

SMART RATION DISTRIBUTION SYSTEM

Tarun Kumar, Shivani Sharma, Ankush Raina, Nikhil Pathania

MIET Jammu

Abstract: The Public Distribution System (PDS) of today is one of the widely controversial issues that involves malpractices such as corruption and illegal smuggling of goods. In this paper, the analysis for use of “Smart Ration Distribution System” is presented. This proposed project based on Radio Frequency Identification (RFID) technology aims to minimize the malpractices by replacing conventional ration cards with the RFID tags. The database of customers, provided by the Government Authority is stored in the microcontroller. The customer is required to scan the RFID tag to RFID reader and the microcontroller then checks for details of the customer with the stored database of the customer in microcontroller to allow for material (ration) dispensation. After successful verification, customer needs to enter type of material as well as quantity of material using keypad. After proper material dispensation to the consumer, the microcontroller sends the information to customer as well as PDS authorities using Global System for Mobile (GSM) technology.

Keywords: Arm Microcontroller, RFID, GSM, Solenoid Circuit, Relay, RS-232

I. INTRODUCTION

The present Public Distribution System allows for ration distribution to the card holders with the requirement of first submitting the ration card and secondly to put the sign in the ration card depending on the material. Then the materials will be dispensed through the weighting system involving the help of human. But the system in use suffers from two basic and noticeable drawbacks, one being the inaccuracy in imprecise weighing of materials due to human errors or mistakes and secondly if a customer doesn't buy the materials at the end of month, the ration shopkeepers sell the materials to someone else without proper intimation to Government Authority and customers. In this paper, the proposed project “Smart Ration Distribution System” aims to overcome these above mentioned drawbacks. In this project instead of conventional ration cards the customers are allotted RFID Tags which serve the purpose of ration cards and these RFID (RADIO FREQUENCY IDENTIFICATION) Tags have a unique identification number. The customers are required to scan the respective RFID Tags on RFID reader which is interfaced with the microcontroller for the distribution of materials [1]. Then the customers' details are validated and after the verification is completed successfully, the customer is required to select the type of the material and the quantity of the same with the interfaced keypad. Based on the type and quantity of material(s) selected by the customer, an appropriate circuitry will be activated and the selected material(s) will be dispensed to the customer. Another technology used in the proposed project of this paper, is the GSM (GLOBAL SYSTEM FOR MOBILE) technology, which communicates the message of ration delivery in the form of SMS to the concerned authority i.e., Government and customer. The major component along with the block diagram of the proposed system is shown as under.

II. BLOCK DIAGRAM

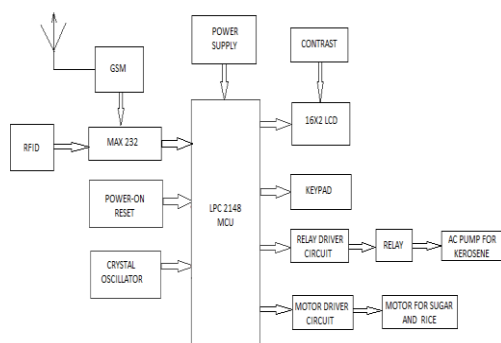


Fig1. Block diagram of the Smart Ration Distribution

The ration distribution system consists of GSM module, RFID module, ARM processor, Solenoid valve circuits, keypad, 16x2 LCD display, and Power supply. The description of the components of ration distribution system is as follows:

A. Power Supply: The power supply is necessary as it will provide power to the microcontroller and other electronic devices.

B. RFID Module: RFID tags fall into two basic categories – Active and Passive Tags.

Active Tags are powered by Batteries and either they have to be replaced, their batteries are to be replaced or disposed off in case their batteries fail. Passive Tags do not have batteries and these tags have indefinite life expectancies. The various operating frequency ranges of RFID Tags are:

LF	LOW FREQUENCY	30 kHz to 300 kHz	125 kHz
HF	HIGH FREQUENCY	3 MHz to 30 MHz	13.56 kHz
VHF	VERY HIGH FREQUENCY	30 MHz to 300 MHz	Not used for RFID
UHF	ULTRA HIGH FREQUENCY	.300 MHz to 3 GHz	868 MHz ,915 MHz

C. ARM Microcontroller: It is the heart of automatic ration distribution system. The microcontroller is used to store the databases of the customers which is used for validation purposes at the time of RFID tag scanning [2], [6].



The following features of LPC2148 are:

- It is a 32-bit ARM Microcontroller.
- It has 8kb to 40 kb of on –chip static RAM and 32 kb of on-chip flash memory.
- Contains 128-bit wide interface which enables high speed 60 MHz operation.
- Has a USB 2.0 full speed compliant device controller.
- Supports In-System Programming /In-Application Programming (ISP/IAP) via on-chip boot loader software.
- There are two 32-bit timers/external event counters, PWM unit and watchdog timer.
- Comprises multiple serial interfaces including two UARTs.
- Contains a single 10-bit DAC providing variable analogue output.
- Has up to 21 external interrupt pins available.
- The on-chip integrated oscillator operates with an external clock from 1MHz to 25MHz.

D. LCD and Keypad: LCD is an electronic visual display and it uses the light modulating properties of a liquid crystal. The proposed system uses 16x2 LCD modules [2], [5]. The module is easily programmable and economical too. The 16x2 LCD modules are interfaced with arm microcontroller LPC2148. The system uses a 4x3 matrix keypad. Both the terminals of the switches of 4x3 matrix keypad are connected to the port pin i.e. four rows and three columns of the microcontroller. Each row and column section is pulled high or low to scan particular key press. LCD displays the keys meant for selecting the respective materials.

E. GSM Module: A GSM modem can be either a mobile device or a modem device which is used to make a computer or any processor communicate over the network. It requires a SIM card for its operation and it operates over a network range which is subscribed by the network operator. It can be connected to devices through USB, Bluetooth or Serial connection. This device is used in this system to communicate the message of material delivery to the concerned authority and the customers.

F. Solenoid Valve: It is an electromechanically controlled valve. It consists of an electric coil with a movable ferromagnetic core in its centre. This core is called the plunger. In rest position, the plunger closes off a small orifice. An electric current through the coil creates a magnetic field. The magnetic field exerts a force on the plunger. As a result, the plunger is pulled toward the centre of the coil so that the orifice opens. This is the basic principle that is used to open and close solenoid valves. "A solenoid valve is an electromechanical actuated valve to control the flow of liquids and gases [3]-[4]."

Solenoid valves are amongst the most used components in gas and liquid circuits. The use of solenoid valves in some of the applications include heating systems, compressed air technology, industrial automation, sprinkler systems, car wash systems, irrigation systems etc. In the proposed system, it is used to regulate the flow of liquid materials such as kerosene.



Fig 2. 2/2 way solenoid valves.

III. METHODOLOGY

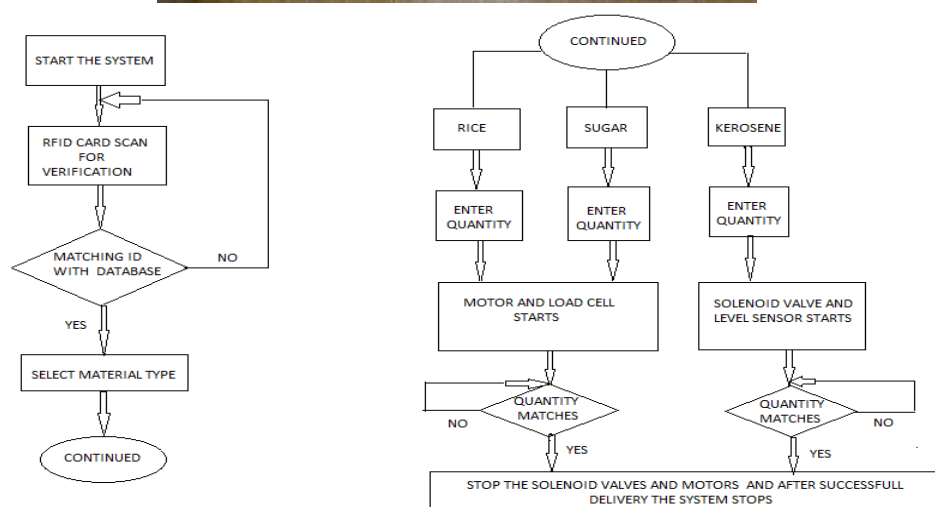


Fig 3. flow chart of smart ration distribution system

The methodology of the proposed system is given under algorithm as follows:

- Every consumer is provided with a RFID card which is registered by the Government authority.
- At the time of verification, first password of consumer is verified.
- Then User ID is verified with the database stored in the microcontroller provided by the Government authority [6].
- Once verification is successful, consumer is asked to select type of material and quantity required through push buttons and keypad respectively.
- Based on type of material chosen by the consumer, the motor or solenoid valve is activated.
- The load cell or level indicator is checked for proper quantity.
- After collecting proper quantity material, motor or solenoid is disabled.
- GSM module will send the information in the form of SMS to the user as well as PDS authority.

..

IV. CONCLUSION

The proposed project aims to minimize the malpractices such as imprecise weighing of the materials due to human mistakes which is more in a conventional ration distribution system. It reduces the processing speed, waiting time and also the material theft. The automatic ration distribution system which is based on GSM and RFID technology replaces the need for conventional ration cards with the RFID tags, which the customers need to scan at the time of details verification. The another drawback of conventional ration distribution from the perspective of providing materials to someone else if the customer fails to collect the ration at the due time is also overcome by the use of the automatic system. In the automatic dispensation, after the database of a customer is successfully validated, the ration distribution starts and once the ration reaches the intended customers, the GSM module which is also interfaced with the microcontroller automatically sends an SMS message to the Government Authority of ration delivery. Thus the new system of ration dispensation would bring transparency in Public Distribution System and it also has some more advantages like paper work reduction, systems' cost effectiveness including proper maintenance of data.

V. FUTURE SCOPE

The future scope of the mentioned project can be extended to include a finger print scanner for better and high security performance of the system and also a debit card system for billing purposes at shopping places such as shopping malls etc[7].

ACKNOWLEDGEMENT

We extend our gratitude to our project guide Dr. Radhika Khanna for the kind inspiration, encouragement, guidance and valuable suggestions.

REFERENCES

- [1]. Vikram M Kakade, Jagruti Utane, Priti Pachare "Review of RFID & GSM Based Automatic Ration Distribution System" International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 5, Issue 2, February 2016.
- [2]. Vinayak T. Shelar, Mahadev S. Patil, "RFID and GSM based Automatic Rationing System using LPC2148" International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 4 Issue 6, June 2015.
- [3]. S.Valarmathy, R.Ramani,"Automatic Ration Material distributions Based on GSM and RFID Technology," International Journal of Intelligent Systems and Applications, vol 5, pp.47-54, Oct 2013.
- [4]. S.Valarmathy, R.Ramani, "Automatic Ration Material Distributions Based on GSM and RFID Technology" International Journal Intelligent Systems and Applications, 2013, Vol. 11, pp. 47-54.
- [5]. Noor Adiba, Piyus, Akash Kr. Singh "Automated Ration Distribution System Using RFID and GSM" International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 5, Issue 7, July 2016.
- [6]. Pranjali Pedwal "Real Time Automatic Ration Material Distribution System" IOSR Journal of Computer Engineering (IOSR-JCE) e-ISSN: 2278-0661, p-ISSN: 2278-8727 PP 05-09.
- [7]. M.S.MANIVANNAN, Dr.P.KANNAN AND Dr.M.KARTHIKEYAN "FULLY AUTOMATED RATION DISTRIBUTION SYSTEM" International Journal of Research In Science & Engineering e-ISSN: 2394-8299 Volume: 2 Issue: 1 p-ISSN: 2394-8280.