RATION DISTRIBUTED SYSTEM USING SMART CARD

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CHAPTER 1

INTRODUCTION

1.1 Overview

In the work presented here, a technique has been developed to read all the information from a centralized server automatically using the internet for computers. In the proposed system, every family will have a separate RFID (Radio Frequency Identification Device) card. These cards are magnetic and they will contain beneficiary’s information. Whenever a beneficiary gets the commodities from FPS (Fair price shops) all the transactions are recorded in the server. The system not only reduces the labor cost but also increases the accuracy and save some amount of time.

1.2 Introduction

The ration distribution system is established by the Government of India under Ministry of Consumer Affairs, Food, and Public Distribution to distribute grocery items to poor people at fair price [2]. The existing conventional ration card system has numerous problems. These problems ranges from the basic issues of renewing the ration card every year by pasting excess leaves which has to be done manually by the employees to the malpractices done by FPS dealers like diverting food grains to open market to make profits[4]. There is another problem of irregularity in opening shops and false announcements of deficit in food grains. By using this system the major problems like bribery, irregular distribution and other difficulties faced by the poor people are eliminated. Illegal activities in the FPS can be greatly reduced by this method. The distribution process is automated using centralized server and so the government facilities reach people properly. The corruption and bribery is the major problem in FPS which can be avoided using this system. The computerized database maintained avoids wrong entry of the product by the officials and provides authenticated transportation and distribution.
1.2.1 Challenges

- Analysis of TPDS has revealed several gaps in implementation.
- These challenges pertain to the inaccurate identification of households and a leaking delivery system.
- Expert studies have shown that PDS suffers from nearly 61% error of exclusion and 25% inclusion of beneficiaries, i.e. the misclassification of the poor as non-poor and vice versa.
- Another challenge is the leakage of food grains during transportation to the FPS and from the FPS itself into the open market.

1.2.2 Applications

- The ration items will be effectively delivered to the valid ration card holders who are below poverty line.
- The main advantage here is that the beneficiaries get their rightful entitlement in terms of quantity. What's meant for them cannot be diverted to the open market because of maintaining the database correctly.
- A common practice adopted by commission agents who run FPS is that they charge people more than the mandated rates, and they often under-weigh the commodities. But using this technique they cannot do so because each and every item will be having its own code and the price will be generated from that code and hence no overcharge can be done.
- The government services are reached to poor people effectively and also the corruption in PDS and FPS can be reduced or avoided to a great extent.

1.3 Problem Statement

Ration Distributed (Food Distribution) system using RFID based Smart Card along with biometric authentication that is fingerprint of Ration Card holder. Every time ration is collected by the family it is logged into the Smart Card. The data logging system is connected with cloud...
to maintain a centralized inventory across the nation. Biometric data of one member of the family is also logged in the card. Every time before ration collection, the authorized person needs to go through the verification phase. Once verification is done, quantity that he collects is also logged into the system.

1.4 Objectives

The objective of the project is to automate the task of distribution of items efficiently. The project is aimed to stop corruption and discrepancies created in distribution shops. Here the system must perform the following.

- Validate the ration smart card of the beneficiaries.
- Validate the right beneficiaries.
- Avoiding irregularities in distribution of grains.
- SMS notifications on the mobiles of the beneficiaries.
- Stock maintenance in the distribution center.

1.5 Organization of Report

The report includes the following contents: Chapter 2 deals with Literature Survey which includes overview, existing system, and proposed system in brief. Chapter 3 deals with Requirements analysis and specification which includes overview, functional requirements, hardware requirements, and software requirements. Chapter 4 deals with System design and architecture which constitutes of overview, module description and architecture, UML diagram, class diagram, use case diagram. Chapter 5 deals with Algorithm. Chapter 6 deals with Testing which includes unit testing, functional testing, and test cases. Chapter 7 deals with Result and analysis which consists of snapshots and results. Lastly the conclusion, future work and references.
CHAPTER 2

LITERATURE SURVEY

2.1 Overview

Dhanashri Pingale [1] et al in her paper has described a Centralized Web Enabled Ration Distribution and Corruption Controlling System is the project that will allow a smooth and easy ration distribution. The paper explains the concept of ration distribution and controlling. This system enabled the distribution of food equally among poor people. The commodities are stored in storage tank, when goods are inserted in the FPS, then that quantity of goods is updated in web server. That website can be accessed by the collector whenever he requires the ration from respective ration shop.

Shivabhakt [2] et al described the concept to automate the PDS, a Government of India initiative process in which a fixed amount of ration is provided monthly to the people by the PDS stores. The increased corruption in the market sector can be prevented if the system becomes automated, increase in adulteration can be prevented as well, the hoarding done by the officials and laborers of government.

**Public distribution system (PDS)** is an Indian system food security established by the Government of India under Ministry of Consumer Affairs, Food, and Public Distribution and managed jointly with state governments in India, it distributes subsidized food and non-food items to India's poor. Major commodities distributed include staple food grains, such as wheat, rice, salt, and cooking oil, through a network of public distribution shops (also known as ration shops) established in several states across the country. Food Corporation of India, a government-owned corporation, procures and maintains the PDS.
2.2 Existing System

Public distribution system also called ration distribution system is one of the widely controversial issues that involve malpractices. In the existing system, works which include product distribution, ration card entry, product weighing, and product delivery are done manually by FPS (Fair Price Shop) commission agent. The present ration distribution system has drawbacks like inaccurate quantity of goods, low processing speed, large waiting time, material theft in ration shop.

Snapshot 2.1 Existing system
2.3 Proposed System:

The proposed system replaces the manual work in FPS. The main 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 provided 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 to RFID reader and then 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.
CHAPTER 3

REQUIREMENT ANALYSIS AND SPECIFICATION

3.1 Overview

The project here uses RFID reader and RFID tag to read the data from the database, phpmyadmin. Here it uses the Biometric device to scan the fingerprint of the beneficiaries or the card holder to match the fingerprint that is stored in the database after which the further process begins.

3.2 Functional Requirements

3.2.1 Functional requirements for beneficiaries

- Beneficiary and his/her family member’s details are stored and RFID tag is assigned to the beneficiary.
- Fingerprints of beneficiaries and family members are captured and stored to obtain the identity.
- Verification of card is done using RFID Reader installed at the center and once verified the system will verify the fingerprint of the beneficiary or his/her family member.

3.2.2 Functional requirements for Server side

- Stocks are updated by food department. They maintain the incoming stock, total distribution of stocks and also the remaining stock.
- Reports of inventory are updated on the server side.
- The system also has a shopping cart for allowing the beneficiaries to shop and do the payments.
3.3 Software requirements

In the project the software requirements are as follows:

- Website developments : Joomla 1.6 version
- Software Package : Jcreator
- Language for Development : Java and Php
- Database : phpmyadmin

3.4 Hardware requirements

In the project the hardware requirements are as follows:

- Minimum RAM : 1 GB
- Hard Disk : 40 GB
- Processor : Intel Pentium 4 /AMD Processor
- Operating System : All operating systems.
- External Hardware : RFID Reader and Cards, Biometric devices.
- Browser : Mozilla or Google chrome.
CHAPTER 4

SYSTEM DESIGN

4.1 Overview of Chapter

In system design, java programming language is used for the front end interfaces and to design the modules and phpmyadmin is the back end used for queries and the database tables to store the data. This concept helps the developer to make the process simple and in easy manner to understand the concept easily.

4.2 Module Description and Architectural design

Modules used in this project are as follows: Login module, RFID verification module, Biometric verification module, Purchase and Alert module.

I. Login Module

In this module, the system takes beneficiaries details like 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 belongs to. All the information is stored in the database.

II. RFID Card Verification Module

RFID is a part of Automatic Identification and Data Capture (AIDC) technologies and is fast and reliable means of identifying objects. RFID based Smart Card verification module consists of two main components, they are interrogator and transponder. The interrogator (RFID Reader) is used to broadcast the signals through its antenna and the transponder (tag) that will be activated after it receives the signals from the interrogator. In this project a transponder is the Smart Card.
The person should scan the RFID card on the scanning system placed at FPS counter.

- The RFID reader sends a broadcast signal to detect the RFID tag (Smart Card).
- Data stored within an RFID tag’s microchip is read.
- The tag's antenna receives electromagnetic energy from an RFID reader's antenna.
- Using the power harvested from the reader's electromagnetic field, the tag sends radio waves back to the reader.
- 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.

After the card verification the next step is to verify the beneficiaries using Biometrics module.

III. Biometric Verification Module

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 needs to determine whether the pattern of ridges and valleys in the image matches the pattern of ridges and valleys in pre-scanned images.
The scanning process starts when you place your finger on a glass plate, and a CCD camera takes a picture. The charge coupled device (CCD) system actually generates an inverted image of the finger, with darker areas representing more reflected light (the ridges of the finger) and lighter areas representing less reflected light (the valleys between the ridges). If the processor finds that the image is crisp and properly exposed, it proceeds to comparing the captured fingerprint with fingerprints stored in database. After verifying the valid beneficiaries, the system will provide access to their ration account.

Snapshot 4.2: SFG Demo screenshot
SFG Demo is software used by the project to save the fingerprints of the beneficiary at the appropriate id, and also to capture, match and search the fingerprints of the of the same.

IV. Purchase Module

After verification of RFID card and beneficiary’s identification by using biometrics, the beneficiary is presented with a list of commodities present in the FPS. The beneficiary has to select the list of commodity he/she wants to purchase. The system will display the total quantity of the commodities that he/she wants to purchase. Once after he/she confirms the commodities, payment is done and beneficiaries are given a receipt in form of a SMS.

V. Alert Module

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

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

Architectural design consists of six components such as beneficiary, RFID reader, biometric verification, monitor and database. The beneficiaries arrive at the fair price shop with a smart card entitled to him. The beneficiaries have to be validated, which includes two way authentications. First step includes swiping the smart card over RFID reader. The second way of authentication is Biometric authentication which includes scanning of thumb.

The beneficiaries are validated on checking the fingerprint ID and Smart Card ID from the database. His/her fingerprint ID or smart card ID is used to fetch information on to the main interface.

![Architectural diagram](image)

Figure 4.2.1: Architectural diagram

4.3 UML Diagram

“A Data Flow Diagram (DFD) is a graphical representation of the “flow” of data through an information system, modeling its process aspects. A DFD is often used as a preliminary step to create an overview of the system. A DFD shows what kind of information will be input to and output from the system, where the data will come from and go to, and where the data will be stored.”
Figure 4.3: Data flow diagram
4.4 Class Diagram

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system’s classes, their attributes, operations (or methods), and the relationships among objects.

Figure 4.4: Class diagram
4.5 Use Case Diagram

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well.

![Use Case Diagram](image-url)
CHAPTER 5

IMPLEMENTATION

This Chapter will discuss the implementation details in the form of algorithm.

5.1 Algorithm

Step 1: Start

Step 2: Enter the commission agent’s username and password.

Step 3: If valid username and password then goto Step 4

    else

    Re-enter commission agent’s username and password

    endif

Step 4: Beneficiary swipes the card.

Step 5: If valid card then go to Step 6

    else

    Once again swipe the card

    endif

Step 6: Scan thumb

Step 7: If thumb impression is matched then goto Step 8

    else

    Once again scan the thumb

    endif

Step 8: Directed to the main interface

Step 9: Add quantity of each commodities that is to be purchased

Step 10: Beneficiary makes payment
Step 11: If next customer arrives go to Step 3

else

Go to Step 12

endif

Step 12: Commission agent logs out.
CHAPTER 6

TESTING

Software testing is a critical element of the software development cycle. The testing is essential for ensuring the Quality of the software developed and represents the ultimate view of specification, design and code generation. Software testing is defined as the process by which one detects the defects in the software. Testing is a set of activities that work towards the integration of entire computer based system. A good test case is one that has a high probability of finding an as-yet undiscovered error.

6.1 Unit Testing

Unit testing is a software development process in which the smallest testable parts of an application, called units, are individually and independently scrutinized for proper operation. Unit testing is often automated but it can also be done manually.

Firstly unit test is carried for commission agent logging to check if he/she is valid or not using the id and a password assigned to them to login into the software package. The next unit testing is carried out for RFID tag and the reader, to check if the RFID reader is able to read 12bit id of the RFID tag. The unit testing for biometric verification module is carried to check if the fingerprint is being read by the biometric device.

6.2 Functional Testing

Functional testing is a quality assurance (QA) process and a type of black-box testing that bases its test cases on the specifications of the software component under test.

The first step towards the functional testing is to check if the commission agent is valid or not by logging in the login page. After that validation of the beneficiary’s identity has to be carried out by a two way authentication method that includes RFID swiping and biometric fingerprint matching. The fingerprint id or RFID id has to match to his/her RFID id or fingerprint id that is stored in the database, after which the database has to correctly fetch the beneficiary’s data into
the main interface. In the main interface, the beneficiary should to be able to correctly specify the quantity of commodity he requires based on the category of the card he/she belongs to.

6.3 Test Cases

The following screenshots demonstrate the test cases in different scenarios:

- The above figure demonstrates the test case where a commission agent has entered a wrong user id or a password assigned to him for login purpose.
Snapshot 6.2: Fingerprint not found

- The above screenshot prompts the message saying, “NO FINGERPRINT MATCH ID”. It is the condition where the fingerprint of the beneficiary isn’t stored in the database.
The prompt of “INVALID USER” appears when the RFID id doesn’t match with the relative fingerprint id in the database, not letting the beneficiary to carry out the further process of specifying the quantity of commodities.
CHAPTER 7

RESULT AND ANALYSIS

7.1 Snapshots

- Validates the commission agent
- The User ID and the unique password is provided by the admin

![Snapshot 7.1: Validating the ration shop keeper](image-url)
• Here the beneficiary will swipe the RFID card.
• The two way authentication refers to the RFID and the Biometrics authentication.
• RFID tag should be swiped against RFID reader.
• Once after RFID authentication is completed, the control moves to the next phase of authentication.

Snapshot 7.2: Swiping Card
Biometric authentication involves scanning of thumb.
For every beneficiary their thumb impression is saved in the database.
Therefore, here the card which has been swiped earlier is matched with the respective thumb impression and then with the database.

Snapshot 7.3: Biometric authentication
Based on the categories of the cards, APL (Above Poverty Line), BPL (Below Poverty Line), and AAY (Anthyodaya Anna Yojana) the stock is assigned.

- Once after the user is validated he is directed towards the main interface.
- The main interface consists of three sections – User details, Shop Stock Details, Specify Quantity Details.
- A user detail consists of all basic details of the beneficiary including the category (APL, BPL or AAY).
- Shop stock detail displays the commodities along with quantities available at the FPS.
- Specify Quantity details include the quantity of each commodity which is purchased by the beneficiary.

![Snapshot 7.4: Main Interface]
• Beneficiary can check the availability of commodities online, by viewing the website.
• It contains the information of various ration shops available nearby and can also check the commodities available in the respective Ration shop.
• The website contains various fields like:
  o “About the Project” - briefly describes the project.
  o “Features of Project” - gives various aspects with respect to project.
  o “Contact us” - for any query regarding the Ration system.

Snapshot 7.5: Home page
- Every beneficiary is provided with Username and Password by admin.
- Using which various users can check the availability of commodities.

Snapshot 7.6: Login form
- The beneficiary can also check the details of the FPS available nearby.
- Admin can add new shop, get detail of each shop, delete shop, and edit shop stock. And also upgrade the user profiles.

Snapshot 7.7: Shop details
CONCLUSION AND FUTURE WORK

CONCLUSION

Ration forgery is one of the most difficult challenges faced by the food distribution department. There may be chances where ration is delivered to the beneficiaries and false records are noted down, regarding the delivery by commission agent. And there is probability of him (commission agent) selling the commodities in open market with extra profit etc. Therefore, the proposed system is more secure and transparent than the normal existing system. Entry of fallacious data in the ration database can be avoided with the use of smart cards and additional security is provided by the biometric authentication. The commission agent is only responsible for entering the quantity of the commodities, whereas updating and deducting is solely handled by the server (food department). Maintaining the database is also helpful for sending messages to the beneficiaries about the ration delivery. It is anticipated that the proposed project will create transparency in public distribution system as the work becomes automatic and also it makes 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.
REFERENCES


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