Review on Automatic Rationing for Public Distribution System (PDS) using RFID, GSM & Fingerprint Module

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Abstract— Ration card is very important for every home and is used to get information about the family members, to get gas connection, etc. Also it acts as an address proof for various purposes. The poor people having a ration card to buy the various materials like sugar, rice, oil, kerosene, etc. from the ration/PDS/fair price shops. But the existing ration distribution system having two draw backs, first is weight of the material may be inaccurate due to human interference and second is, if the materials not buy at the end of the month, they will sale to others without any intimation to the government and customers leading to unavailability to the customers. Here we have proposed an Automatic Rationing for Public Distribution System using GSM (Global System for Mobile), RFID (Radio Frequency Identification) and Fingerprint Module instead of ration cards. To get the materials in ration shops users need to authorize his/her identity by scanning a finger & then show the RFID tag to the RFID reader. Then controller verifies the customer database for details. After verification, these systems show the amount details. Then customer need to enter the amount of required material/s using a keyboard. After receiving material/s controller will send the information to government office and customer through GSM technology about the transaction. This system provides the materials automatically without help of humans.

Key words: RFID, GSM, Fingerprint Module

I. INTRODUCTION

The main purpose of Public Distribution is to protect the ever diminishing interests of the poor people of the society. Many day-to-day essential commodities are made available to the weaker sections of the society through Fair Price Shops. Though there are proper channels, there are loopholes also in the system which has made the entire system deflect from its main objective of ensuring food for all. All the items are made available to the people through the Fair Price Shop and each ration card holder gets a fixed quantity of items allocated to him/her under the scheme at a certain price fixed by the government. The price at which the items are made available to all is called the issue price. PDS operates on difference between the market price and the issue price. The failure of PDS is also attributed to the lack of purchasing power of the poor and they are unable to avail the full quota of grains allocated to them, which results in black marketing of the PDS commodities. Lack of proper coordination and monitoring system, lack of information among the various stakeholders involved in the system has resulted in breakdown of PDS at several levels. This has affected the sole motive of ensuring food security of the poor. Therefore, a study on the Public Distribution System is necessary to identify the loopholes in the existing system and device necessary means to correct them.

Food being the basic necessity of human life, the Public Distribution System works towards ensuring that no one goes hungry at any point of time. However, there are certain issues to be dealt when the viability of this system has to be tested on a large scale. The focus should be more on commodities required in a particular context rather than anything given by the government under the scheme.

A. Existing System

Here the customers use a ration card to buy the materials from the ration shops. To get the material from the ration shop, first need to show the ration card and then put the sign in the ratio card depending on the materials. Then they will issue the materials. But in this system having two drawbacks, first is weight of the material may be inaccurate due to human interference and secondly, if no one buys the materials at the end of the month, they will sale it without any intimation to the government and customers. About half the grains is leaked before reaching consumers it reflects inefficiency, corruption.

B. Automated System

In this project, we have proposed an Automatic Rationing for Public Distribution System (PDS) using GSM, RFID & Fingerprint Module to avoid the drawbacks & improve security factors. Fingerprint used for customer authorization will prevent the malpractices like stealing of ration card. RFID acts as e-ration card and can be used for other purpose such as RC book, insurance details, etc. GSM used to communicate the information between the two people to update the information depends on the requirements.

Thus we have designed and implemented an Automatic Rationing for Public Distribution System using Fingerprint module, RFID technology and GSM Module to avoid irregularities and increased adulteration and the hoarding done by the officials and laborers of Govt. can be prevented as well. The designing is cost effective and can prove helpful to Govt. Hence only authentic person can recover ration materials from ration shops based on the amount available on his database.

II. PROBLEM STATEMENT

To overcome the problems mentioned below, the automatic public distribution system plays a vital role.

1) There is hoarding and black marketing of the ration materials by the agent thus the ration material remains unavailable to the poor & needy people. Thus we have proposed an automated system.
2) Also there is misuse of ration cards & bogus cards are used so to avoid this, RFID e-ration card can be used along with a fingerprint access.
3) Overcrowding as processing speed is slow
4) Hijacking of ration cards
5) Materials theft
6) More than the prescribed rates are charged
7) Unable to get the accurate quantity of supplies
III. DESIGN DEVELOPMENT

Development of the project is motivated by following things:
- The ultimate objective is to make all government services available to the common man through common service delivery outlets, and ensure efficiency, transparency and reliability.
- To provide materials automatically using a mechanical and digital setup without the help of humans. Thus it is more accurate.
- Only authentic persons can recover ration materials from ration shops by fingerprint authentication based on the amount available in the RFID.
- It sends the information to Govt. office & customer through GSM technology after receiving the ration materials.

A. Challenges:
- Corruption in the Government and market sector has to be prevented.
- Increased adulteration in consumables has to be prevented by tracking the transportation and quality control measures.
- To make the ration material available to the needy at fair prices with maximum accuracy in weight by automation.
- Time saving approach as everything will be centralized and digital.
- To make the system paperless i.e. go-green approach by using RFID instead of traditional ration cards and billing transaction details will be sent to customer on mobile phones using GSM.
- The total database about customer details, transactions and stock of grains at the shop should be accurately maintained.

IV. PROPOSED DESIGN

In order to overcome all problems which are majorly faced such as illegal usage of ration cards, bogus cards, black marketing and hoarding of goods, etc. we developed a design of automatic rationing material distribution using GSM, fingerprint module & RFID technology to facilitate better efficiency and proper service to the customers.

A. LPC2148 Microcontroller:
The microcontroller is basic part of the system which controls its overall working. It is an assembly placed between smart card reader, GSM module and Fingerprint module and establishes a communication between them.

LPC2148 is a 32bit 64 pin IC with 12MHz crystal oscillator. Also has two 10bit ADC’s providing 6/14 analog inputs with conversion times as low as 2.44μs per channel.

B. Fingerprint Module
Fingerprint module is used for customer authentication by scanning his finger. It is interfaced with microcontroller and PC via RS232 which matches fingerprint with the database stored during enrollment. It acts as a password for smartcard i.e. RFID tag. Thus, makes system more secure and avoids illegal use.

C. RFID (Radio Frequency Identification):
RFID based smart-card reader is connected to microcontroller and PC via RS232. When a user swipes the smart card, and provides the password to the system, it is a smart card reader which detects and reads the RFID Tag (smart card) and forwards the details to the interfaced microcontroller module for further processing.

D. GSM (Global System for Mobile Communication)
The GSM is the most popular mobile phone system in the world. It uses Frequency Division Multiplexing & Time Division Multiplexing. It is a globally accepted standard for digital cellular communication. It is a common European mobile telephone standard for a mobile phone radio system operating at 900MHz.

Here the GSM module is used to exchange the information in form of text message between microcontroller assembly, central database provided by the Government and the customer.

VI. WORK SIMULATION

The Automatic Rationing for PDS using GSM, Fingerprint and RFID Technology used to distribute or vend the liquid & grains ration shops. Initially everyone will be provided an RFID as smart Card, instead of a ration card. When a
customer visits the FPS to get the ration material, he/she has to scan his finger using fingerprint module. Once the fingerprint matches the database the access is granted. Then swipe the ration smart card to the RFID reader & recognizes the RFID number shown by the user. Each user will have a unique identification number.

The recognized RFID number will be given to a microcontroller and then it is compared with the database. It consists of details such as user name & address, date of expiry of ration card, amount of grains available in his monthly quota, etc.

After identification of the user, the microcontroller checks how much ration item has he purchased in that month and remaining amount of ration items on his account is displayed on the LCD screen. The user is asked for his choice to buy ration item. The controller then asks for the amount or quantity of item to buy as per the quota available for him on his RFID card. The microcontroller will start the solenoid and motor mechanism for dispensing the required ration item. During dispensing process, the controller sends a command to GSM modem, to send the text SMS to the user with details of his purchase and transaction.

A. Future Scope

As there is no role of human in storing all information in database this system has greater scope in future.

We can preserve the privacy of the data through data mining technique based approach for distribution of products and services. Also induces better security and transparency in the distribution of the goods.

We can also use the GPS for tracking of the vehicles during transportation to avoid illegal use and hoarding of materials. This will ensure the transparency between the government and the rationing system.

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