Swap-O-Matic Vending Machine by Using Arduino Uno

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ABSTRACT: Vending machines have become an increasingly important distribution channel in public and private sectors. This paper proposes the design of Automatic vending machine. The main purpose of writing this paper is to create a vending machine which could provide three different products to the people using extremely simple steps. This is Arduino based vending machine that sales different type of chocolates from machine. This paper attempt to provide solution in coin based vending machine which is not returned the amount of money that is no any change from machine. The plan is to use Radio frequency Identification along with Arduino. Once RFID is to be read then User can select the product after card is scanned and collects the product at output unit. There are three parts; First part is scanning of RFID card which provides cashless payment. The second is programming unit which is implemented using arduino. The third part is display information and deliver product at output. This paper attempt to provide solution on coin based vending machine which is not returning the money.

KEYWORDS: Arduino; vending machine; RFID; interrogating; dialect

I. INTRODUCTION

A vending machine is an automatic machine that sells different types of food such as canned soups and packaged sandwich, snacks such as potato chips, chocolate bars, candy, hot drinks, cold drinks; or other items such as newspapers when coin is inserted. This machine can be implemented in different way by using processor or controller. After paying amount, a product may become available to user by the machine releasing it. Some product need to be prepared to become available. But in previous microcontroller based vending machine problem may occurred by using coin recognize unit. Suppose if product cost are Rs.5 And user inserted Rs.10. Then remaining cash is not return from machine. They require building more complex circuitry. So in our project we use RFID along with Arduino controller to reduce the problem of change of money.

The first modern coin operated vending machines was introduced in London in early 1880s, it dispense post cards. The machine was invented by Percival Everitt in 1883 and earlier used at railway station and post offices, dispensing postcards, and notepaper. The Sweetmeat Automatic Delivery Company was founded in 1887 in England as the first company to deal primarily with the installation and maintenance of vending machines.

One of the most common forms of vending machine is the snack machine, It uses a metal coil. When coil is rotated product are available at the output. The main example of a vending machine giving access to all users after paying for one item is a newspaper vending machine found mainly in the U.S. and Canada. After a sale the door automatically returns to a locked position A customer could open the box and take all the newspaper or, for the benefit of other customers, leave all of the newspaper outside of the box, slowly return the door to an Unlatched position, or block the door from filly closing, each of which are frequently discouraged, sometimes by a security clamp. Generally in market

it is found that products are vend as per regard to the customer desire, this machine helps to dispense as per necessary [2]. It is user friendly and very simple in operation.

II.   RELATED WORK

In previous vending machine system is processor or microcontroller based vending machine used for entire processing and also it has complex coding. This include the sensing of the reception of genuine currency coin through the coin inlet, deciding the number of product to be delivered, inserting the electrical motor to deliver exactly the number of product, to be delivered. But the disadvantage of this system is if the insertion of fake currency coins inside the currency collector could not be prevented, though product not delivered for them. The coin sensor senses the density and size of the coin. It is possible to access the product by inserting fake coins with the material of same density and size [3].

After analysis of above system, general conclusion is to use Arduino with RFID tag and reader. We have proposed the new cashless technology by using RFID. There are three different tags with three different serial numbers. If one of the tag is read by reader then three different choice of product are available to user. If user select product then it will be available to output of machine.

III.   THEORY

A. *RFID CARD:*

Radio frequency identification (RFID) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some types collect energy from the interrogating radio waves and act as a passive transponder. Other types have a local power source such as a battery, and operate at hundreds of meter from the reader. Unlike a barcode, the tag does not necessarily need to be within line of sight of reader, and may be embedded in tracked object. Radio frequency identification is one method for Automatic Identification and data Capture [2].
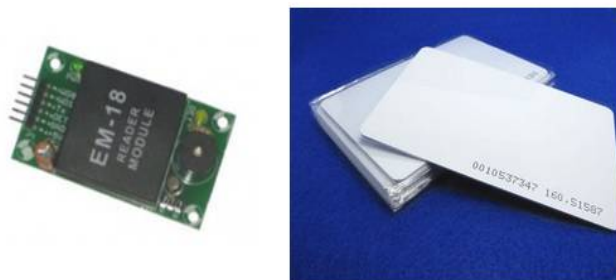

Fig.1. RFID Tag And Reader

A radio frequency identification system uses tags, or labels attached to the objects to be identified. Two way radio transmitter receivers called interrogators or reader send a signal to the tag and read its response. RFID tags can be either passive, active or battery assisted passive. An active tag has an on board battery and periodically transmit its ID signal. Tags may either be read only, having a Factory assigned serial number that is used as a key into a database or may be read or write, RFID tag contains two part: an integrated circuit for storing and processing information, modeling and demodulating a radio frequency signal and antenna for receiving and transmitting the signal. Tag information stored in nonvolatile memory. RFID reader transmits an encoded radio signal to interrogate the tag. The RFID tags receive the message and respond with its identification and other information. This may be unique tag serial number or other specific information.

B. *ARDUINO UNO:*

The Arduino Uno is a microcontroller board based on the ATmega328, It has 14 digital input/output pins, 6 analog input, a 16 MHZ crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. The Uno differ from all preceding boards in that it does not use the FTDI USB to serial driver chip."UNO" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno is the latest in a series of USB Arduino boards and reference model for Arduino platform. The Arduino Uno can power via the USB connection or with external power supply. External power can come either from an AC to DC adapter or battery.
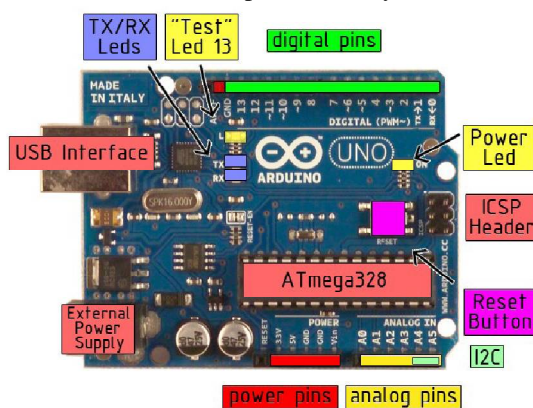

Fig.2. Arduino Uno Board

The board can operate on an external supply of 6 to 20 volts. If supply with less than 7v, however, the 5v pin may supply less than five volts and the board may be unstable. The Ttmega328 has 32 KB of flash memory for storing code.It has also 2KB of SRAM and 1KB of EEPROM. The Arduino software includes a serial monitor which allows simple textual data to be send to and from the Arduino board, The RX and TX LEDs on the board will flash when data is being transmitted via the USB to serial chip and USB connection to the computer. A Software Serial library allows for serial communication on any of the UNO's digital pins, the arduino software includes a wire library to simplify use of the I2C bus.

Arduino is open source hardware and software, which are license under the GNU lesser General public license, which is permitting the manufacture of Arduino board and software distribution by anyone. The Arduino are programmed using a dialect of feature from programming language C and C++. In addition to using traditional compiler tool chains, the Arduino provide integrated development environment (IDE) based on processing language project [6].

IV. SIGNIFICANCE AND SCOPE

The availability of vending machine is very important because many people depend on them to access product conveniently, they are normally used to dispense candy, drinks, foods and other consumables that do not require a sales person's presence. These machines cater for needs of consumers whenever they need them. Considering the pace at which the world is working in today, it is important to have fast paced machine that dispense what consumer need. This type of machine is preferred by many traders because of the many benefits they have.

1. Saves time.

2. Choice of product available at any time of day.

3. Reduce human effort.

4. Faster delivery of product are available to customer would be possible during peak time and unnecessary crowd near the shop would be avoided.

V.   PROPOSED METHODOLOGY

The Arduino act as main processor. The vending machine containing an Arduino Uno as a master controller along with RFID tag and reader. There are various slots on Arduino Uno for connecting various external devices such as keypad, display. The regulated supply provided overall system as show in fig.
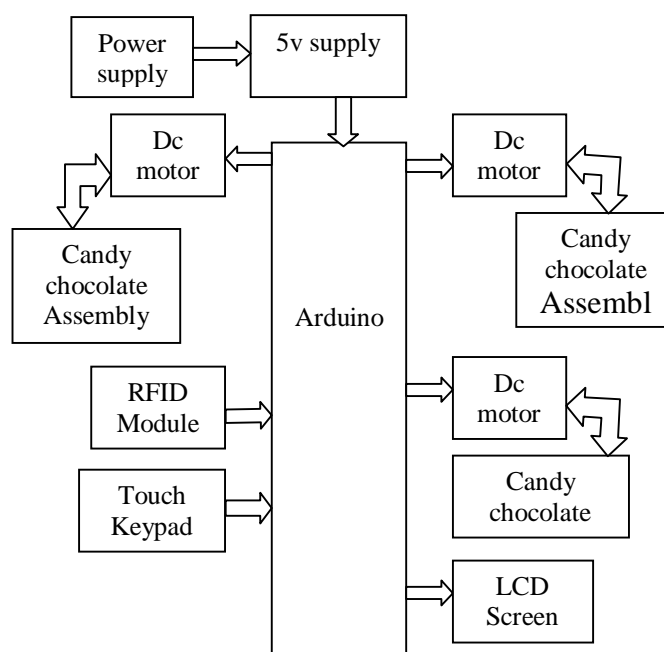
Fig.3. BLOCK DIAGRAM

As show in fig 3. First RFID card is scan and after reading the RFID user can select the product as per choice. This is done with Arduino software. The motor driver circuits are interface between Arduino and DC motor. Because DC motor require more current this is not sufficient to provide from controller. the product are inserted in spiral spring which is connected to stepper motor .If motor rotate fixed angle the product are available to user at output of vending machine.

1. MECHANISM:

*   An arduino based vending machine is designed.

*   The arduino can be programmed with arduino software (IDE).

*   The RFID card is used to provide cashless payment.

- Display information on LCD display such as insertion of RFID card, selection of product,User name and Account balance, choice of Product etc.

- User press the switch and select the product.

- Product available at Output of vending machine.

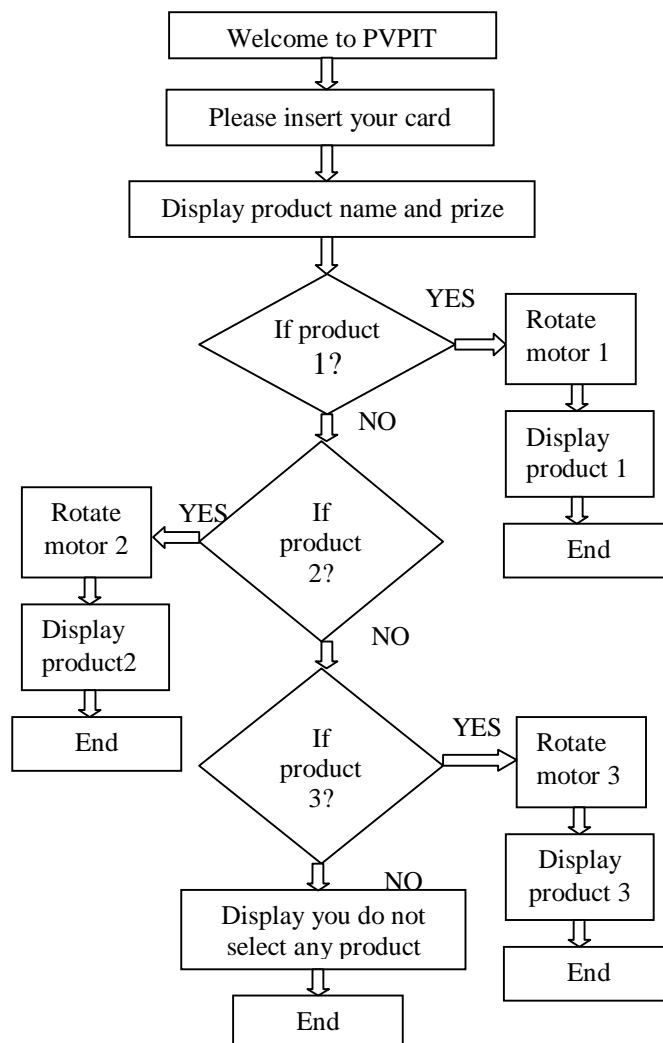- Display remaining balance in Account on LCD screen.

Fig.4. FLOW CHART

A. *SOFTWARE IMPLEMENTATION:*

The software part programming through Arduino Uno software (IDE). It is easy to write code and upload it to the board. C and C++ language are used for programming.

VI. EXPERIMENTAL RESULT

For our project of "Swap-O-Matic Automatic Vending Machine" we have to consider three different chocolate such as Dairy milk, perk and Kitkat. Also consider the three RFID cards having different serial number assign to each card. If one of the card is to be detect by RFID reader then user name with their account balance is displayed on LCD screen and after short time delay three product with their corresponding prize also displayed on LCD screen. If the user select one of the product by pressing the switch .Then metal spring are rotated and the chocolate will be available to user at the output of vending machine and also remaining balance are display on the LCD screen. The hardware Assembly is show in fig.5.
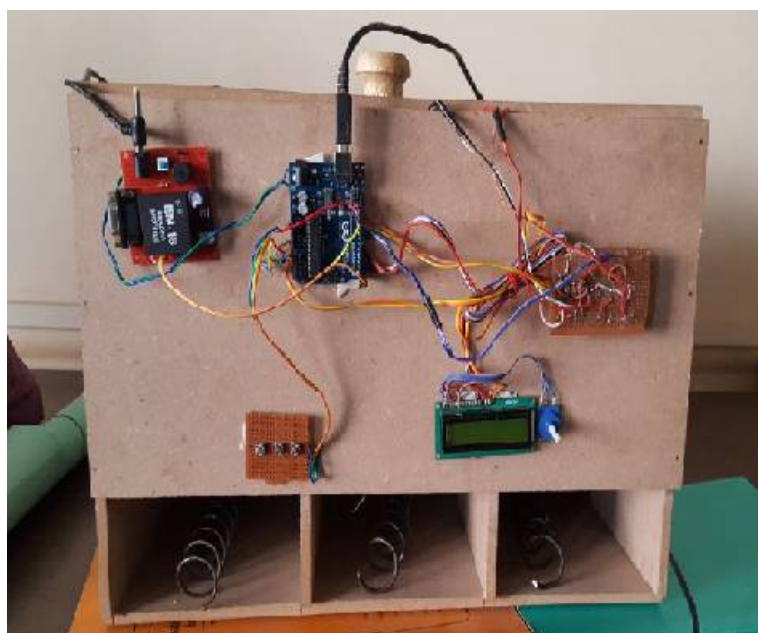

Fig.5. HARDWARE ASSEMBLY

VII. CONCLUSION

The objective of this project is to design and implement a chocolate vending machine using an Arduino Uno. There are various improvements that could be made to the project to increase it's functionality such as cashless payment. In the recent time use of digital is increasing day by day due to their accuracy and feasibility. This automatic chocolate vending machine offer variety of product. Due to time saving feature people can use vending machine in busy area like airport, bank, office etc. This system is portable, affordable, consumes less power and can be made easily available so that the user can use this system whenever and whatever.

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