

Design of Autonomous E-Rationing System

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ABSTRACT

RFID (Radio Frequency Identification) based innovation which is a creative methodology in PDS (Public Distribution System) is an economical, accurate and automated ration distribution technique. Public distribution system is often referred to as a distribution rationing scheme and is one of the commonly debated issues concerning malpractice. The current proportion dispersion framework has elevated level of defilement like erroneous estimation of merchandise, huge holding up time, and material burglary in apportion shop and manual dissemination isn't anything but difficult to deal with swarm. In this exploration paper, the proposed framework replaces the manual work in open appropriation framework. The planned framework's principle objective is to mechanize the proportion shop to give straightforwardness using RFID and GSM innovation like the ATM. This robotized apportion framework replaces the conventional proportion card framework with a RFID tag, the administration authority gives the microcontroller put away information base to the shopper. The shopper needs to examine the tag to the RFID per user, and afterward the microcontroller checks the data of the shopper with the put away information base to apportion the proportion shop content. Shopper needs to enter sort of material just as amount of material in the LCD display keypad after positive authorization. Materials will be dispensed based upon their requirements.

Keywords: AT mega 2560, RFID, LCD Display and E-Ration.

1. Introduction

The Public Distribution System for India (PDS) is the world's biggest retail framework. Public dispersion network offers a proportion card gave under a State Government request or power to purchase basic customer materials, for example, rice, wheat, lamp oil, and fuel. State government issues particular apportion cards, for example, yellow proportion card, saffron apportion card, and white proportion card, in view of the yearly family income [1-2]. Apportion businessperson supplies the customer material to proportion card holders in the primary seven day stretch of every month. Public delivery system is one of the highly debated topics surrounding malpractice. Manual interference in material weighing prompts inaccurate estimations and additionally it can happen that sends data to related individuals as SMS. The proposed computerized apportion shop based on RFID would add accountability to the system of public distribution and become helpful in avoiding malpractices.

Radio-frequency identification (RFID) uses electromagnetic fields to classify and track tags attached to objects automatically. The tags contain information which is stored electronically. Unlike a barcode, the tag must not be beyond the reader's line of sight and it could be embedded in the object being monitored. RFID is one Auto Identification and Data Capture (AIDC) process. Each customer, i.e. the head of the family, received an RFID card which goes about as an apportion card. The RFID card has special ID code. The client examines the RFID-per user card. Each needs to utilize their RFID to get their apportion. Specialist in the proportion shop can gather rapidly.

Apportion retailer utilizes purchaser materials illicitly without earlier assent of proportion card holders. The proposed program aims to monitor malpractice that is present in the ration shop by replacing manual work with automatic RFID and GSM based system. Each customer, i.e. the head of the family, gotten a RFID card which goes about as a proportion card. The RFID card has interesting ID code. The client examines the RFID per user card that is interfaced with the apportion shop microcontroller. At the point when the client is verified by secret key, the gadget requests that the client pick the right material and material amount through the keypad. Reasonable circuitry will be activated based on

material selected by the customer and the consumer gets material. Microcontroller interfaced with GSM.

2. Literature Survey

A. Arduino based Smart Ration Distribution System for Civil Supplies Hoarding in India

This project is developing a smart, integrated delivery system for the ration. This, we accept, would suit the requirements and desires for the advanced world and individuals of things to come. Known as Automatic apportion machine, proportion shops assist individuals with purchasing their month to month family products in an improved manner by making the whole cycle brilliant, viable, solid and simple to utilize. More significantly, it forestalls the debasement, imitation and sneaking of merchandise by the proportion shop vendors and laborers. To put it plainly, this activity guarantees that the merchandise meets the average folks viably as per their requests. The proposed venture is an electronic framework with insightful highlights, for example, IOT interfacing, intelligent products calculation and keeps all the information registered with regards to the products carried and distributed to customers. The basic function of the device is to know the consumer's requirements, get acknowledgement or confirmation of the purchase, accurately measure the good needed and deliver it to the consumer in an intelligent manner. The entire process is digitized and registered in the central database in order to prevent cheating while selling products. The application likewise gives points of interest of the complete amount of products bought, the all-out amount of merchandise sold and the amount of merchandise staying in that shop to average residents with just a tick so as to make the activity understood. The purchaser can likewise get to the merchandise accessible in their neighbourhood shop by means of the web through which they don't have to go to and fro to the shop. During their inaccessibility in the extent of assets, which spares individuals time and builds venture proficiency.

B. Smart Ration Card and Automatic Ration Material Distribution System using IoT

This project describes an accurate, automated and secure RFID-based system used for ration distribution using the advanced PDS methodology AADHAR card code. Often known as PDS is the ration distribution scheme, which is one of the widely contested problems involved in malpractices. The ongoing distribution system of ration has high-level irregularities such as bribery of supplies, long waiting times and incorrect measurement of products in ration shop. It's also not easy to manage crowd when ration is being distributed. In this they replaced the job performed manually in the supply Smart metering centres for automated electronic devices with the aid of ARM microcontrollers that accurately calculate the products and update them regularly in the database on the accessibility of products and data on digitized exchanges. There, a focal information base is created to give admittance to stock data and information that can be gotten to from their administrative centre by the administration's standard invigilators for conveyance focuses. This paper subsequently ensures the activity of debasement free apportion places, which will likewise improve shoppers' immediate contact with the legislature and will resistant give straightforwardness.

3. Proposed System

In order to address the disadvantages of different ration delivery systems approaches, we are introducing an LCD display hardware to display the commodity to be purchased with its picture that will be easy for analphabets to find what they want. To measure the kerosene, a separate water flow sensor is placed, and a servomotor arrangement is made to push the product out of the setup upon purchase. The commodity to be sold is packaged in packages so that the user does not need to bring bags to buy items. The biggest benefit is that if the card has left quantity, the customer can purchase the product they need at any time.

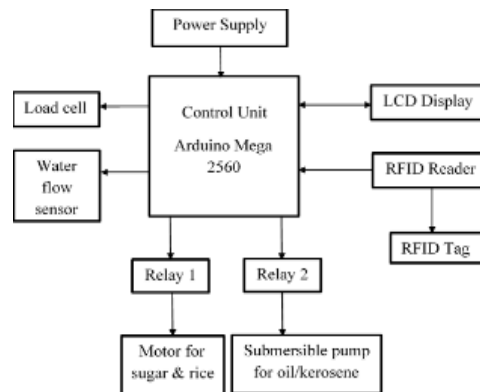
Algorithm

1. Every purchaser is furnished with a RFID card which is enlisted and connected to the PDS and Government information base.
2. At the hour of proportion conveyance at apportion shop, either shopper filters the RFID card or enters the 12-digit AADHAR NUMBER.
3. User is provoked to enter the exceptional 4-digit {IN for validation}.

4. Password of purchaser is confirmed with the information base gave by the Government authority which is put away in the microcontroller.
5. Once confirmation is fruitful, User ID is shown on LCD, shopper is requested a Select sort of material (Here, 1. Rice and 2. Oil) through keypad.
6. Based on sort of material picked, the customer is requested the sum or amount to be entered through console.
7. Meanwhile, Database is refreshed with the current exchange. In the event that the asked amount isn't inside Allowable Amount, Transaction comes up short.
8. Otherwise, the Servo or Solenoid valve is enacted dependent on the material picked.
9. After apportioning definite amount of material engine or solenoid is impaired.
10. Database is Updated.

4. Methodology

The detailed working of the project is given in the block diagram as shown below.



Block diagram of Autonomous e-rationing system

4.1 Hardware Architecture

Arduino MEGA 2560

The Arduino Mega 2560 R3 is an open source precise microcontroller board based on the ATmega2560 SMD chip which is a successor to the Arduino Mega. This board has 54 digital input / output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (serial hardware ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset key.



Fig.1 Arduino MEGA 2560

TFT LCD Display

3.5-inch colour screen, 65 K colour display support, full colour display.320x480 HD transparent display resolution. Fast transmission with parallel bus with 16-bit. On-board level shifting IC 5V/3.3V, compliant with operating voltage 5V/3.3V. Supports full use of Arduino Mega2560 plug-in. It provides an Arduino library with a rich sample program. Easy to expand the experiment with SD card slot. Military-grade process standards, long-term stable work.



Fig.2 3.5 TFT LCD Display

Relay 5V

Relays are most commonly used switching device in electronics. Trigger Voltage is the voltage needed to switch the relay on, which is to shift the Common->NC to Common->NO touch.

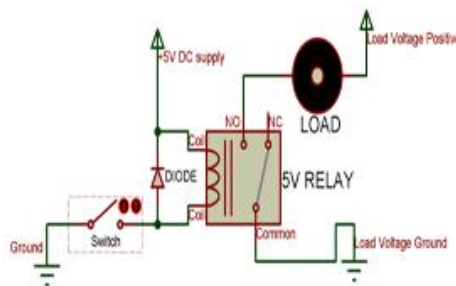


Fig.3 Relay 5V

4.2 Communication Module

RFID Tag

RFID Tag includes microchip with radio antenna mounted on substrate which carries 12 Byte unique Identification number.



Fig.4 RFID tag

RFID Reader

It is used to read RFID tags with unique ID. As RFID tags come into range, RFID reader reads its unique ID and transmits it to the microcontroller or PC in serial format. The RFID reader has a transceiver placed on it and an antenna. Usually it is fixed in stationary position.



Fig.5 RFID Reader

YF-S201 Hall Effect Liquid Flow Sensor

There are many techniques for measuring water flow as well as different types of water flow meters used to measure the volume of water flow in pipelines but these are all too expensive. This article discusses ideas for designing and creating low-cost automated water flow meters, with the aid of water flow sensors that are readily accessible and low cost.



Fig.6 Hall Effect Liquid Flow Sensor

4.3 Power Supply 5V

Step down transformer

Choosing an effective transformer is very critical. The transformer's primary and secondary voltage levels are a critical factor. The transformer's current rating depends upon the current required to drive the load. The info voltage to the 7805 IC ought to be in any event 2V higher than the essential 2V yield, so it needs an information voltage of at any rate 7V. Thus, I have selected a 500mA current 6-0-6 transformer (Since $6 * \sqrt{2} = 8.4V$).

Voltage Regulator

As we require a 5V we need LM7805 Voltage Regulator IC. 7805 IC Rating: Input voltage range 7V-35V. Current rating $I_c = 1A$. Output voltage range $V_{Max} = 5.2V$, $V_{Min} = 4.8V$

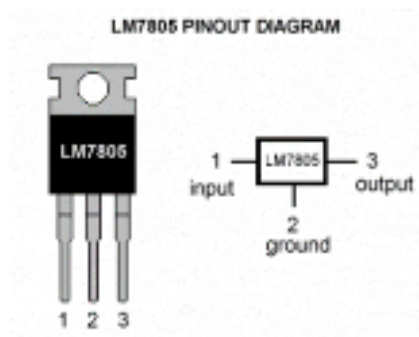


Fig.7 LM7805 Pin Diagram

Rectifying circuit

The simplest way to do so is to use a full wave rectifier and its advantage is that the DC distortion is less than in both cycle diodes. Higher transformer uses factor (TUF). 1N4007 diodes are used because they can tolerate a higher reverse voltage of 1000v while 1N4001 is 50V.

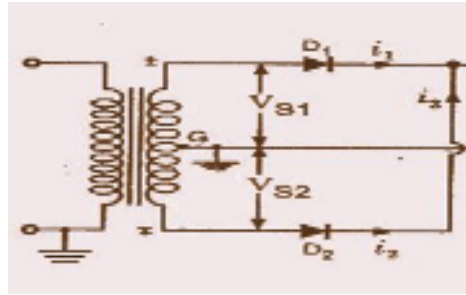


Fig.8 Rectifying circuit

We have to determine this capacitance for filtering

$$Y = V_{ac-rms} / V_{dc}$$

$$V_{ac-rms} = V_r / 2\sqrt{3}$$

$$V_{dc} = V_{Max} - (V_r / 2)$$

$$V_r = V_{Max} - V_{Min}$$

- $V_r = 5.2 - 4.8 = 0.4V$
- $V_{ac-rms} = 0.3464V$
- $V_{dc} = 5V$
- $Y = 0.06928$

Hence the capacitor value is found out by substituting the ripple factor in $Y = 1 / (4\sqrt{3}fRC)$

4.4 Motoring unit

Servomotor

A servomotor is a linear or rotary actuator that allows precise control of angular or linear position, velocity and acceleration. It consists of an appropriate motor coupled with a sensor for the input from location. It often includes a fairly sophisticated controller, often a specialized module specifically designed for servomotor use.



Fig.9 Servomotor

Submersible pump

A sub siphon (or sub siphon, sub electric siphon (ESP)) is a gadget that has an airtight fixed engine near the siphon body. The entire get together is dunked into the liquid to be siphoned. The fundamental

advantage of this kind of siphon is that it disposes of cavitation of the cylinder, an issue related with the high contrast in stature between the cylinder and the outside of the fluid.



Fig.10 Submersible pump

4.5 Process Flow

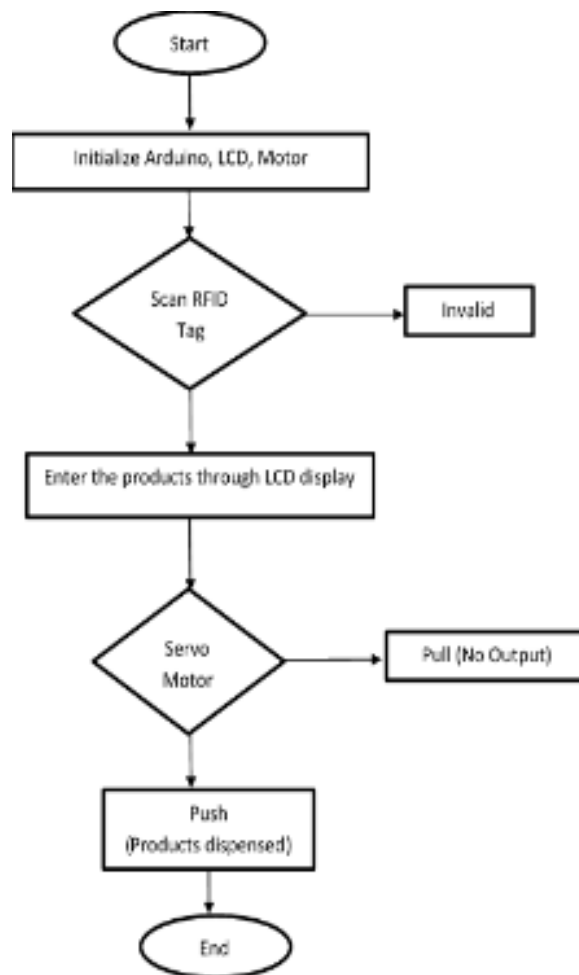


Fig.11 Flow Chart

5. Result

The DC engines consequently pivots in steps, when the RFID card examined is legitimate and the subtleties of the individual are shown in both LCD and PC. The wares required (rice/sugar/wheat) are acquired precisely. Just as sub siphon siphons out required measure of fluid (oil/lamp oil).

Table 1. Accessing of products by user through RFID

RFID Card	Touch Display
Card 1	Valid
	Put bag for sugar/rice
	Oil is on
	Transaction is done
Card 2	Invalid

6. Conclusion

Automated Ration Distribution Program Successfully implemented using RFID and LCD display. This framework is secure and easy to understand, even with RFID the uninformed individuals can work. - client's record is kept in a specific information base that helps the individuals who move starting with one spot then onto the next. This model will help many individuals who rely upon apportion stores. Government ought to follow the procedure and apply it on a wide scale. Such gadgets will be utilized later on apportion shops to work effectively so the crime percentage is brought down and hindered individuals can get their offer. Utilizing controlled adjusts, proportion retailers can't deceive the clients, load cell is utilized which quantifies the right measure of apportion. The proposed technique might be changed for future examination to incorporate thumb impression (Bio-metric) for confirmation rather than RFID labels to offer more insurance. To conclude, all targets for this project have been successfully achieved. The objectives are

1. To reduce corruption
2. To design user-friendly interface
3. Transparency
4. To distribute proper ration to consumers

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