# SMART GROCER

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## ABSTRACT

*This project is about Smart Grocer. It is a machine that dispenses items like pulses, nuts, rice, cereals, fluid etc to customers automatically. Large scale retailing is possible through these machines by placing the machine at convenient locations like bakery and public distribution shops etc. This reduces usage of plastics and malpractices at grocery shops. Machine contains three systems payment system, delivery system and storage systems. Separate bins are used as storage units. Payment systems contain cash mode and cashless are commonly used .Here cashless payment like RFID systems is used as payment option. LCD is used as displaying unit. In this machine there are different chambers for dispensing the items. Each chamber has one continuous rotation DC motor attached under it, when someone insert RFID card on machine and presses the button, then corresponding DC motor rotates and dispenses the items .it measures the quantity itself by the predefined value and the items is dispensed as per amount entered .Adruno uno microcontroller is the used. It is the brain of the systems which controls all subsystems like sensor modules and data base systems that connected across it. This machine provides several advantages like plastic reduction saves human effort, money and time. It is more reliable .the system will bring more improvements in the future.*

**Keywords:** *RFID, LCD, DC Motor, Adruno uno microcontroller , Sensor, Shops*

## 1.INTRODUCTION

This project focuses on implementation of automatic distribution system in a ration shop. Civil Supplies Corporation is the major public sector company which manages and distributes the essential commodities to all the citizens. In the system we mainly focus on the various essentials like nuts pulse, rice etc.… are distributed using convectional grocery shops. There is a chance of illegal usage of products in convectional system; the materials may be robbed in the register without the knowledge of customers. Due to this a large amount of money given by the government gets wasted. In these days usage of plastic are increases in these shops .So now our state government banned the usage of plastic in this system to support the government we can recycle our containers in that already we have in our houses .Everything we buy from shops are packed in plastics, after use plastic becomes a waste. So that usage of plastic increases. In this machine items are stored in bins. they can select the quantity and customers receive items directly from bins to customers own containers. Thereby we can reduce the plastic usage in public distribution system as well as in many stores like bakery, grocery shop ,ration shops etc.…The money handling is mostly done by RFID signals. The money transfer is using RFID cards. So, we can make easy handling of money. To overcome these problems, automation of ration shops using embedded C languages is proposed in this project. In our project we designed the hardware for two commodities are stored in reservoir tank and they are measured and supplied to the users as and when required. Motorized gate valves are used for the delivery operations. It consists of the reader component and reader tags and when the reader tag is placed on the reader component, the motorized gates will be opened or closed. This leads to different types of malpractices in ration shops and many other errors and corruption practices too. Anything which reduces human effort is a machine and, on the same lines is proposed an automated ration vending machine.

The proposed system reduces malpractices at ration shops, eases data maintenance reduces paper works.Save time and is cost-effective approach automation is the key for smooth running of processed today. At the end of the

day, stock availability of each price shop can be collected, and theft of the materials can be avoided. Managing plastic waste is an important point of concern these days. The main aim of this project is to present the concept of vending machine which is proposed to serve as a solution to the problem of pollution caused due to plastic item especially plastics which are comply used for package of food items like cereals, pulses, nuts… etc. The concept of this machine is an approach towards green engineering technology. The machine is an integration of sensors, LABVIEW programming along with data acquisition and pneumatics technology. This machine is a low-cost automatic machine. The present article also focuses on the concept of cashless mode of payment where it promotes customer satisfaction and help in reducing greenhouse gas emission and pollution.

## 2.PROBLEM IDENTIFICATION

In our public distribution system we use a large amount of plastic bags. There is a huge production for plastic bags for the grocery shop this will generates a lot of environmental problems. As we know, plastic is non-biodegradable when plastic thrown on land it makes the soil less fertile, when thrown in water it chokes our ponds, rivers and oceans and harms the sea life because the bacteria in their stomach cannot break the plastic up into smaller pieces. For the reduction of usage of plastics and also the reuse of plastic bags we came into this project. Recently, our group visited an eco-friendly grocery shop near to our college and found that they reduce the plastic usage and recycle of plastic bags and we found some limitation there and we overcome those limitations in our project. We also face so many corruptions in this system and also difficulty in money handling in this field. We overcome these limitations through this project. Usually it takes more time for purchasing food items in grocery and stationary shops .through this project we can save time. Customer can buy the desired quantity of food items in a single step.

## 3.LITERATURE REVIEW

[1]Our group visited an eco-friendly grocery shop named 7 to 9 near to our college and found that they reduce the plastic usage and recycle of plastic bags and we found some limitation there. Grocery items like cereals, pulses and nuts are stored in different bins which have an opening liver and slots at bottom. Customers can collect the items at required quantity by pulling over the lever and items are collected by customers own container and we found some limitation there we overcome those limitations in our project

**Abhirup kar and Mohak gupta** presented [2] Rfid-based automatic ration vending machine to avoid corruption and malpractices at ration shops. In this system, various essentials like rice, sugar and water are distributed using conventional ration shop system There is a chance of illegal usage of products in the conventional ration system; the materials may be robbed by making wrong entries in the register without the knowledge of the ration card holder. Due to this, a large amount of money given by government gets wasted. To overcome these problems, automation of the ration shops using Embedded C Language is proposed to design the hardware for two commodities namely Rice and Water.

**Aswathy B** describes [3] Automated Ration Material Distribution System People having a ration card can buy various groceries. Present ration system has two imperfections, one the weight of the material may be inaccurate due to human mistakes and the other one is if the materials are not bought till the end of the month, ration shopkeepers will sell it to others at higher rates without the notice of the customers and the government. An Automated Ration Material Distribution System based on Radio Frequency Identification (RFID) technology instead of traditional ration cards to get ration materials.

**Aye Aye Nyein** explains [4] RFID Based Vending Machine .This vending machine which provides the beverage like snacks, cold drink, it is also used for ticketing. These systems are operated on either coin or note or manually switch operated. This paper presents the system which operates not on coin or note, it operates on RFID system. This system gives the access through only RFID which avoid the misuse of machine. A small RFID reader is fitted on the machine. The identity card which contains RFID tag is given to each person. If the ID card owner wants to get some snacks, by showing the ID tag to the reader is the only way to get the desired snacks and the amount to money to pay will be deducted from the account.

**Susanne gruber** presented [5] the commodity vending machine. This paper describes the groups of players in the

vending market and introduces a typology of vending machines. From a commodity perspective, vending includes the discussion of the types of vending machines and their technical demands for storing and preparing goods and services and for installing the vending machine at a certain location. From a marketing perspective, vending is defined as the distribution and selling of goods and services by a vending machine. In addition, a vending machine is seen as a distribution channel of a retailer.

**Dr. R.R. Dube, et al**., [6], explains a system where the smart card can be used in the place of a ration card. The device is placed at all the ration shops of the country which uses the internet to connect to the server. The user has to login to the system each time before collecting ration materials. The payment for the ration materials is automatics it is directly deducted from the customer bank account through web once the user enters data in the application. The details of the transaction are sent to the users mobile. This reduces cheating of employees about the rates of materials.

**KrithikaPatil, et al**. [7], describes a system where the RFID card is used for the authentication process and the information about the ration material delivered will be directly sent to the Government automatically using Global System for Mobile Communication (GSM) technology. Use of RFID cards for authentication and it is verified with the data in the database once it is verified the user has to input the materials needed through push buttons and keypad the grains start filling in the container the solenoid valve closes once it reaches the required weight and the GSM sends message to the user as well as the PDS authority

**Parvathy A, et al**. [8], presents an efficient method for the management of examination hall. The system is designed mainly for students to identify the respective examination hall during exams. An RFID card and an RFID reader is used for this purpose. This system helps in identifying the floor or to get directions of their respective examination halls immediately. The card reader is located at the entrance of the building so that the students can identify their respective examination halls while entering the college itself. Thus this system explains the use of RFID technology in the field of education.

## 4.COMPONENTS

### 1.Battery

Battery is one of the important parts of Smart grocer. It is connected to DC motor by electric wire. 12 v Battery is used in this. It is store electrical energy and supply to DC motor so that motor will rotate clockwise and anticlockwise direction. Batteries operate by converting chemical energy into electrical energy through electrochemical discharge reactions. Batteries are composed of one or more cells, each containing a positive electrode, negative electrode, separator, and electrolyte. Cells are to be divided into two major classes primary and secondary. Primary cells are not rechargeable and must be replaced once the reactants are depleted. Secondary cells are rechargeable and require a DC charging source to restore reactants to their fully charged state.

### 2.DC Motor

DC Motor are used to control the opening and closing of valve In this machine two DC motor are provide in each to rotate clockwise and anticlockwise direction. The specification of motor used is 12 V, with 15 rpm .When power supply from battery to DC motor then DC motor rotate in clockwise direction and when reverse current supply from battery to DC motor then DC motor will anticlockwise direction. Which will forward and backward movement of valve. An electric motor uses electrical energy to produce mechanical energy. 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. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. 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.

### 3.Fixed Frame

The fixed frame forms the base of the Smart grocer. This frame is made of iron. The whole parts and systems are arranged on this iron frame. The frames are strong and rigid so that it can absorb all vibrations and makes it stable.

### 4.Storage Bins

Bins are used for storage of items like cereals, pulses, nuts etc. Two storage systems are provided. Each containing a capacity of maximum 10kg .volume of these bins is 7L. This Bin is made of Mild Steel.

### 5.LCD Display

Lcd display is used in this smart grocery is to display the quantity which has to be given by the machine according to the amount given. It is combination of two states of matter, the solid and the liquid. Lcd uses a liquid crystal to produce a visible image.

### 6.Relay Drivers

A Relay driver IC is an electro-magnetic switch that will be used whenever we want to use a low voltage circuit to switch a smart grocery ON and OFF which is connected to 12v battery. The required current to run the relay coil is more than can be supplied by various integrated circuits like Op-Amp, etc. Relays have unique properties and are replaced with solid state switches that are strong than solid-state devices. High current capacities, capability to stand ESD and drive circuit isolation are the unique properties of Relays.

### 7.RFID Card Reader

A radio frequency identification reader (RFID reader) is a device used to gather information from an RFID tag, which is used to track individual objects. Radio waves are used to transfer data from the tag to a reader. RFID is a technology similar in theory to bar codes. However, the RFID tag does not have to be scanned directly, nor does it require line-of-sight to a reader. The RFID tag it must be within the range of an RFID reader, which ranges from 3 to 300 feet, in order tobe read. RFID technology allows several items to be quickly scanned and enables fast identification of particular product, even when it is surrounded by other items.

### 8.RFID Card

Radio Frequency Identification (RFID) is the wireless non-contact use of radio frequency waves to transfer data. Tagging items with RFID tags allows users to automatically and uniquely identify and track inventory and assets. RFID takes auto-ID technology to the next level by allowing tags to be read without line of sight and, depending on the type of RFID, having a read range between a few centimetres to over 20+ meters. RFID has come a long way from its first application of identifying airplanes as friend or foe in World War II. Not only does the technology continue to improve year over year, but the cost of implementing and using an RFID system continues to decrease, making RFID more cost-effective and efficient.

### 9.ARDUINO UNO Microcontroller

The Arduino Uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button. This contains all the required support needed for microcontroller. In order to get started, they are simply connected to a computer with a USB cable or with a AC-to-DC adapter or battery. Arduino Uno Board varies from all other boards and they will not use the FTDI USB-to-serial driver chip in them. It is featured by the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

10.Strain Gauge

The strain gauge is one of the most important sensor of the electrical measurement technique applied to the measurement of mechanical quantities. As their name indicates, they are used for the measurement of strain. As a technical term "strain" consists of tensile and compressive strain, distinguished by a positive or negative sign. Thus, strain gauges can be used to pick up expansion as well as contraction.

## 5.WORKING

A 12v battery provides the required voltage to the card reader module (RFID Reader) is used for the data transfer and gives the signal to operate. TXD is data transferring PIN of the reader module which is connected to PIN 26 of the microcontroller. Both containers are controlled using a single tag. The LCD screen is used for displaying the text, when the RFID card scans. RFID out becomes high and system activates and IC enables. Data input values are either 0 or 1. 15-18 data input lines are connected to LCD by two connections. one connection to voltage supply through switches which means 1 and other to earth through resistance that means 0.when the switches activate earth connections disables voltage supply connections enables that is input becomes high. 0-15 codes for microcontroller which provide the signal for enable the character should be displayed. The microcontroller PIN 15 -18 connected to 4 keypads which is grounded through separate resistors R1, R2, R3, R4 each contain an initial 5v.

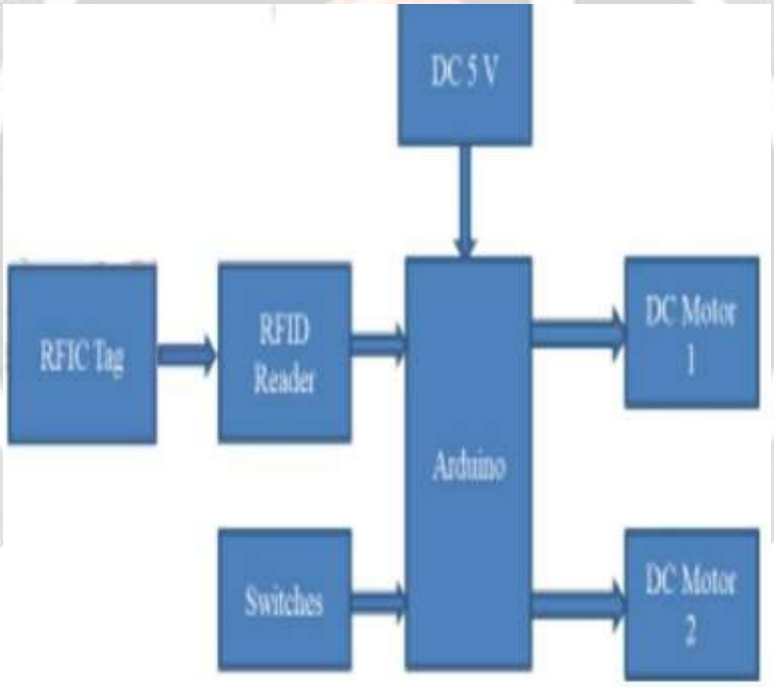


**Fig-1: Block Diagram**

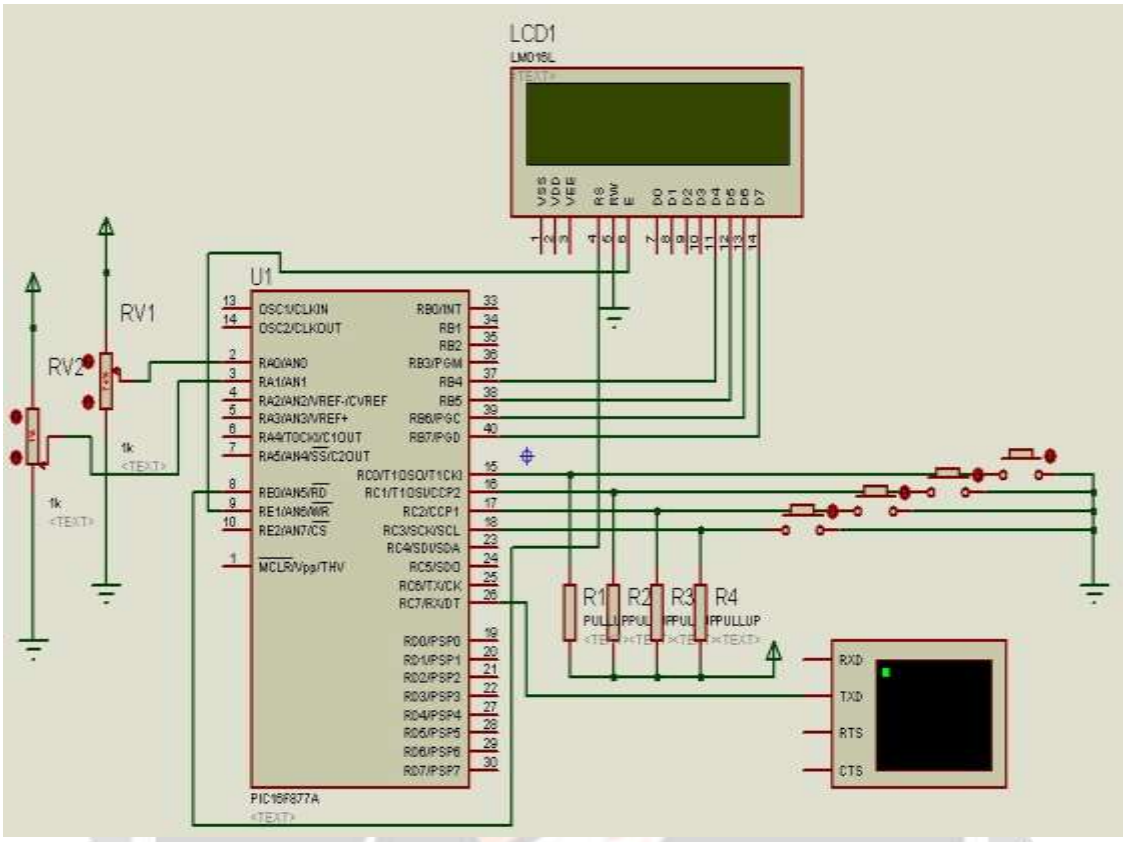


**Fig-2: Circuit diagram drawn in the Protues Simulaction Software**

The PIN 19-22 of the microcontroller is connected to each relay. Four relays are powered by battery. The RV1 and RV2 is the analog channel of the load cell. Thus each analog signal is given to PIN 2 and PIN 3 of the microcontroller. When a personnel need an amount of item that set with help of keypad and the LCD screen. The item released by the container 1 through a valve controlled by a motor. When the analog signal balances the digital value set according to the coding the valve closes. Then the container 2 opens the valve and does same as container 1. The relay 1 and 2 is used for controlling the opening and closing of the valve of container 1. The relay 3 and 4 is used for controlling the opening and closing of the valve of container 2.

**Fig-3: Fabricated setup**

## 6.ADVANTAGES AND LIMITATIONS

1. Advantages

- It reduces the usage of plastic
- It consumes very less time
- Reduces the human effort
- Easy handling of money
- Increases the productivity and sales
- Improves the customer satisfaction
- Maintenance and service cost is less
- Eco friendly
- More efficient

2. Limitations

- Payment using currency and coins are unavailable
- Initial cost is high
- Only one person can use at a time
- It requires a space

## 7.RESULT

In Smart Grocer, an Arduino Uno is a master controller along with RFID tag and reader. In this system there are two chambers for dispensing the items. Each chamber has one continuous rotation DC Motor attached under it, when someone inserts a RFID card on machine and presses the button, then corresponding DC motor rotates and dispense one item. Dispensaries valves have been attached to DC motor to dispense the Item on rotation of DC motor, these valves are made by iron. If motor rotate fixed angle the products are available to user at output of vending machine. Display information on LCD display such as insertion of RFID card, selection of product.

Switch ON the smart grocery which is connected to the battery. The lcd display will turns ON when we reads the RFID card by using the RFID card reader. Then it will shows 2 options, option 1 for bin 1 and option 2 for bin 2.If we choose bin 1 and press enter ,then we have to enter the amount in rupees and press enter button. We already stored data in the Adrino- uno Controller according to the amount to weight of the item.ie if item1 is1kg for 13rs. If the customer enter 26rs then 2kg will dispensed . The strain gauge sensor will senses the weight of quantity in the bin. The relay helps the opening and closing of the delivery hub in the bin. We can also use these 2 bins simultaneously by selecting the 2 options by entering the required amount so that required quantity will separately delivered through bins 1 and 2.

## 8.CONCLUSION

This project focuses on design and implementation of Smart Grocer. manual efforts in the ration shops are minimized by the automated embedded system. It is a automated grocery vending machine design using RFID technology, and removes major drawbacks of conventional ration system namely, the in-appropriate quantity of products and making of fake entries, material hijacking, card piracy, black market and human errors. This project is low cost, low power consumption and more accurate suited for real time implementation. It also reduce the plastic usage in this system thereby reduce the environmental problems due to increase in plastic generation like various pollutions and other environmental changes

.This project helps to reduce the usage of plastic at a greater extent

Some of the limitations of this prototype are that people will need to be made aware of the functionality of the machine. There will need to be technicians who are trained to operate and further troubleshoot these machines. The machines need to be produced at an industrial level as small-scale production might not be economically viable. In this project, we have tested a Prototype based on RFID technology and we achieve so many objectives that we have aimed in this project. System helps to modernize traditional rationing system and fight corruption up to a great extent and it achieve our main objective that it reduces the plastic by 100%

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