Smart Ration Card and Ration Distribution System using RFID and IOT

Mr. Gurumallesh M N[1], Mr. Gokul Kumar N[2], Mr. Hoysala Vishnu G S[3], Mr. Bharath C M[4],

Dr. Bhaskar S[5]

Student, Electronics and Communication Department, SJCIT, Chikkaballapur, Bangalore, India[1-4]

Professor, Electronics and Communication Department, SJCIT, Chikkaballapur, Bangalore, India[5]

Abstract: The present PDS (Public Distribution System) framework has disadvantages like low processing speed, imprecise quantity of goods, material theft, large waiting time in rationing shop. RFID (Radio Frequency Identification) based programmed rationing shop is novel approach out in the PDS valuable for more effective, precise and mechanized method of distribution of ration. An accurate, automated and efficient RFID based technology used for distribution of ration using AADHAAR card number which is an advanced methodology in PDS. The proposed automated rationing system depends on RFID innovation that replaces regular ration card by RFID tag. Customer's database is already saved in ARM microcontroller which is given by Government Authority. Customer has to scan the RFID tag to RFID card reader and after effective biometric check, customer has to enter material type and also the amount of material with the help of keypad. Accurate amount of food grains is dispensed and as soon as the ration is dispensed SMS (Short Message Service) notification is sent to the customer's mobile number by using GSM module (Global System for Mobile Communication) along with it ARM microcontroller updates its database periodically about the availability of goods and the information regarding the transactions done in a digitized manner and it updates its database to the cloud as well by the use of IOT.

Keywords: Microcontroller-ARM, RFID tag, RFID reader, GSM module, SMS, Sensors, LCD display, Keypad 4x4, DC motor

I. INTRODUCTION

PDS (Public Distribution System) is also called as ration distribution system, which is one of the commonly disputable issues which are involved in malpractices. Public Distribution System of India facilitates supply of rice, ragi, wheat, cooking oil to the Below Poverty Line (BPL) periodically on a monthly basis. Smart Ration Card is a replacement of the normal ration card, which is normally used to supply food grains and other provisions by the Government at a subsidized cost to a specific class of people in the society. 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 Smart Ration Card of the beneficiaries; Avoiding irregularities in distribution of grains; SMS notification on the mobiles of the beneficiaries; Stock maintenance in the distribution centre.

II. SYSTEM OVERVIEW

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 (RFID tag) will be activated after it receives the signals from the interrogator. It operates as follows: The RFID reader sends a broadcast signal to detect the RFID tag; Data is stored within an RFID tag's microchip; 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.

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).

ARM7 microcontroller-LPC2148 is the main module through which all input and output processing is going to happen. ARM Processor is a general purpose 32-bit processor. It offers high performance and very low power consumption. It is based on Reduced Instruction Set Computer (RISC) principles. High instruction throughput. Impressive real-time

response from a small and cost-effective processor. CPU operating voltage range of 3.0 V to 3.6 V. On-chip static RAM is 8 kB-40 kB. On-chip flash memory is 32 kB-512 kB. Accelerator allows 60 MHz high-speed operation.

An LCD display(16x2) is a small, low cost display. A 16x2 Display means it can display 16 characters per line and it has 2 lines. It is easy to interface with a micro-controller because of an embedded controller. This controller is standard across many displays which means many micro-controllers have libraries that make displaying messages as easy as a single line of code. It offers high flexibility to users. LCD display is used to display the result in terms of litres and kilograms.

Global System for Mobile (GSM) is an open and digital cellular technology used for transmitting mobile voice and data services operates at 850MHz, 900MHz, 1800MHz, 1900MHz. GSM is used to send SMS to Beneficiary's Mobile number about the amount of ration material dispensed and the person who has come to ration shop to take the ration along with date and time of Ration distribution. It also sends the date of the next month of distribution, only on or after that date that customer is eligible to take the ration.

DC Motor system is used to open and close the valves for automatic distribution of Rice, sugar and oil. Initial valve arrangement is used to prevent the fall of grains. Three DC motors each having specifications 12V, 60 RPM and 0.37 A are used for this purpose. The Motor Driver acts as an amplifier that converts controller command signal into the power necessary to energize the motor windings. ULN2803 is used here. They are high voltage, high current Darlington drivers comprising of eight NPN Darlington pairs.

Hydraulic valve system is used to control the speed of an actuator by regulating the flow rate. The valve is controlled by the electric current passed through the DC motor.

Solenoid value control circuit is a level sensor which is used for determining the level or amount of liquids, fluids or other material that flows in a closed or open system.
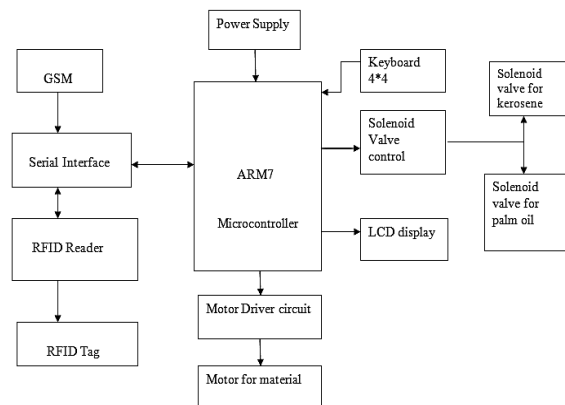
III. SYSTEM ARCHITECTURE

Fig.1: Block diagram of System Architecture

ADVANTAGES

- Easy to use
- Data Integrity
- No mediator Cheating
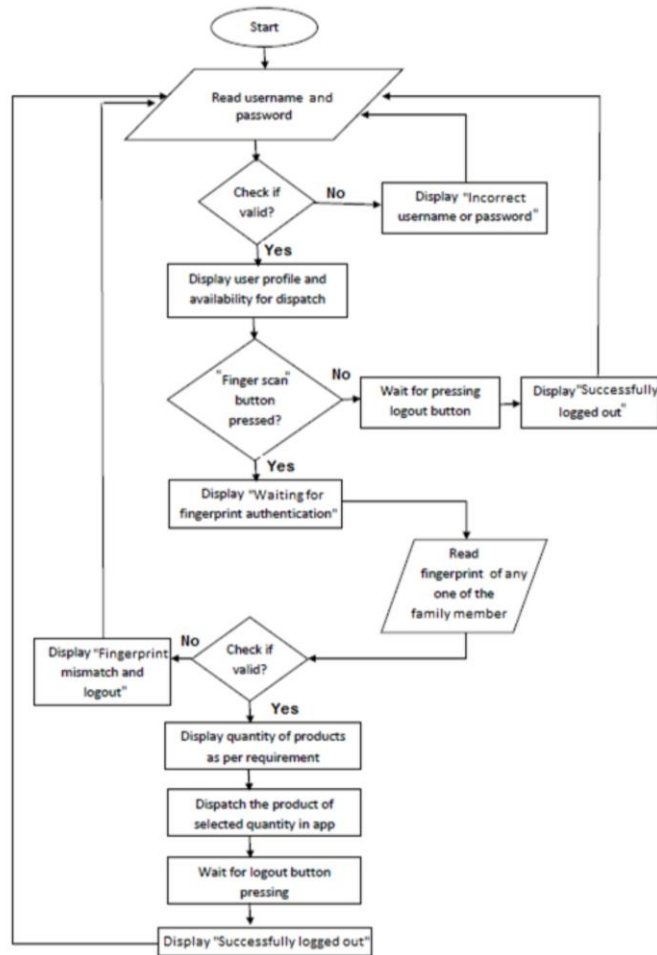- Security/Safety
- Flexibility

IV.FLOWCHART

Fig.2: Block diagram representing algorithm

Fig.3: Snapshot of showing 1kg rice being dispensed

pds		
8	rice	1
8	sugar	1
8	oil	1
16	rice	1
16	sugar	1
16	oil	1

Fig.4: Snapshot of transaction details of user

CONCLUSION AND FUTURE WORK

Ration forgery is one of the most difficult challenges faced by the food department. There may be chances where the ration is delivered to the beneficiaries and false records are noted down, regarding the delivery by commission agent and there is a probability of him selling the commodities in open market with extra profit. Therefore, the proposed system is more secure and transparent then the normal existing system.

IoT based Smart Ration Distribution System is an automation system and it is a recompense over the present fair price shops. Fingerprint authentication makes the system more secure and accurate. It eliminates fake ration card holders and protects the interest of common people ensuring the country's food security. By means of its performance one can reduce the corruption level. The automated PDS is easy to implement and requires much less hard work when compared to the other system. Using this system one can avoid the malpractices because there is no manual operation and also all information is stored in a database. Higher authorities can cross check the details whenever it feels necessary as there is no manual data stored in the registers. So, this system will be really helpful to the people. Just in case the data stored in the microcontroller is thrashed, the data can be retrieved from the cloud's database.

Project can be further extended by making the payment to the purchased commodities can be done online. Thus, it will make system more automatic. Distance of communication by doing between server and client can be increased using internet.

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