

# AUTOMATION OF RATIONSHOP USING RFID

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*Abstract*— Rationing distribution is one of the widely controversial issue that involves corruption and illegal smuggling of goods. One reason of this to happen is because every job in the ration shop involves manual work and there is no specific technology involved in automating the job. These irregularities or illegal activities are for example - wrong entries in stock register of shop containing wrong stock information of the products that is supplied to the public, sometimes there are chance of distribution of low quality/graded products than the actual products provided by the Government for supplying to the public, also the information regarding the actual available stock quantity in a ration shop that is provided by the Government to the public. In this paper we propose the concept of replacing manual work/job in distributing the commodities to the public by automated system which can be installed in a ration shop with ease. Here RFID card reader is used and the person has to show the RF card to the card reader which is provided to the user. This prompted us to interface RFID reader to the microcontroller (PIC 16F877A) and PC via RS232 to develop such a system. Using such a system, Government would have all required control/monitoring over the transactions at ration shop. In our project we designed the hardware for three commodities namely Sugar, Rice and Kerosene as other products can be provided as packets to the users. These three commodities are stored in reservoir tanks and they are measured and supplied to the user as and when required. In our project there is also option to block the card if the user has lost his card. The user can block the card with the help of the worker by displaying any proof of the user that he is belonging to the same family. The user after blocking the card, can also be able to apply for a new card. The user can also able to change their personal details like changing address, adding or removing the members of the family by showing birth certificate or death certificate to the worker. Hence it is possible to prevent the corruption and irregularities at a ration shop.

*Keywords* — RFID Tags, RFID Reader.

## I. INTRODUCTION

Our paper focuses on design and implementation of Automation of Ration shop. Due to manual measurements in the conventional system, the user cannot able to get the accurate quantity of the material. There is also a chance for the illegal usage of our products in the conventional system. To avoid these limitations, we go for Automation of Ration Shop System. In this system, RF tags will be provided to all the users in which the information about the users like photo of the head of the family, address, number of persons in the family, names and ages of the family members. Only one worker is enough in this system for paying money to the commodities. The user have to bring the RF card near the RFID reader. Each RFID will be having unique ID number. The user have to remember this ID for blocking the card incase if they missed their card.

The reader reads the ID of the card and it displays on the PC. There will be three options on the PC. They are PURCHASE, BLOCK, DETAIL CHANGING. Then the user have to select the option with the help of the worker. Based on the number of persons in the family the commodities will be allocated. The user has to enter the required amount of goods and they have to pay to the worker. Then the user should go near the vending machine and should place their bag. The worker will enter OK button on the PC so that the entered amount of the commodity will be flowing from the vending machine. The database will be maintained on each ration shop so that if the user changes their address which does not include that ration shop then that RFID number will get stored in the respective area ration shop's database.

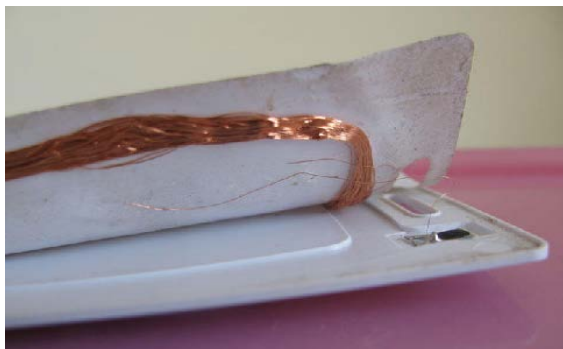
## II. RFID TAGS

RFID tag is a small device which stores and sends data to RFID reader. They are categorized in two types- **active tag** and **passive tag**. Active tags are those which contain an internal battery and do not require power from the reader. Typically active tags have a longer distance range than passive tags. Passive tags are smaller

and lighter in size than the active tags. They do not contain an internal battery and thus depend on RFID reader for operating power and certainly have a low range limited up to few meters.



**Fig 1: A RECTANGULAR PASSIVE RFID TAG**



**Fig 2: REMOVING THE BACKSIDE LAYER OF THE TAG DISCLOSES THE ABOVE LOOK.**

In this paper, passive tags are used. A passive tag consists of a microchip surrounded by a printed antenna and some form of encapsulation, plastic laminates with adhesive that can be attached to a product or a small glass vial for implantation. The tag reader powers and communicates with passive tags. The tag's antenna conducts the process of energy capture and ID transfer. A tag's chip typically holds data to identify an individual product, the product model and manufacturer. Fig 2 shows the look of the passive tag when the backside layer of the tag is removed. The copper coil is also known as the antenna in fig 2.

### III. RFID READERS

**Fig 3: DATA TRANSMISSION BETWEEN RFID CARD AND RFID READER**

Radio Frequency Identification Devices (RFID) is a data communication method for remotely storing and retrieving data between a Reader and a Card / Tag as shown in fig 3. The communication distance range from a couple inches to many meters. In fig 4, the RFID Reader additional board is used to read identification cards (RFID Cards) using radio waves. This additional board features a receiver/transmitter module with antenna and a 2x5 pin connector that enables connection with development systems. The operation of the RFID Reader board is based on amplitude modulation of radio waves and electromagnetic induction. The RFID card is not provided with the RFID Reader, but you can buy it separately. The presence of the power supply is indicated by a LED marked POWER.

When the RFID Reader is turned on, a 125 kHz voltage is supplied on its antenna. As a result, the antenna starts emitting an electromagnetic field necessary for reading the RFID identification card. As passive RFID card doesn't have its own power supply, it features a coil where the voltage is automatically induced by approaching the card to the RFID Reader's antenna. This voltage is necessary for the chip featured on the RFID card to work. The memory chip on the RFID card contains a unique identification code. This code is sent by the card when it

is placed close to the RFID Reader's antenna. The code is received via this antenna. Then, it is sent to the microcontroller for further processing.

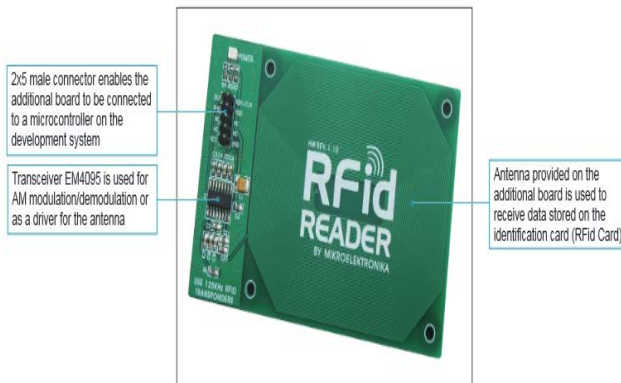


Fig 4: RFID READER

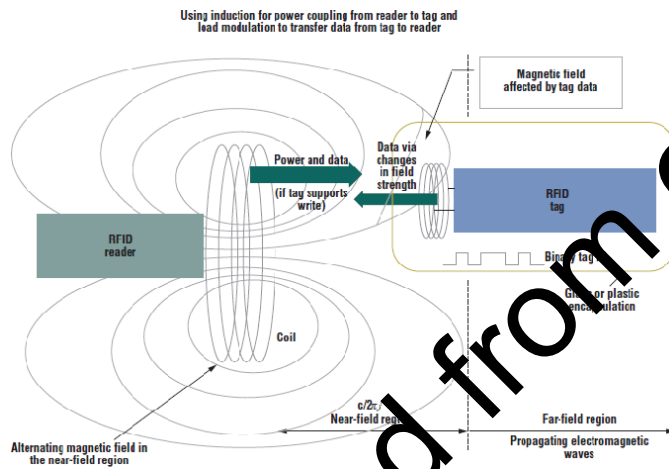
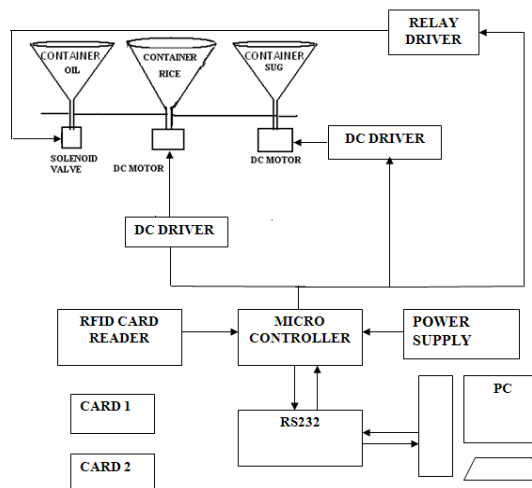


Fig 5: Operation of RFID CARD READER

IV. GENERAL BLOCK DIAGRAM OF THE SYSTEM



### Fig 6: BLOCK DIAGRAM

Fig 6 shows the general block diagram of the proposed system. The reader passes a large alternating current through a reading coil, results in an alternating magnetic field. A tag that incorporates a smaller coil in this field, an alternating voltage will appear across it. This voltage is rectified and coupled to a capacitor, a reservoir of charge accumulates, which is used to power the tag chip. The tag use near field coupling send data back to the reader using load modulation (the data).

Then this data is passed to the microcontroller (PIC 16F877A) and gives output in digital form which is sent to the PC via RS232. And the PC makes the given data to produce the details of the card holder and further processing of good happens through the DC motor and the solenoid valve.

DC motor is used to draw rice and sugar materials which controls the flow of them using a DC driver and the flow of oil is controlled by the solenoid valve which opens and close as and when required which is operated with the help of relay.

#### 4.1 POWER SUPPLY

As we all know any invention of latest technology cannot be activated without the source of power. All the electronic components starting from diode to Intel IC's only work with a DC supply ranging from  $\pm 5\text{V}$  to  $\pm 12\text{V}$ . We are utilizing for the same, the cheapest and commonly available energy source of  $230\text{V}$ - $50\text{Hz}$  and stepping down, rectifying, filtering and regulating the voltage. The power supply output is given to micro controller and other circuit also; the design of the power supply is mainly because of the micro controller, the micro controller work in Dc source with a voltage of  $+5\text{V}$ . As we are getting the line voltage VL has  $230\text{V}$  in ac source, so it is not possible. This power supply designs an output of  $+5\text{V}$  DC to activate the micro controller.

#### 4.2 MICRO CONTROLLER

The micro controller, which we are using here, is PIC 16F877A. It consists of 5 ports, ADC, CLK& MCLR. These are inbuilt with in 40 pins. The micro controller accepts and gives the o/p in digital form.

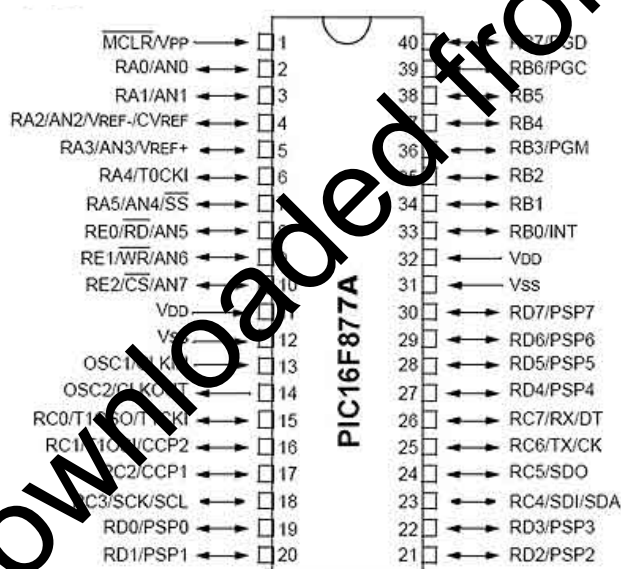


Fig 7: PIN DIAGRAM OF PIC16F877A

#### 4.3. RELAY

A relay is an electrical switch that opens and closes under the control of another electrical circuit. In the original form, the switch is operated by an electromagnet to open or close one or many sets of contacts. Because a relay is able to control an output circuit of higher power than the input circuit, it can be considered, in a broad sense, to be a form of an electrical amplifier. Mechanical relays are devices that can turn on or turn off the power

supplied to another device, like a switch. However, instead of having a person flip the switch, mechanical relays switch when provided with a small amount of power. This allows high-power circuits to be controlled by low-power devices. Mechanical relays use an electromagnetic coil to open or close the circuit. When current runs through the input and energizes the coil, it creates a small magnetic field which either pulls the arm of the switch away from the other contact of the switch, or pushes it down to close the switch depending on the how the switch is made. A relay also serves as an isolator, because the control (input) and load (output) ends of the relay are not electrically connected. This allows you to protect the device you're using to control the relay from power surges in your application. Relays are designed to be controlled by a particular voltage applied to the coil. Since mechanical relays are nothing more than a controllable switch, they support both AC and DC loads. A relay has an electromagnet, called a coil, and a lightweight switch inside it. When you energize the coil, a piece of the switch is attracted by the coil's magnetic field, which switches the switch on or off.

#### 4.4 DC MOTOR

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion. This DC or *direct current motor* works on the principal, when a current carrying conductor is placed in a magnetic field, it experiences a torque and has a tendency to move. This is known as motoring action. If the direction of *electric current* in the wire is reversed, the direction of rotation also reverses. When *magnetic field* and *electric field* interact they produce a mechanical force.

#### 4.5. RS 232

In telecommunications, RS-232 (Recommended standard 32) is a standard for serial binary data signals connecting between a DTE (Data terminal equipment) and a DCE (Data Circuit-terminating equipment). The most common communication interface for short distance is RS-232. RS-232 defines a serial communication for one device to one computer communication port, with speeds upto 19,200 baud. Typically 7 or 8 bits (on/off) signal are transmitted to represent a character or digit. The 9 pin connector is used. The pin details is given in fig 8.

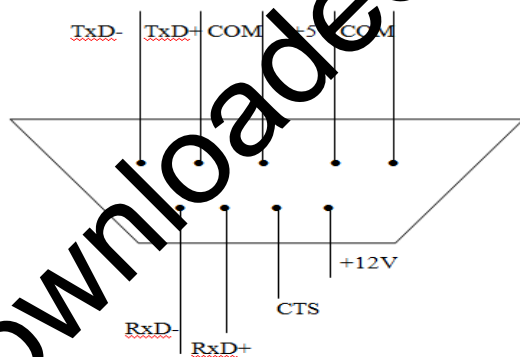


Fig 8: RS-232 9 PIN CONNECTOR

## CONCLUSION

The cost of the proposed system is found to be very less when compared to the existing ones. This system helps to avoid unnecessary losses to the public. Since we use a security system it is used as a good database management where a persons information cannot be stolen at any cost. Even the illiterate people can make use of this proposed system with ease. With this system the user can easily change their personal details with more security. In case of missing their card, the user can easily block their card so that misuse of the cards can be easily prevented. With the help of this system, the government can have a accurate database about the amount of commodities used by the public. So the irregularities at the ration shop can be prevented.

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