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Automated Ration Wending Machine for a Ration Shop Using RFID Card

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Abstract: ***The rapid growing and advancement of modern technology has yield to the development and inventions of modern equipments and machineries. RFID (Radio Frequency Identification) based automatic ration shop is novel approach in public distribution system (PDS) useful for more efficient, accurate, and automated technique of ration distribution. The present ration distribution system has drawbacks like inaccurate quantity of products, low processing speed, large waiting time, material theft in ration shop.so that we are using automation method to develop prototype model and It is transparent and has control over prices of some commodities in the open market, dealer will not be able to keep fake ration cards with them system helps to modernize traditional rationing and combat corruption up to great extent.***

Keywords: PDS, RFID

1. Introduction

In this paper we use password for ration shop access to the user along with the database. Whenever a person wants to use ration shop the people details are verified by password. The microcontroller searches the data of the user. Further it finds out the amount of quantity allocated to the family and sends instruction to the sensors. We designed the hardware for two commodities namely Wheat and Kerosene. These two commodities are stored in reservoir tanks and they are Measured and supplied to the user as and when required. The user has to enter the required product and quantity using a keypad and options displayed on LCD. For weighing purposes, we use load cell for wheat and liquid flow Sensor for kerosene. The microcontroller is attached with the geared DC motor and a dedicated liquid flow sensor for kerosene. The mechanical assemble along with the motor helps to pour the required quantity of wheat to the person automatically. As overall process is done automatically there is no chance irregularity.

When get the material from the ratio shop, first need to submit the ration card and they will put the sign in the ratio card depends on the materials. Then they will issue the materials through weighting system with help of human. But in this system having two draw backs, first one is weight of the material may be inaccurate due to human mistakes and secondly, if not buy the materials at the end of the month, they will sale to others without any intimation to the government and customers. In this paper, we have proposed an Automatic Ration Materials Distribution Based on RFID Technology to avoid the drawbacks. Today we are facing a number of transport related problems. RFID technology effectively used to solve some of them. RFID is act as ratio card and other purpose such as RC book, insurance details, service details etc.

Figure 1: Block diagram of proposed system

The automatic rationing system installed at the ration shop which contains three interfaces namely touch screen, billing printer and RFID. All these interfaces are interfaced to the advanced microcontroller. Embedded PIC Microcontroller is interfaced to the PLC and further to the central database of the government. The person would have to swipe the card on the system placed at ration shop counter. After that for security authentication and to prevent card misuse, the system would ask for the password and the detector detect the correct consumer. Once authenticated, automatic rationing system would get updated information regarding the existing subsidies for the current user in the touch screen. The inputs are given by the consumer and select the products by the consumer itself in the touch screen. From the touch screen inputs are given to the microcontroller unit, which are given to the PLC module and the products are obtained from the automated ration shop. Further to prevent irregularities in distribution of ration, government can supply various products (like rice, wheat, kerosene, sugar etc.) to rationing shops in the form of sack stored in the container. Central database would be updated immediately after every transaction made by the users. In this project, we have designed and implemented an Automatic Ration Materials Distribution Based on RFID Technology.

In this system, only authentic person can be recovered ration materials from ration shops based on the amount available in the RFID. The survey of related works is provided. The proposed, developed method and circuit diagrams are also provided in this project.

2. Problems in Existing System

The Planning Commission (2008) has estimated the rate of the TPDS (Targeted Public Distribution System) rice and wheat is leaked. Hence, more than half (54%) of the grain taken off for the TPDS disappeared before it reached buyers in the FPS. Moreover, the leakages have increased compared to 1993-94 and 1999-2000, and are estimated at 28%. That about half the TPDS grains is leaked before reaching consumers reflects inefficiency, corruption and theft on a gigantic scale

Table 2.1: Estimated consumption of TPDS rice & wheat as a percentage of TPDS off-trade rural & urban

	1993-1994	1999-2000	2004-2005	2007-2008
TPDS Consumption	10.64	12.290	13.53	18.93
TPDS off-trade	14.7	117.11	29.65	33.12
Leakage (%)	28	28	54	43

Some of the problems which consumer experience in local ration shops are

1) Need to wait in queue: Consumers need to wait in queue for their turn leaving their works.
2) Time restrictions: There will be time restriction of supplying on few hours in the morning and afternoon. There will be no ration shops to supply goods on special occasions like national festivals
3) False weights: People at ration shop supply lesser good than actual measurement to consumers.
4) Adulteration: This is the major disadvantage of PDS system where they can increase goods by adding adulterants. This reduces the quality of goods. Even few adulterants cause disorders.
5) Misuse of ration cards: People misuse others ration cards when they need goods at fewer prices. For their benefit they take ration card from others and get ration in the ration shops

3. Methodology

The block diagram shown in fig: 3.1 depict all the information about components used. LCD display unit is used to display the options and the keypad for selecting the options. Solid and liquid pouring unit are output to draw the goods. This project consists of power supply unit, LCD display, keypad, solid pouring unit and liquid pouring, output controlled by PIC microcontroller. A power supply is a device that supplies electric power to an electrical load.

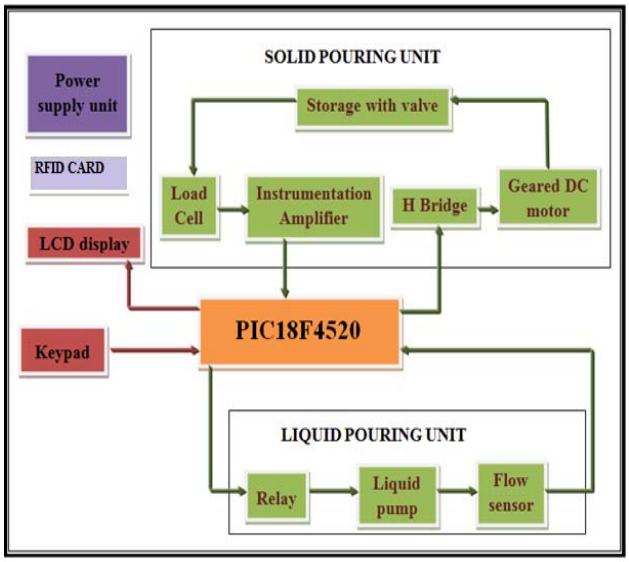
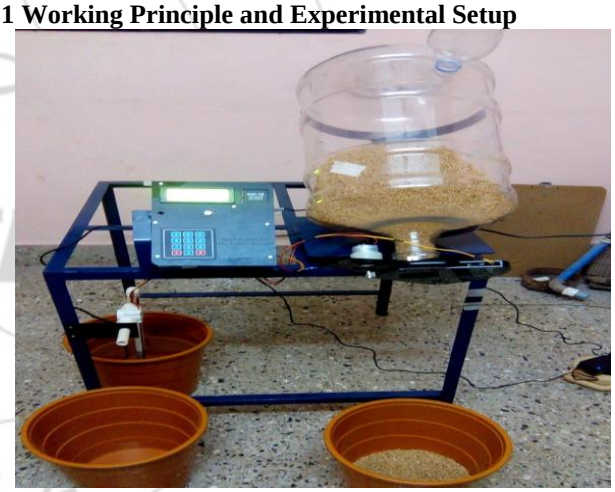


Figure 3.1: Block diagram

We have power supply of 230V AC and 12V DC for constant supply. Solid pouring unit, one of the output unit, which consists of, Storage unit with valve, Load cell, H-Bridge, Instrumentation amplifier. Liquid pouring unit, another output unit, consists of flow sensor, which controls the flow of liquid and the liquid pump.

3.1 Working Principle and Experimental Setup



Firstly, keypad provides a means to enter and select the option by user such as, to enter password, to select the commodity and quantity of the same. LCD display serves as the mediator between PIC microcontroller and keypad by displaying options. In this we have used two power supply, one is 230V AC supply to run water pump and another 12V DC adapter which in turn step down to 5V using IC 7805, PIC controls major process in this project. PIC is the brain of this vending machine which controls and co-ordinates the functional activities of secondary elements.

The working steps of overall process are listed below:

Stpe1: Initially it will display the welcome message to the user and asks to press * to continue the process.

Step2: When user starts the process, it asks password, on verification of password it display profile of the user.

Step3: It will then displays the available commodities with quantity of his/her account.

Step4: Now user has to select the commodity and the quantity that he/she wants to draw.
Step5: Assume that user selected commodity is kerosene (i.e. liquid), then it will check whether this is available and user entered quantity are permissible. Also it will check for available balance amount in user account.
Step6: If all conditions are met, then it will activate the relay which will switch 230V power supply to the water pump.
Step7: The liquid pump will drift the liquid from the source. The flowing water will make wheel in the flow sensor to rotate. For example, if entered quantity is 1 liter, then 230V power supply is switched to water pump until wheel rotates for 305 turns. When count is equal to 305 turns, then supply releases and water pump is turned off.
Step8: Similarly, if chosen quantity is 2, 3, 4 or 5 liters then flow count will be 610, 915, 1210 or 1510 respectively.
Step9: After successful transaction, it will display "Transaction Successful" and it will deduct quantity drawn and amount of it, from the database
Step10: If transaction failed due to no stock or less balance than entered, also if wrong password entered, then it will display "Transaction Failed".
Stp11: If the commodity chosen is wheat (i.e. solid), then it will check whether the quantity is available or it is permissible choice. Also it will check for balance amount in user's account.
Step12: If all necessary conditions are met, then 5V DC supply is given to DC motor via H-bridge. This makes DC motor to rotate in clockwise direction. It will do so, until valve get interrupted by IR sensor which is used to stop the valve.
Step: 13 Opamp is used as a comparator. When there is infinite feedback (no feedback) opamp act as a comparator. It will compare two input voltages: one from the pot (pot will give the variable voltage 0-5V) and another from IR sensor. In IR sensor, collector to emitter conduction depends on the IR light intensity. When IR sensor voltage exceeds or equal to pot voltage, the comparator gives the digital output high (1). Upon getting high signal, the supply to DC motor is removed.
Step14: As soon as valve gets opened, ration gets poured into container with required amount chosen. Wheatstone bridge of load cell gets decreased, which in turn results in decrease of voltage i.e. analog output voltage get decreased.
Since the output voltage of load cell is in terms of mill volt, it is applied to instrumentation amplifier (AD620). The output of instrumentation amplifier is in the range of 1V to 4.6V.

The output of this amplifier is given to inbuilt 8-bit ADC in PIC controller. If the user wants to draw 1kg of wheat then valve is open until ADC counts get increased by 17. Similarly for 2kg, 3kg, or 4kg, the count will be 34, 51, and 68 respectively as tested. Then the valve is closed by anticlockwise rotation of DC motor via H-bridge, the valve is interfered by limit switch. Thus transaction completes. If the user is willing to check the available balance in his/her account. Then enable to this, provision is made to choose exit option. On each and every transaction only 10 secs limitation is added. This is to avoid hanging of program control at any point. For example, when user has to enter password, he has to do that interaction within 10 secs else transaction fails. This occurs even when user fails to enter required quantity of ration.

The 10 seconds interaction time limitation is achieved by using internal interrupt. Here interrupt will occur 50 times for every 1 second. On every occurrence of interrupt, temporary count will get incremented by 1. When this count=500, we have achieved interaction time limitation of 10 seconds. After that, it once again reset to zero. Also this count is initialized on every start of process.

It will also require updating the ration and kerosene balance in the beginning of every month. With this prototype, we have considered a period of 10 minutes. After 10 minutes, available balance of wheat will reset to 30kg and kerosene to 5 liters. To achieve this also, internal interrupt is used in software code, which has no effect on PIC microcontroller.

Finally, still noticeable thing that mode of payment. We had partially implemented this concept by assuming a government supervisor can update the amount. We have provided two level of authentication password to him, after that the supervisor can update balance amount of user through their IDs.

4. Hardware Requirements

S. No	*Components*	*Quantity*
1.	PIC Microcontroller	1
2.	H-Bridge	1
3.	Instrumentation amplifier	1
4.	Flow sensor	1
5.	DC motor	1
6.	Load cell	1
7.	Relay	1

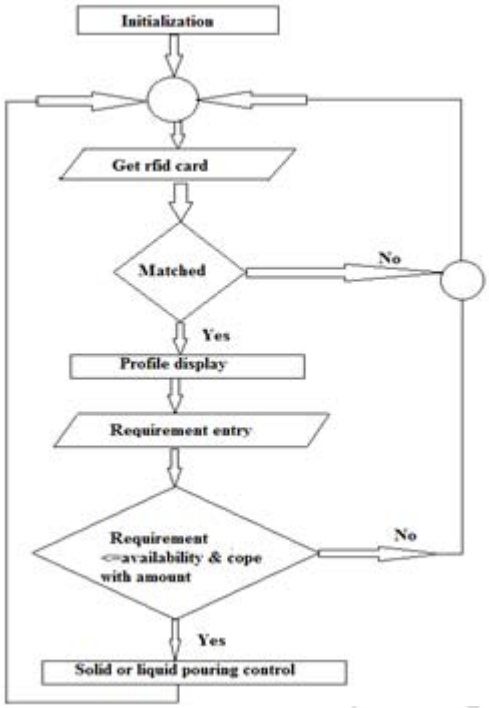
5. Software Requirement

PICkit is a family of programmers for PIC microcontrollers made by Microchip Technology. They are used to program and debug microcontrollers, as well as program EEPROM. The PICkit 2 introduced in May 2005 replaced the PICkit 1. The most notable difference between the two is that the PICkit 2 has a separate programmer/debugger unit which plugs into the board carrying the chip to be programme

6. Algorithm and Flow Chart

Algorithm
Step 1: Initialize the hardware
Step 2: Punch the RFID card
Step 3: Verify the user details
Step 4: Display the available materials (kerosene/wheat) for the respective card
Step 5: Select the materials (kerosene/wheat)
Step 6: Keep the container ready
Step 7: Fill the container with selected material (kerosene/wheat)
Step 8: End the process

Flowchart



7. Result and Discussion

7.1 Outcome of the Project

Figure 7.1 (a): Welcome to ration shop

Figure 7.2: User details

Figure 7.3: To enter press 1 to get a KEROSENE

Figure 7.4: Kerosene is filled in a container to enter press 2 to get a WHEAT

Figure 7.5: Wheat is filled in a container

8. Comparison with Manual Method

Manually operating	Machinery operated
People can cheated	People can't be cheated
People can't get ration at their convenient timing	People can get ration at their convenient timing
Duplicate and bogus ration cards can be used	Elimination of Duplicate and bogus ration cards can be used
Data is not maintain properly	Data is maintain properly
It is not bring transparent	It bring transparent
It is not required any power supply	It is required power supply
System is not accurate	System is accurate
Processing speed is slow	Processing speed is high
Material can be theft	Material can't be theft
Poor quality of supplies Over crowd	Good quality of supplies
Manually operating	Not over crowd

9. Advantages and Application

9.1 Advantages

1) Avoid people from being cheated:
2) People can get their ration at their convenient timings
3) Completely automated system

4) Elimination of duplicate and bogus ration cards
5) Increased adulteration in consumes can be prevented
6) This system helps to maintain the data properly
7) This system is very accurate, simple and low power consumption, which is used for real time application
8) Bring Transparent
9) Avoid people from being cheated: In present ration shops the shopkeepers are
10) Involved in various malpractices like adulteration, false weights etc., this can be avoided to certain extent.
11) People can get their ration at their convenient timings: Since this project provides ration availability at all time. So people need not to wait to get the ration. When they want they can access their ration.

9.2 Application

1) It is concerned on automation of process involved in ration shops which are the part of public distribution sectors (PDS) and digitalized it
2) It can be implemented in all the ration shops to help people not be cheated
3) This new technology gives solution and this research work will make a great change in PDS and
4) Provides benefit to the government by sending current stock information
5) Milk dispensing system
6) Water distribution system
7) Fertilizer and micro-organism dispensing system in agricultural
8) Water distribution system: In water dispensing system the water is obtained by inserting the card or the coin when the card/coin is inserted the data with respect to particular person is available based on the quantity available the water is withdrawn

10. Conclusion and Future Enhancement

10.1 Conclusion

In this paper we are proposing new modern system to weight of ration winding. Using this proposed modern system we can have better management of the ration distribution system Govt can have indirect check on the availability of the ration to the beneficiary. It is transparent and has control over prices of some commodities in the open market, dealer will not be able to keep fake ration cards with them system helps to modernize traditional rationing and combat corruption up to great extent

10.2 Future Enhancement

- This system can also be implemented using solar panel to provide power requirement coetaneous power supply
- The same system can be implemented by using GPRS which is capable to access the data base customer also outside the home town
- Using RFID along with GSM interfaced with micro controller sends information in the form of SMS to related people
- System can improve to remove waste particle like stones ,dust in Rice

References

[1] S.Sukhumar, K.Gopinathan, S.Kalpanadevi, P.Naveenkumar, N.Suthanthira Vanitha1. Automatic Rationing System Using Embedded System Technology, International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering (IJIREEICE), Vol. 1, Issue 8, November 2013.
[2] Shivabhakt Mhalasakant Hanamant, Suraj V. S., Moresh Mukhedkar. Automization of Rationing System, IJCEM International Journal of Computational Engineering & Management, Vol. 17 Issue 6, November 2014.
[3] S.Valarmathy1, R.Ramani, Fahim Akhtar, S.Selvaraju, G.Ramachandran. Automatic Ration Material Distributions Based on GSM and RFID Technology, I.J. Intelligent Systems and Applications, 2013, 11, 47-54.
[4] Jaid Rahul A, Kadam Chetan K, Kokare Aniket S, Deore Minal. An Overview of Automatic Rationing System, International Journal of Informative & Futuristic Research, Volume 2, Issue 6, February 2015.
[5] Peter Svedberg, Reforming or Replacing the Public Distribution System with Cash Transfers.
[6] David A Bell, Operational Amplifier and Linear ICs, 2nd edition
[7] Ministry of Consumer Affairs, Food and Public Distribution Department of Food and Public Distribution, Annual Plan 2011-12.