Automated Ration Vending Machine

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Abstract: The Public Distribution System (PDS), 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 is facing significant threats to its very existence. These threats starts from the basic issues of renewing the ration card every year which has to be done manually by the employees to the malpractices done by the ration store dealers like diverting food grains to open market to make profits. There is another problem of irregularity in opening shops and false announcements of deficit in food grains. Hence through this paper the idea is to completely automate the rationing system. For simplicity, it is better to implement an embedded system for the same. In the proposed system, the advanced ARM8 (Advanced RISC Machine) processor is used and it is the heart of the system that controls all sub systems like sensor modules, database systems, connected across it. The user authentication is provided by smart card (RFID card). The Customer/ user can access his/her ration through this diverse smart card.

Keywords: ARM8 Processor, Public Distribution System, RFID card

I. INTRODUCTION

Public Distribution System (PDS), an Indian food security system, is a means for ensuring food security to the poor and the needy. Essential commodities like rice, flour, kerosene etc., are supplied to the people under the PDS at subsidized prices [1]. Indian food security system, established by the Government of India under Ministry of Consumer Affairs, Food and Public Distribution is to distribute subsidized food and non-food items to India's poor. This scheme was first launched in February 1944, during the Second World War and was launched in the current form in June 1947. Major commodities distributed include staple food grains, such as wheat, rice, sugar and kerosene, through a network of fair price 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 [..]. The existing conventional ration card system has numerous problems, includes renewing the ration card every year, malpractices done by the ration store dealers, diverting food grains to open market, irregularity in opening shops, false announcements of deficit in commodities.

The proposed system avoids malpractices which are present in ration shop by replacing manual work with automatic system based on RFID and GSM. Each consumer family is provided with a distinct RFID card which holds all the data of the family, including whether they are APL or BPL [.].By using this system the major problems like bribery, irregular distribution and other difficulties faced by the poor people. Illegal activities in the ration shop can be greatly reduced by this method. The product arrival is intimated to the people so it helps the people to save their time by not waiting in front of the ration shop. The distribution process is automated using microcontroller and so the government facilities reach people properly. The corruption and bribery is the major problem in ration product distribution 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 [3].

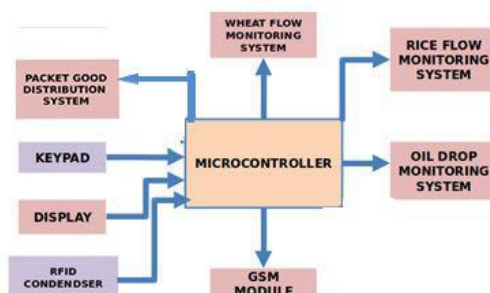## II. DESIGN AND IMPLEMENTATION

A. BLOCK DIAGRAM

Fig.1 Block Diagram

The above shown figure represents the block diagram of the proposed vending machine. Here the system receives possible identification of the customer using RFID card, as soon as customer shows his/her RFID card an OTP is send to the registered mobile number which the customer have to enter to the machine for confirmation. After acknowledging the consumer the required commodities and their quantity is stored to the microcontroller memory by using keypad, together with visual conformation from display. The microcontroller processes the needed signal and transmits to the corresponding distribution system. The signal send from the microcontroller also has the amount of the commodity/product required. Oil/liquid distribution system uses the timing required to control their flow.
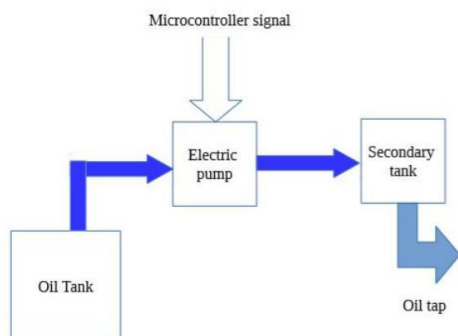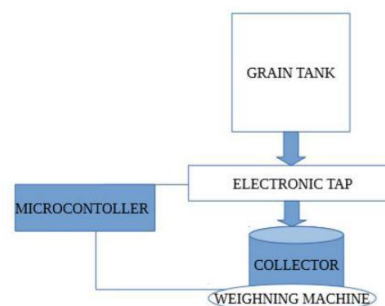

Fig.2 Oil Distribution System   Fig.3 Grain Distribution System

For oil distribution system (Fig.2) the signal received from the microcontroller last for the time required by the electric pump to pump the oil to the desired amount. If the amount required exceeds the capacity of secondary tank, then the pump repeats the pumping until the required amount of oil is provided. The error expected here is minimum since the oil transmitted by the pump per sec remains the same. However the pump requires external uninterrupted power supply, which can be ensured by providing a separate power supply to the electric pump. In case of grain distribution system (Fig.3) when the signal from microcontroller reaches the tap, the grains are allowed to pass to the collector. Which is being weighed continuously, the result is received at the microcontroller which uses this data to stop the grain follow when it reaches the required quantity. Since the packet distribution system is seen common, this paper is not discussing about it, but it is a easy procedure to connect it with microcontroller.

B. ALGORITHM

STEP1:   START
STEP2:   Read consumer ID
STEP3:   Validate consumer ID. If true go to step6 otherwise go to next step
STEP4:   Print "Invalid Entry"
STEP5:   Go to step2
STEP6:   Read commodities list & quantities
STEP7:   Differentiate the commodities list(Grains, Oil, Packet, Etc.)
STEP8:   Read conformation signal (ready for receiving commodity) & Read the limiter counter from consumer
STEP9:   Check both conformation signal; if true then go to next step otherwise go to step12
STEP10:   Open the tap(Set delay)
STEP11:   Go to step8
STEP12:   Close the tap

STEP13:   Print receipt
STEP14:   Send data to corresponding registered mobile number
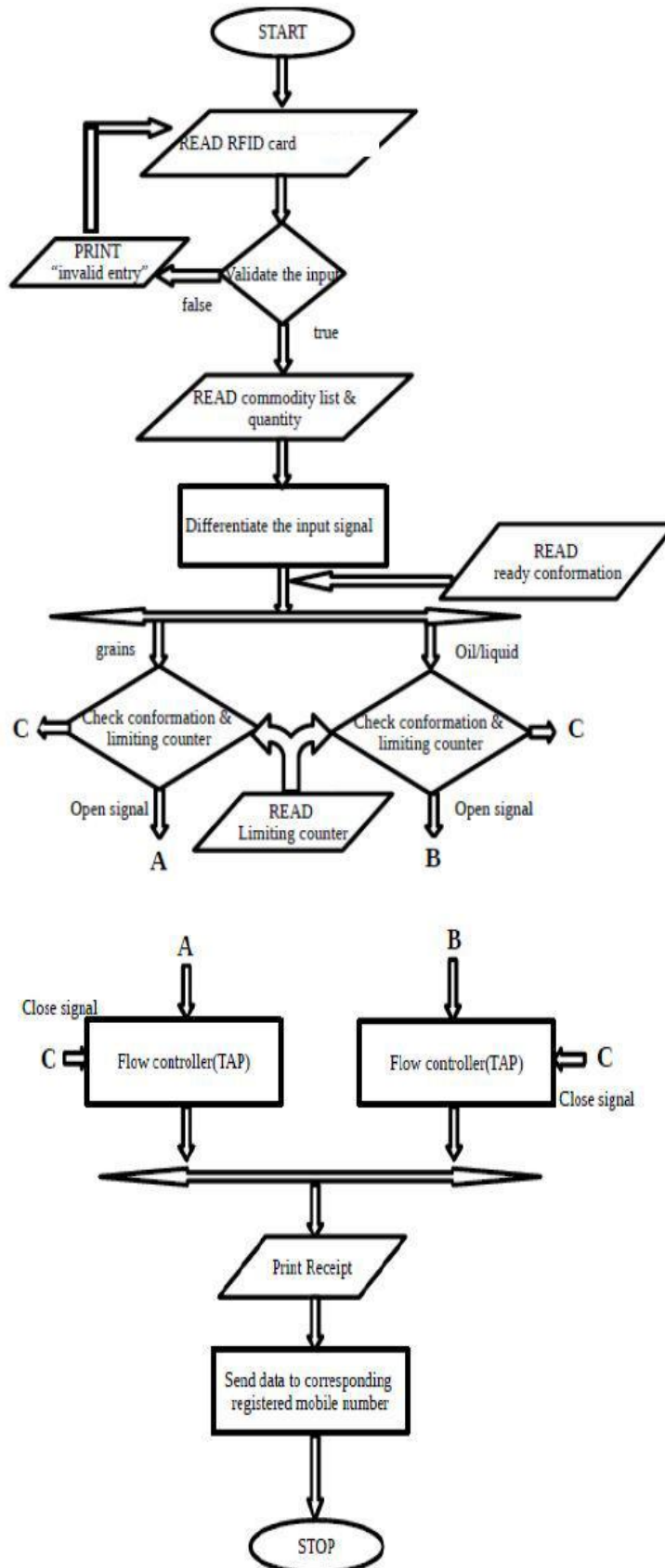STEP15:   STOP

C. FLOW CHART

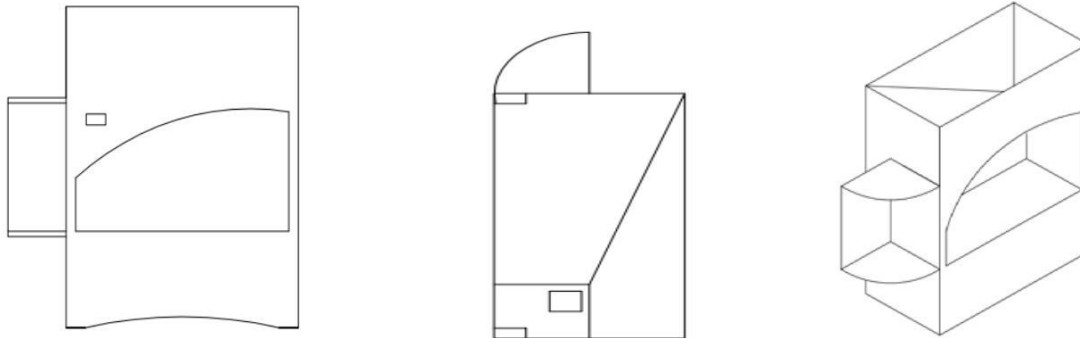Fig.4 Flow Chart

Fig.4 CAD Design

III. EXPERIMENTAL RESULTS

Table1. Dynamic OTP detection test results

Attempt no.	OTP number	Type of customer(APL/BPL)
1	8910	APL
2	7816	APL
3	3214	BPL
4	6832	BPL
5	4519	BPL

Table 2. Results of OTP time delay arrangement

Attempt no.	OTP Delay time(sec)
1	7 sec
2	11 sec
3	11 sec
4	8 sec
5	11 sec

The reliability of the proposed system falls upon the OTP the machine sends. It needs to be accurate, dynamic and fast, where which the factors like accuracy and dynamic property relay upon the programming of microcontroller. But in case of the speed of the message depends upon the service provider. So it is ideal to choose an area with fair cellular services to place the proposed system.
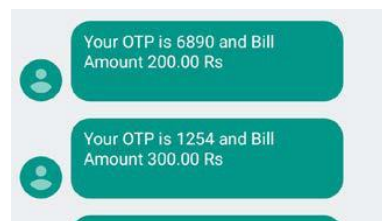

Fig.5 OTP message

However the reliability of the proposed system was tested and got the results as shown in Table.1 and Table.2. It is crucial to note the dynamicity of the OTP the machine provides, which shows the security that the system provides the customers. Also through the time delay test it is clear that the system doesn't make the customers wait for too long to receive the OTP messages.

IV. CONCLUSION

In this paper the manual efforts in the ration shops are minimized by the automated embedded system. Accurate record of stock log and sales log can be maintained. The database renewed easily and quickly, also it helps government to avoid additional expenses for data entry and printing of ration books. By implementing this concept each ration shops don't need large storage facility, one storage area can be used as common for a number of ration shops. All they need is to top up the commodities as soon as they are finished. In short through this paper, a refined technology that could

completely avoid the existing malpractice and other issues faced by public distribution system is proposed. Primary idea provided here is to destroy the corruption seen in Raton shop.

V.   FUTURESCOPE

The system is expected to have a lot of improvements, including remote access, booking of commodities. Also automated or semi automated home delivery system may be implemented with research and study. To a great extend it is possible to have AI influence where the customer doesn't need to order commodities, system automatically detects the deficit items and books them. The Proposed idea can also be implemented in Supermarkets, Malls etc other than ration shops.

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