Smart Coffee Vending Machine Using RFID

Rahul Jadhv, Mrunali Jejurkar, Pranita Kave & Prof. H.P. Chaudhari

*Instrumentation Engineering department, AISSM'S IOIT, Pune,
Maharashtra-411001, India.*

Abstract

The 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 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 employee. According to estimation the numbers of cups per day as per client's requirement are programmed. Then an employee goes to vending machine show his card to the reader then the drink is dispensed. But when employee wants more coffees than fixed number, that person is allow for that but that employee has to pay for extra cups and amount is cut from the salary account.

Keywords- RFID, Arduino, Vending machine.

I. INTRODUCTION

Vending machine is a machine that dispenses item such as snacks, beverages, alcohol cigarettes, lottery ticket ensured to customer automatically after the customer. These machines are likely used in various area like commercial, industrial, shops, organization etc.

Automatic regular coffee vending machine including coffee powder or coffee beans, sugar, and milk powder stored in chamber. It also includes the hot water chamber

where the water is heated. After giving command through a switch the machine add that specific amount of ingredients in the hot water. And then it gets delivered in the cup. The controlling mechanism like heating is done by the use of microcontroller.

But some of the drawbacks of use of these machines is that

- There is not any control on the consumption of coffee. Also there is no any record of the consumption of coffee per person.
- Some systems work on the coin or note which can be eliminated using the RFID system.
- Sometime coin or note may be fails to dispense the coffee or any beverages.

The main objective of this project is

- To reduce human interface and provide security by Automation of machine using modern technologies and waste reduction.
- To add the security feature the consumer is provided with RFID card which is fed with consumer id. Whole information of that user is fed to that smart card so the details of the consumer through this card is digitally recorded and updated to the company database.

In Offices daily numbers of cups of tea/coffee are consumed, there is no record of number of cup consumed in a day, and number of cup consumed by a particular person. In this way lots of wastage occurs every day. This problem of wastage can be reduced or stop by using this project.

COMMON FEATURES:-

- Electronics:-Very stable high power controller RFID.
- Temperature:-Can be set from keypad actual temperature is shown on display.
- Counter:-Indicates consumption of drink digitally.
- Water level**:-**Audio visual signal will go on when storage tank is empty.
- Powder and water setting:- It is possible to accurately set the weight of powder and volume of water.
- Smart card:-RF(contactless)smart card reader can be a fixed.
- Serviceability:-The machines have been designed in such manner such that service engine can replace any part within the min in matter of few min

BLOCK DIAGRAM OF THE PROPOSED SYSTEM
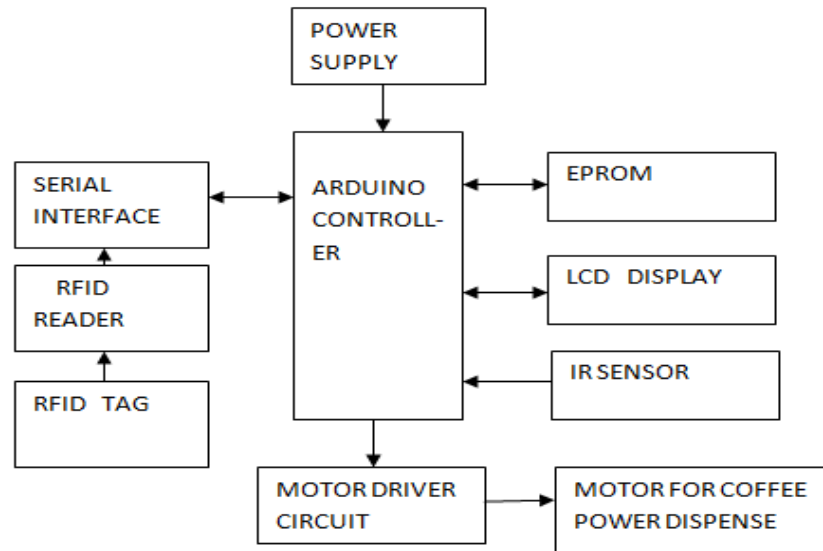
Fig.1 Block diagram of coffee vending machine

The above fig.2 shows the basic block diagram of coffee vending machine. The above system consist of ARDUINO UNO Controller for controlling process. The controller is interfaced with LCD display, RFID reader, EPROM, motor.

The RFID reader stores the employee data(e.g name, unique ID), when reader scans the RFID tag given to employee it compares with saved data and allows access to the machine meanwhile the IR signal from IR sensor is required for detection of cup at machine.

The AC motors are used for the flow control of coffee powder.

LCD display is used to show details of employee and process operation.

A. RFID: RADIO FREQUENCY IDENTITYFICATION

Radio Frequency Identification is an electronic device which consists of a small chip and an antenna. The chip can carry a data of about 2000 bytes. RFID is similar to the barcode which provides a unique identifier for that object. RFID device is scanned to retrieve the information. RFID tag is scanned and categorized by means of Unique Identification Number (UIN) by the RFID reader and it is not necessary that the RFID tag should be in the line-of- sight to a reader. The RFID reader is capable of scanning the RFID tag if it is within the range of the reader. The reader consists of a RF module which behaves as the transmitter and receiver for the radio signals. The transmitter itself is a combined unit of oscillator, modulator and an amplifier.

The modulator impinges the data command upon the carrier signal created by the carrier signal created by the oscillator. The boosting of the signal is over by the amplifier so that taken the signal can   awake the tag. The microprocessor stores the data   and it is the control unit which employs an operating system and memory. The reader employed in this system operates at a frequency of about 125 KHz.

B. ARDUINO UNO CONTROLLER

It is 8bit microcontroller based on the AVR enhanced RISC architecture. It has 32kbytes flash program memory and 1Keprom. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

There is no need of separate piece of hardware (called a programmer) in order to load new code onto the board Arduino can interact with buttons, LEDs, motors, speakers, GPS units, cameras, the internet, and even your smart-phone or your TV! The hardware boards are pretty cheap.

C. Serial Interface

 Every RFID reder comes withe serial output pins. We can collect the read data through these output pins using arduino. There are two possible outputs from an RFID reader. One is RS232 compatible output and other one is TTL compatible output. A TTL compatible output pin can be connected directly to arduino.

D. IR sensor

A proximity sensor is used to detect any object without any contact. It mainly consists of two parts. One of these is transmitter i.e. LED, and another is receiver i.e. detector. The IR sensor is interfaced with the Arduino board. It is used to detect the presence of the cup for the coffee. The required supply for the IR sensor is the 5 Volt.

E. AC motor

The AC motor is used to control the feed material like coffee powder. By connecting the shaft of motor to the hopper mechanism the flow of solid material can be controlled. The controller is programmed in such a way that the motor will be on for particular time which is fixed as per the requirement. The power supply required for the motor is 230 Volts, 50Hz. It is controlled through the relay board.

Solenoid valve: It is used to control the flow of the liquid such as hot water. 5Volt power supply is used to operate the solenoid valve.

F. LCD Display

A liquid Crystal Display is a flat panel display, electronic visual display that uses the light modulating properties of liquid crystals. LCDs are available to display arbitrary images (as in general purpose computer display) or fixed images which can be displayed or hidden such as preset words, digits and seven segment displays as in digital clocks. The lcd display is used to display the information regarding the consumer (such as Name, Unique ID,etc).

G. EPROM

An EPROM or erasable programmable read only memory is type of memory chip that retains its data when its power supply is switched off. Each storage location of EPROM consists of single field effect transistor. Each field effect transistor consists of channel in the semiconductor body of device. To retrieve data from the EPROM, the address represented by the values at the address pins of the EPROM is decoded and used to connect one word (usually an 8 bit byte) of the storage to the output buffer amplifier. The EPROM is used to store the data regarding the consumption of coffee by each employ.

H. Power Supply

Since Arduino (ATMega 328P), LCD, IR operate on 5Volt DC Supply, we have used 7805 regulator IC and 0.05 micro farad capacitor that generate conatant output voltage 5Volt, output current capability of 100 mA. To drive the AC motor and heater we require 230 Volt, 50 Hz supply.

Applications:-

* In small scale industries.

WORK FLOW:
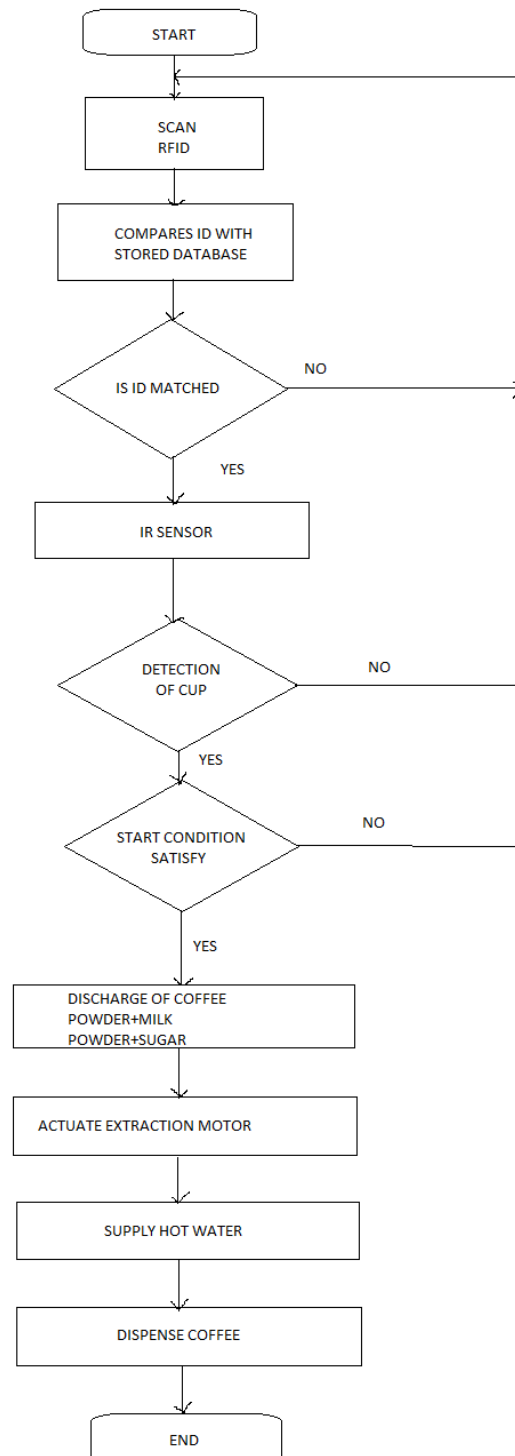
Fig.2 Flow chart of smart coffee vending machine
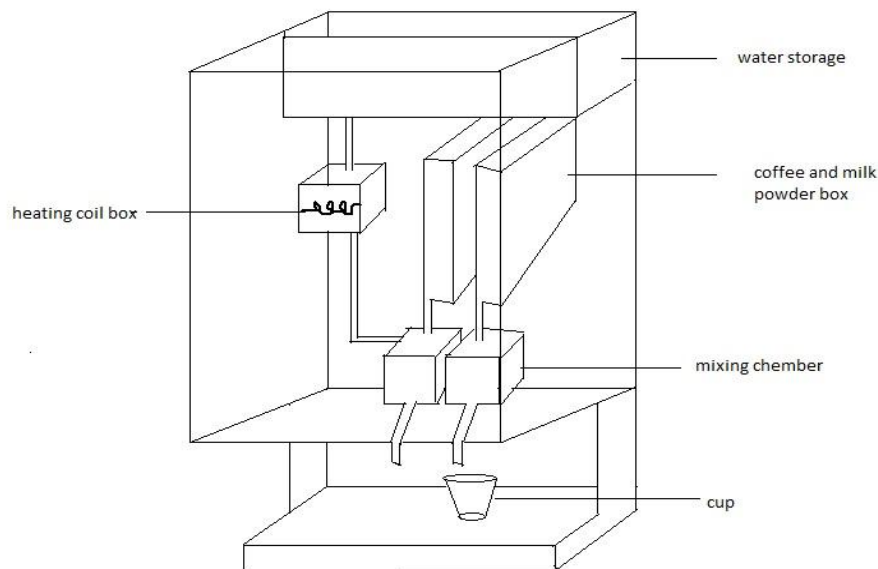
Fig.2 Perspective view of machine front door being open.

As shown in the figure the water storage tank contains the water which is feed in the heating chamber. In the heating chamber the heater is there. Two chambers are there which contains coffee powder of different flavours. Below that the small mixing chamber is used where a mixing motor is connected. And the dispensing mechanism is used to receive the coffee in the cup.

CONCLUSION:

This project focuses on automatic coffee vending machine using the arduino controller and RFID technology which is used to control the consumption of product and also reduce the waste of product in low budget and also gives the historical data in EPROM.

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