

Automatic Public Distribution System

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Abstract— Automatic Public Distribution system (APDS) introduces more efficient, accurate and automated technique for ration distribution. The Automatic Public Distribution System consist specialized control centers to maintain and monitor each and every Automatic Public Distribution Machines (APDM). The control centers are responsible for refilling every APDM whenever it is needed.

Keywords – APDS; APDM; Control Center.

I. INTRODUCTION

Public Distribution System (PDS) also known as fair price shop (FPS) was first established in June 1947. It is a part of India's public system established by Government of India which distributes rations at a subsidized price to the poor. Major commodities include wheat, rice, sugar and kerosene. About 500,000 fair price shops are currently working in India which is the largest public distributing network in the world [1]. In this existing Public Distribution System, public has to give the smart card to the employee in the particular ration shop and the card is scanned with help of QR code reader, after which details of the family members and quantity of different commodities available for this card is displayed. The public tells the employee about quantity of items they want. The employee manually measures the quantity of items which have been asked for and delivers it to the consumer. After delivering, the employee updates the details of the purchase in the card manually. But this system has many disadvantages and limitations. The proposed system addresses the problems of the existing system and provides a fully automated environment for all fair price shops in India.

A. Drawbacks of the existing system

- The details of the purchases are manually updated hence the employee may go wrong with the details or intentionally fool the consumers
- Due to manual updation of the details and measurement of the goods, public have to wait in a long queue
- The commodities may not be available all the time
- Many FPS employee have been found to sell foods in open market
- Numerous malpractices make nutritious food in accessible and unaffordable for the poor
- Limited working hours

B. Proposed System

The proposed system provides complete user interface which makes purchase easier and safer. The user end has a smart card slot where the user can insert it. After insertion, the details of the available commodities for the specific card are displayed on the screen. The public can choose from the available products and enter the required quantity on the screen. The payment method has to be selected from the available options. Once the payment is made successfully, the selected goods of given quantity is delivered automatically. The quantity delivered will be updated and it is reduced from the total quantity allotted for the card per month. A particular number of ration shops is monitored by the control center where the quantity of each item stored in the container is displayed round the clock. Whenever the quantity is below a particular level in a container, a message will pop-up in the system of the control center. Then the appropriate material which is required to be filled is sent from the control center. In this way, product will be always available for the consumer.

II. BLOCK DIAGRAM

The overall operation is controlled by PIC microcontroller [3]. Fig. 1 describes the user terminal setup by which user can enter their needs into the APDM. It consists of user interface system (PC) and RFID reader.

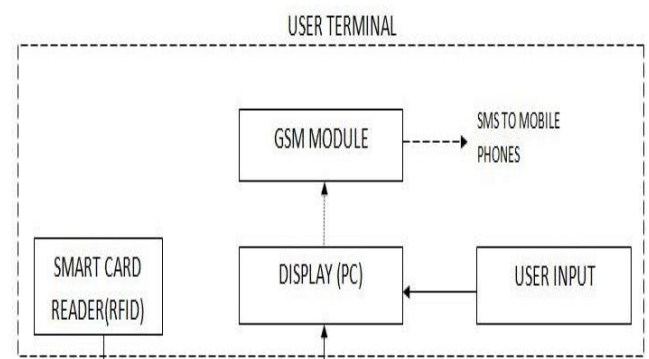


Fig1. User terminal

RFID reader is used to gather information from RFID tag consisting of name, mobile number, quantity available etc. It consists of a small chip and an antenna where the chip is capable of carrying 2,000 bytes of data [2]. RFID represents the current smart card which is based on QR code.

GSM module consists of SIM card mounted on the modem which is used to send purchase details to the registered customer mobile number through SMS [4].

The complete block diagram of the APDM is shown in the fig. 2.

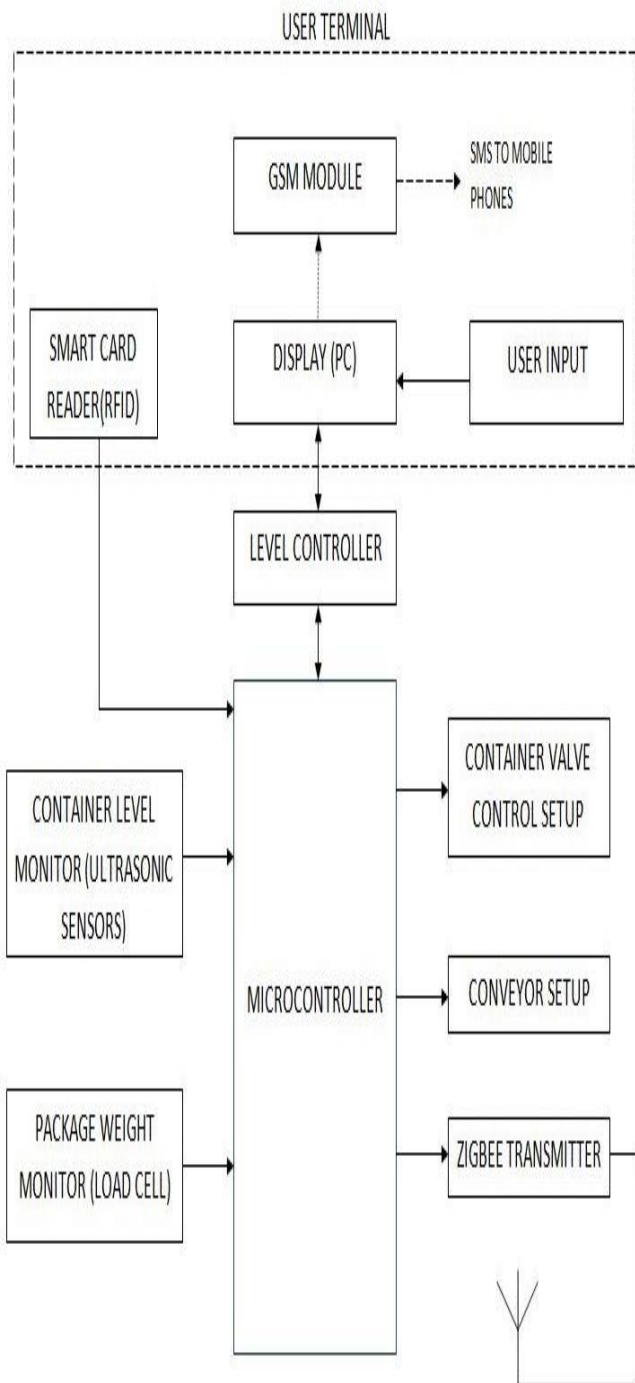


Fig. 2 Complete block diagram of APDM

Load cell is used to measure the exact amount of the product required by the customer. Based on the value of electrical output, the opening and closing of slit is controlled [7].

The upper portion of the containers which hold the goods inside the APDM is fitted with these sensors which help to monitor the quantity present inside it directly from the control center. If the quantity falls below a threshold level in a container, a message is sent to the control center and the goods are refilled ensuring continuous supply [5].

The output of the ultrasonic sensor will be transmitted to the control center (fig. 3 shows the control center setup) through ZigBee transmitter continuously. The level can be monitored from the control center based on the received ultrasonic sensors output through ZigBee receiver and suitable measures can be taken to refill the container whenever the level drops down below the lower threshold [6].

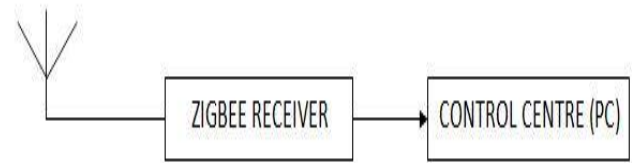


Fig. 3 Control center block diagram

Conveyor setup collects the products when it is filled with specified product and delivers it to the user side automatically.

III. SYSTEM WORKING

The automatic public distribution system's front end has a RFID reader. The customer has to show the RFID card to the RFID reader which consists of a unique number & the reader will recognize it (RFID card represents the current smart based on QR code). Each card consists of name of the cardholder, quantity allotted, quantity currently available and bank details associated with the account [2]. The details of the previous purchases are recorded and the customer can buy only the quantity allotted for them for that month.

The customer has to enter the quantity required for the current purchase and amount to be paid is calculated and displayed to the user. If the user has insufficient balance in their account, then the process is not carried out and a message is displayed on the screen.

If the required balance is available, amount will be deducted from the customer's bank account which is linked with the smart card and a SMS will be sent to the registered mobile number of the user about the purchase detail [4]. Then the container slit gets opened and the product is filled according to the quantity specified by the user. The quantity is measured based on the load cell above which the product weight is measured. The load cell is a transducer which gives voltages according to the weight placed on it [7]. The microcontroller opens the slit of the container and closes it when the desired voltage is reached corresponding to the weight [3]. After the slit is closed, the packet is delivered to the customer. If the customer has applied for another product, then the same process is repeated and delivered to the customer.

The level of the containers which holds the rice and wheat are monitored by ultrasonic sensors which operates based on the level (amount) of the quantity present inside the container [5]. If the quantity falls below a threshold level, a message is sent to the control center, so that quantity is refilled ensuring continuous supply.

IV. FLOW DIAGRAM

The flow of the entire process is shown in the fig. 4 below.

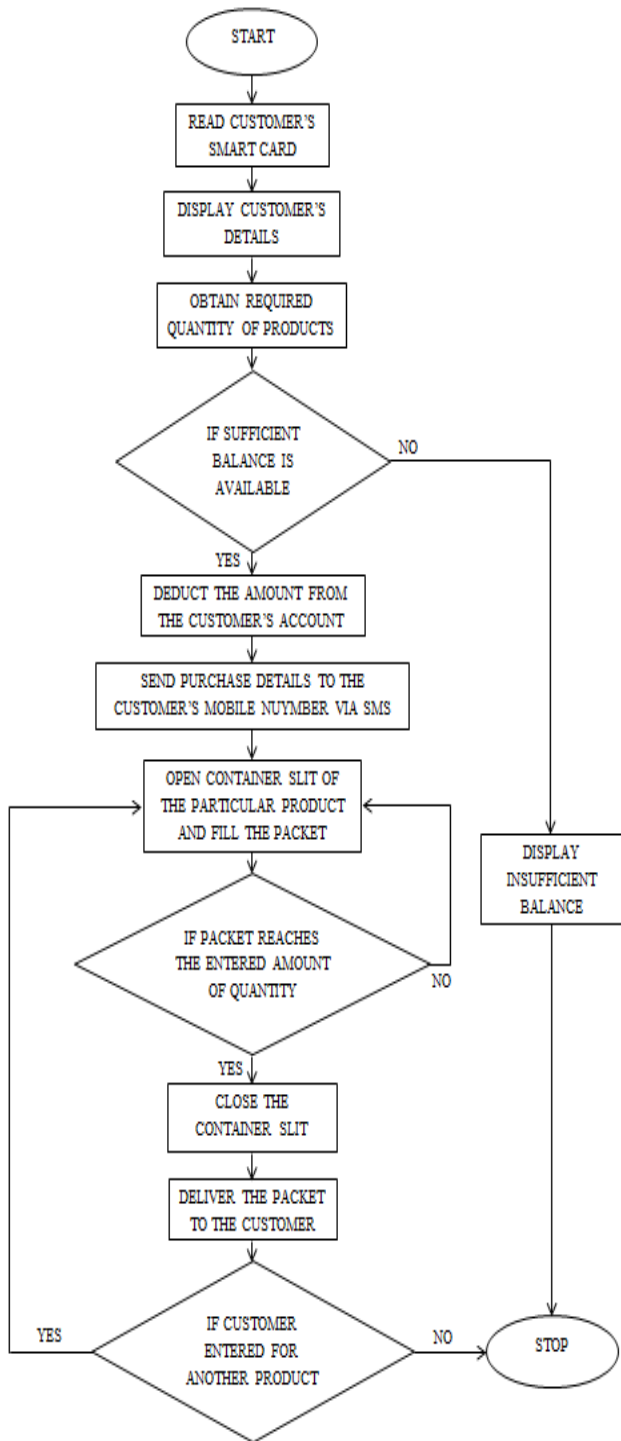


Fig. 4 Flow diagram

V. SOFTWARE INTERFACES

A. User Interface

The user end of the APDM is provided with a user interface shown in the fig. 4, which displays details of the card holder such as name, mobile number and monthly allocation for goods. It is also used to enter the quantity required by the user. It also shows the availability of goods.

If there is no sufficient balance of goods or money in the users account it shows insufficient balance message.

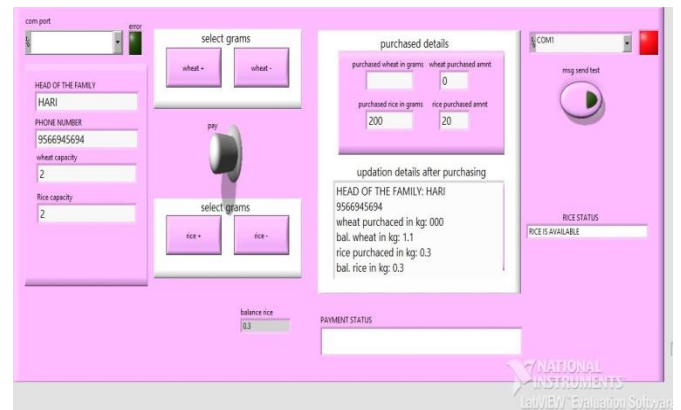


Fig. 4 User interface

B. Control center

Control center acts as a hub which controls the particular number of APDMs continuously. The level of container which holds goods is continuously monitored from control center (shown in fig. 5). Whenever the level drops below the lower threshold, message will be displayed to fill the container of the particular shop. Then the appropriate measures will be taken to fill the particular APDM.

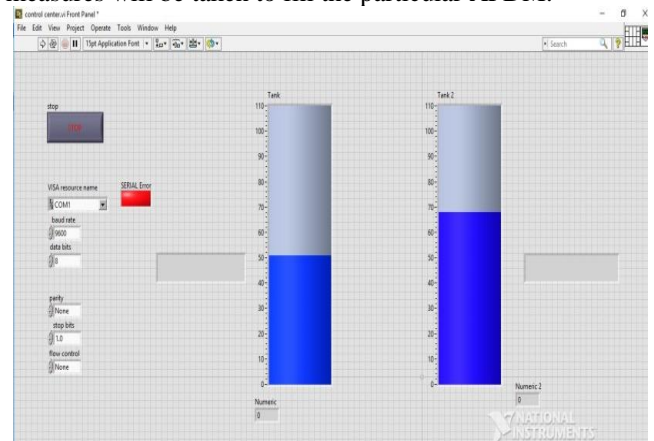


Fig. 5 Control center

VI. RESULT

The proposed system delivers goods in an uninterrupted manner and eliminates the waiting time of the users. It improves standard of the rations shops by providing accurately measured quantity of goods to the public and the third person between the fair price shops and the public is eliminated so that the material theft can be abolished.

VII. CONCLUSION

India is a country that suffers from poverty and has more than half of its population below the poverty line. The main source of affordable subsidies for these people is through rations. The ration goods which are allocated for these people should be made fully accessible without any interference from any third parties who try to take benefits by manipulating the existing distribution systems. By digitizing India's largest network that is widely accessed by the people, the standard of the ration shops will be elevated and it will also create a gateway that allows for future

development in the country. India is a developing country that strives to be a world power one day. These ration shops will be a means to realize this dream come true, a fully “DIGITAL” India.

VIII. REFERENCE

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