and then beneficiary's information is displayed on the screen.

III. Biometric Verification Module

Anil K. Jain, Arun Ross and Salil Prabhakar[7] says, Biometric recognition or, simply, biometrics refers to the automatic recognition of individuals based on their physiological and/or behavioral characteristics. Prasanth. R, Balamurugan. V, Roubavaan. S, Suresh. E, Purushothaman. N[8] proposed, the system which is mainly focuses on security system which is provided by using fingerprints for a family card that has been used to the Civil Supply Corporation.

The fingerprint scanning system has two processing steps. Firstly, it enrolls the fingerprint, where it gets an image of the thumb, and finally performs matching, later it determines if the pattern of ridges and valleys in the image are matched with the pattern of ridges and valleys in pre-scanned images. The scanning process begins with a beneficiary placing his/her thumb on a glass plate, where a CCD camera takes a picture. The **charge coupled device (CCD)** system actually generates an **inverted image** of the finger, with darker areas representing light that is more reflected (the ridges of the finger) and lighter areas representing light that is less reflected (the valleys between the ridges). When the processor obtains the image that is crisp and properly exposed, it proceeds for comparing the captured fingerprint with fingerprints stored in database. After verifying the valid beneficiaries, the system will provide access to their ration account.

IV. Purchase Module

Dhanoj Mohan, Rathikarani Gopakumar [9] says, we are automizing the distribution system at the ration shop as well as we are maintaining the database at one main control station and updating the database so that the shopkeeper do not cheat the poor people. A.N. Madur, Sham Nayse[10] Says, User have to enter the amount of Kg he want to withdraw. System checks his account. If the user will have sufficient balance to withdraw the current amount, system will open the valve

Once authenticated, the beneficiary should select the list of commodity he/she wishes to purchase. The system displays the total quantity of the commodities and also the amount of quantity a beneficiary is permitted to buy. Once after he/she confirms the commodities, payment is done and beneficiaries are given a receipt in form of a SMS. A beneficiary is permitted to take only those subsidies on products apportioned to him/her by government according to the available database inventory.

V. Alert Module

Ka Ching Chan and David Tien[11] says, Direct interconnection with Mobile Network Operators (MNO) is a very high cost approach due to the high charges imposed by the MNOs. A GSM gateway provides mobile voice and SMS connectivity to the mobile carrier's GSM network.

A SMS gateway API serves the purpose of sending bulk messages to its users; here in this project it plays a role for intimating the beneficiary about the recent transaction made by him/her by sending him/her the message on his/her registered number.

VI. Stock Module

Dhanashri Pingale, Sonali Patil[12] Says, In this system they are storing the grains in the tank, and when the ration is inserted into the shop then that quantity is updated in web server.

The food department will send the stock to the respective distribution centers and also automatically update the stocks of the respective distribution center in the database. In this module the system maintains the details of incoming stock, distribution and remaining stock.

RESULTS

In this section, the snapshots below demonstrate various modules suggested where figure (4) corresponds to the FPS Agent login, Every agent is issued a unique user id and the password to login into a system installed at FPS, similarly figure (5) relates to the swiping of beneficiary's card against RFID Reader, Figure (6) represents biometric authentication which is fingerprint scanning, Figure (7) corresponds to the Main Interface which is displayed on user authentication. Figure (8), (9), (10) represents the website developed to serve the beneficiary where a beneficiary on logging in can obtain the shop details including the amount of stock remaining in the shop from the website with an additional option of administrator being able to add new shops details and update stocks in the shops.



Figure 4: Login Interface



Figure 5: RFID Card Verification



Figure 6: Fingerprint Verification

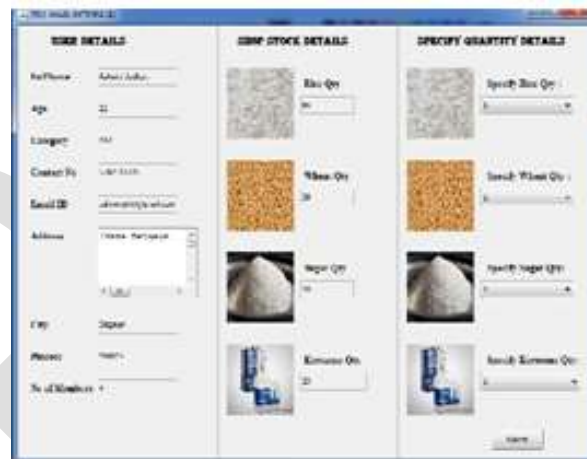


Figure 7: Main Interface

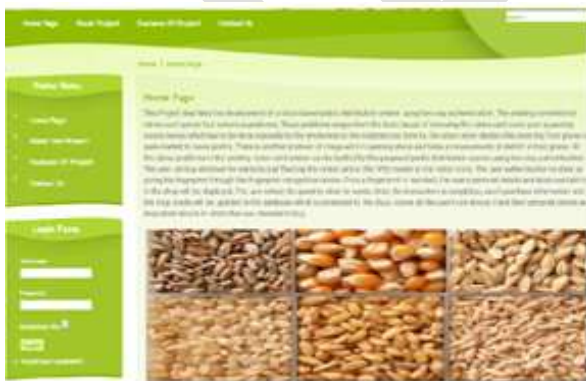


Figure 8: Home Page



Figure 9: Add shop Details



Figure 10: Add Shop details by beneficiary

CONCLUSION

Of the greatest challenges faced by the food distribution department is ration forgery. There are apparent chances that a FPS agent may involve in the process of ration forgery resulting in the various irregularities like fallacious entry of entry, partial distribution of the commodities entitled to beneficiary and directing the remainder to open market etc. The proposed system is more secure and transparent when compared with the normal existing system as the direct communication has been established between the beneficiary and government and hence forbidding the irregularities encountered. Using Smart Card one can avert entry of fallacious data in the ration database besides an auxiliary security is provided by the biometric authentication. In the proposed system, the FPS agent is only in charge of entering the quantity of the commodities, while updating and deducting is solely handled by the server (food department). Maintaining the database can be proven helpful in sending messages to the beneficiaries regarding the ration delivery. The proposed system is expected to be more guileless as it is anticipated to create transparency in public distribution system making the tasks automatic resulting in the system free from irregularities.

FUTURE WORK

- For better understanding, an interface and website can be made available in different languages (regional languages).
- For the ease of use, an application can be built for the same.
- Kiosk can be developed for the beneficiaries to check the commodities available.
- Automatic weighing system can be implemented at the FPS.

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