Automated Ration Distribution System Using RFID and GSM

Noor Adiba [1], Piyus [2], Akash Kr. Singh [3]

Abstract— **An efficient, accurate and automated technique of ration distribution is RFID (Radio frequency identification) based technology which is an innovative approach in PDS (Public Distribution system). Public distribution system is also named as rationing distribution system which is one of the widely disputable issues that involve malpractices. The existing ration distribution system has high level of corruption like inaccurate measurement of goods, large waiting time, and material theft in ration shop and manual distribution is not easy to handle crowd. In this research paper, the proposed system replaces the manual work in public distribution system. The main objective of the designed system is the automation of ration shop to provide transparency by using, RFID & GSM technology which is similar to the ATM. This automated ration system replaces the conventional ration card system by RFID tag, the government Authority provides the customer's database stored in microcontroller. Customer needs to scan tag to RFID reader, and then microcontroller checks customer's details with stored database to dispense the material in ration shop. After successful authorization, customer needs to enter type of material as well as quantity of material using keypad. After delivering proper material to consumer, proposed ration shop system is connected to the government database via GSM module to provide information to customer as well as PDS authorities.**

Index Terms— **Microcontroller, Arduino, RFID, GSM, Solenoid.**

I. INTRODUCTION

The PDS is recognized by the Government of India, with a network of 4.78 Lakh Fair Price Shops (FPS) is perhaps the largest retail system in the world [1]. This scheme was launched in India on June 1997. Public distribution system provides a ration card issued by the State Government for the purchase of essential consumer materials like rice, wheat, kerosene and oil. The fair price shops are mainly used to distribute the goods at a subsidized price to the poor.

Public Distribution System is one of the widely controversial issues that involve inefficiency in the targeting of beneficiaries and the resulting leakage of subsidies.

The Indian ration card is the authority of the Indian people. It is an important livelihood tool for providing proof of personal identity [2]. Public Distribution System is one of the widely controversial issues that involve malpractice. The manual interference in weighing of the materials leads to inaccurate measurement and it may happen, the ration shop owner illegally uses consumer materials without prior knowledge of ration card holders [1]. In this paper, the proposed automated ration distributed system aids to control

Malpractices by replacing manual work with automatic system based on RFID and GSM technology.

II. LITERATURE SURVEY

This automated ration system replaces the conventional ration card system by RFID tag, the government Authority provides the customer's database stored in microcontroller. The main objective of the designed system is the automation of ration shop to provide transparency by using, RFID & GSM technology.

The RFID systems basically consist of three elements: a tag or transponder, a reader and a middleware deployed at a host computer. The RFID tag is a data carrier part of the RFID system which is placed on the objects to be uniquely identified. The RFID reader is a device that transmits and receives data through radio waves using the connected antennas. Its functions include powering the tag, and reading or writing data to the tag. Consumers are provided with RFID card which acts as ration card. The PDS system today supports over 40 crore Indians below the poverty line with monthly supply of subsidized food grains [2]. This large crowd can be handled by using UID (Unique Identification) number system called AADHAR number which can be linked with government databases.

GSM, which stands for Global System for Mobile communications, reigns as the world's most widely used cell phone technology. GSM is a globally accepted standard for digital cellular communication. GSM is a common European mobile telephone standard for a mobile cellular radio system operating at 900MHZ. It delivers voice, data and facts on a small form factor with low power consumption [3].

In this paper we have designed and implemented an automated ration distribution system using RFID and GSM. In this system every consumer is provided with a RFID card which acts as ration card. The RFID card has unique identification number; the consumer scans the card on RFID reader which is interfaced with microcontroller. After successful authorization, customer needs to enter type of material as well as quantity of material using keypad [4]. After delivering proper material to consumer, proposed ration shop system is connected to the government database via GSM module to provide information to customer as well as PDS authorities. By implementing the automated ration distribution system each user is assured to get a correct amount of ration. The project can be implemented in large scale by using UID (Unique Identification) number system

called AADHAR number which can be linked with government databases [4].

III. PROPOSED METHODOLOGY

A. Block Diagram

The basic setup of the complete project consists of Arduino Board, Motor/Solenoid Valve, RFID Tag, RFID Reader, keypad, LCD display, Power Supply, Alarm. The proposed system demonstrates distribution of solid as well as liquid consumer materials that is grains (wheat/rice) and kerosene [1]. RFID reader and keypad acts as inputs to system and LCD is used for displaying ration stock and related activities. The microcontroller outputs are used to drive motor and solenoid valve.
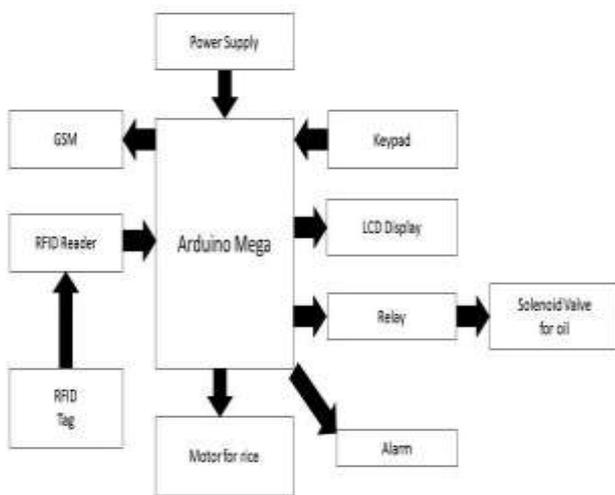

Fig 1: Block Diagram

B. Algorithm

Algorithm of proposed system is:

1. Every consumer is provided with a RFID card which is registered by the Government database.
2. At the time of ration distribution at ration shop, consumer scans the RFID card and enters the password.
3. Password of consumer is verified with the database provided by the Government authority which is stored in the microcontroller.
4. Once verification is successful, User ID is displayed on LCD, consumer is asked for a select type of material through keypad.
5. Based on type of material chosen, the consumer is asked for the amount of quantity through keyboard.
6. The motor or solenoid valve is activated based on the material chosen.
7. After dispensing exact quantity of material motor or solenoid is disabled.
8. The information in form of SMS is send through GSM module to the user as well as PDS authority.
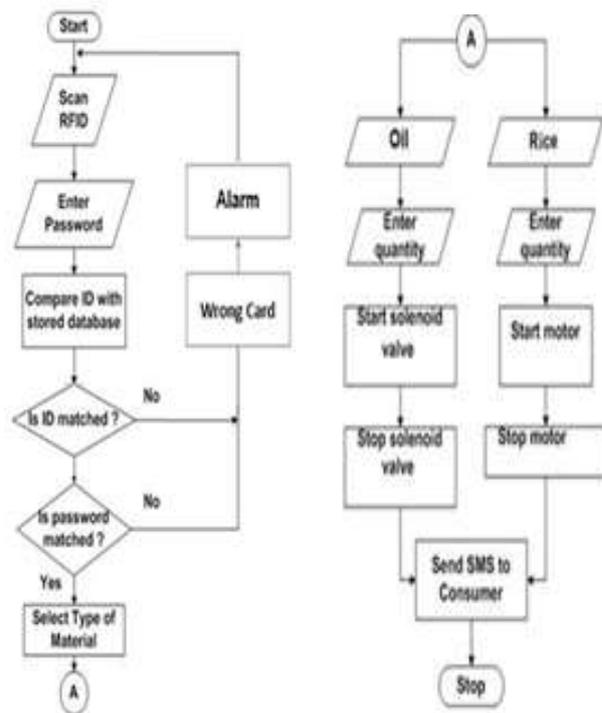
C. Flowchart

Fig 2: Flowchart

IV. CIRCUIT DIAGRAM

Microcontroller Atmel 2560 is the heart of the ration materials distribution system. The circuit diagram is shown in the Fig. 3
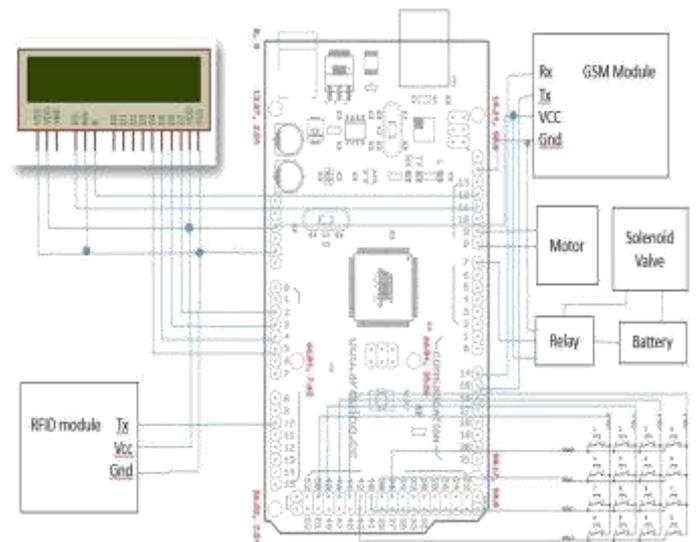

Fig 3: Circuit Diagram

A. Microcontroller

The 12 MHz crystal oscillator is used to provide the required clock signals to the microcontroller. The Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a

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power jack, an ICSP header, and a reset button [4].

B. LCD display and Keypad interfacing

A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. The LCD is used in a wide range of applications including computer monitors, televisions, instrument, aircraft cockpit displays.

Hex key pad is simply an arrangement 0f 16 push button switches in a 4X4 matrix form. Typically, a hex keypad will have keys for number 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and letters A, B, C, D, *, # [4].

C. Relay and Solenoid Valve

A solenoid valve is an electromechanically operated valve. The valve is normally closed. It is controlled by current through it. The solenoid valve is interfaced with Arduino using relay circuitry. Solenoid valve is used in system for controlling the flow of kerosene. As soon as consumer selects kerosene and its quantity, solenoid valve switched on by relay circuitry. The ON time of Solenoid valve depends on selected quantity of kerosene. Solenoids offer fast and safe switching, high reliability, long service life, good medium compatibility of the material used, low control power and compact design.

D. Motor and Alarm

Features of Motor

- High torque DC motor with 180 RPM.
- Metal Gear box with centered shaft length 14mm.
- 6mm diameter shaft with M3 thread hole.
- No load current 800mA, load current up to 7.5A.

V. IMPLEMENTATION RESULTS

In our proposed model, the Arduino Mega 2560 board is firstly interfaced with LCD to display the cardholder information like their name, monthly withdrawal information, etc. The Solenoid valve and gear DC motor is interfaced with Arduino board, the Solenoid valve is controlled by the relay circuit and it is used to distribute the liquid like Kerosene oil, Palm oil, etc. This model also consists of interfacing of GSM module and membrane keypad to the Arduino board. Here GSM is used for delivering of messages to the authorized person for having the log of information of transaction just like ATM system and keypad is used for entering different choices.

Fig 4: Automated ration distribution System

The mechanical part of the automated ration distributed is shown Fig. 5. It contains an RFID module interfaced with Arduino with a GSM module. A LCD is also interfaced. A motor and a solenoid with relay is also interfaced which is used for the dispense the ration. The alarm is also interfaced to detect the wrong card. The full working is shown below in different figures [4].
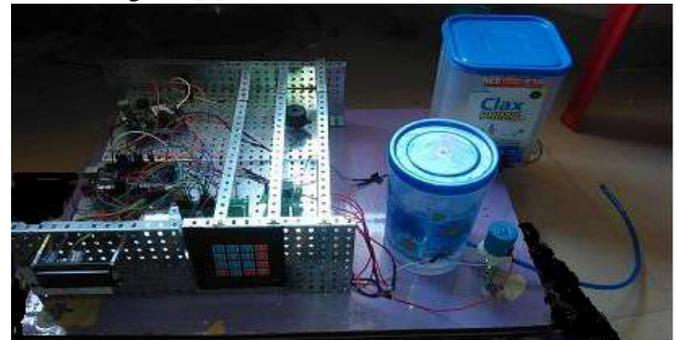

Fig 5: Automated ration system with mechanical Part
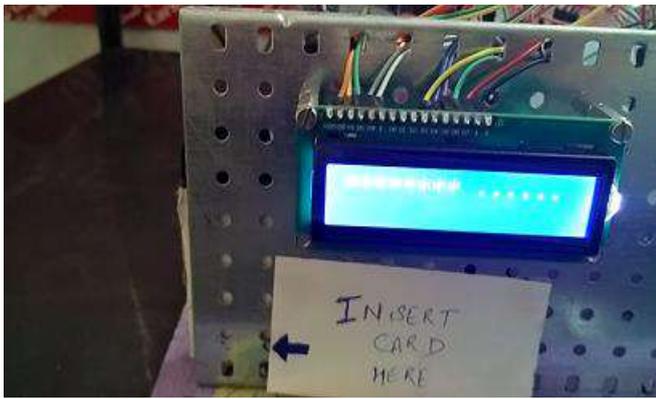

Fig 6: Show your RFID tag

Fig 7: Enter Password
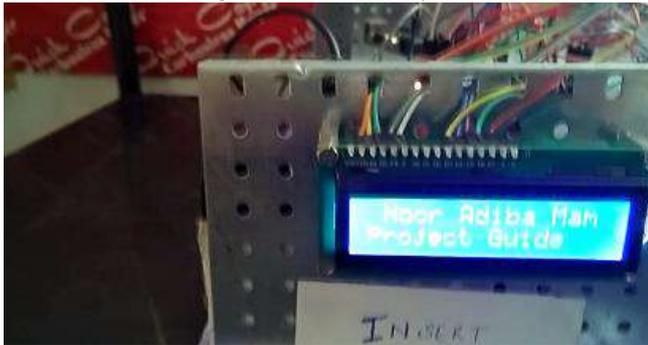
Fig 8: Password Verified

Fig 13: Sending message
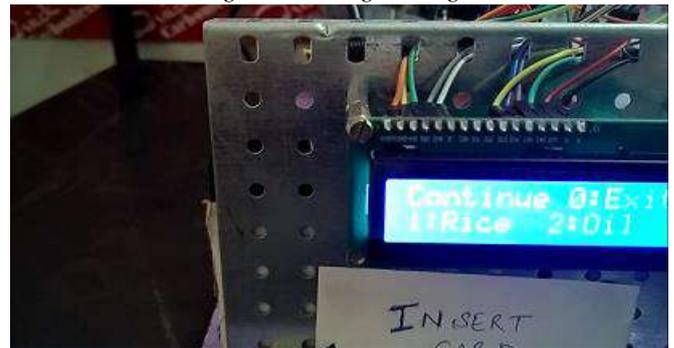

Fig 9: RFID tag detected

Fig 14: Continue or Exit

Fig 10: Ration Selection

Fig 15: Oil drawn from system

Fig 11: Rice Selected

Fig 16: Thank You

Fig 12: Rice drawn from system

VI. CONCLUSIONS AND PERSPECTIVE

Automated Ration Distribution System Using RFID and GSM System has been successfully implemented. This system is secure and user friendly, even the uneducated people can operate with RFID. The record of each user is maintained in a specific database which helps the people who travel from one place to another. This model will help a lot of people who rely upon ration shops. The methodology can be

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adopted by the government and be implemented in large scale. The future ration shops can include these modules to run in an effective manner so that the crime rate is reduced and poor people can get their share. The ration shop owners can't cheat the users by using manipulated balances, load cell is used which measures correct amount of ration. For future research the proposed methodology can be modified to include thumb impression (Bio-metric) for authentication instead of RFID tags to give more security.

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