Smart Computerized Vending Machine Enhanced With IOT Technology

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Abstract- **The main aim of our project is to adopt smart technology in vending machine to make the method ease using internet of things. This paper characterizes the design, implementation and employment of cashless and secure payment system in vending machine by using internet of things (IoT) technology and to improve the traditional cash-based payment system that involved lot of problems and risks i.e., hacking, auditing, storing currency and material of coins and notes. Our proposed methodology consists of server end, where the information is stored in that system. Further, the more users can access the vending machine through the web page and the desired products can be purchased in easy manner. The DC motors powered in mechanical structure of vending machine to push the material out. The system is done through the wireless communication. Further, the data storage and accessibility can be done easily.**

Index Terms- Arduino, ESP8266, Motor

I. INTRODUCTION

The vending machine which provides the beverage like snacks, cold drink, it is also used for ticketing. Or other items such as newspapers when coin are 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. 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 IOT system. This system gives the access through only Wireless technology which avoids the misuse of machine. A small IOT device is fitted on the machine. In proposed system, we are purchasing the goods and Products in wireless manner. Here, the server end will store the complete information about the vending machine; also vending machine will update the clear details about the product availability in the machine. The vending machine and server is connected with the router. Once the user enters into mall or theatre, he/she can ping the server IP address. After in mobile it will display the available goods in the vending machine. Further, user can the select the necessary goods and needed quantity. Then the information is received by the server and it will display the amount on mobile screen. Once the payment is done, the server will generate the OTP to vending machine and users. The OTP will be entered on the keypad on the vending machine; if it is matched further the DC motor will run and it will pull the selected goods outside. Here, the multiple users can be accessed and multiple goods can be pushed out.

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.

After analysis of above system, general conclusion is to use Arduino with ESP8266. We have proposed the new cashless technology by using WI-FI Module.

III. THEORY

A. ESP 8266 WI-FI Module

The ESP8266 is the name of a micro controller designed by Espressif Systems. The ESP8266 itself is a self-contained Wi-Fi networking solution offering as a bridge from existing micro controller to Wi-Fi and is also capable of running self-contained applications. This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect NodeMCU devkit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly.

Wi-Fi ESP8266EX implements TCP/IP, the full 802.11 b/g/n WLAN MAC protocol and Wi-Fi Direct specification. It supports not only basic service set (BSS) operations under the distributed control function (DCF) but also P2P group operation compliant with the latest Wi-Fi P2P protocol. Low level protocol functions are handled automatically by ESP8266EX.

- RTS/CTS
- Acknowledgement
- Fragmentation and defragmentation
- Aggregation
- Frame encapsulation (802.11h/RFC 1042)
- Automatic beacon monitoring / scanning, and
- P2P Wi-Fi directs Like P2P discovery procedure, passive or active scanning is performed autonomously once initiated by the appropriate command. Power management is handled with minimum interaction with host to minimize active duty period.

  ESP8266 is an impressive, low cost Wi-Fi module suitable for adding Wi-Fi functionality to an existing microcontroller project via a UART serial connection. The module can even be reprogrammed to act as a standalone Wi-Fi connected device–just add power! The feature list is impressive and includes:

- 802.11 b/g/n protocol

- Wi-Fi Direct (P2P),
- soft-AP Integrated TCP/IP protocol stack

3.2.2 HARDWARE CONNECTIONS

The hardware connections required to connect to the ESP8266 module are fairly straight-forward but there are a couple of important items to note related to power:

- The ESP8266 requires 3.3V power–do not power it with 5 volts
- The ESP8266 needs to communicate via serial at 3.3V and does not have 5V tolerant inputs, so you need level conversion to communicate with a 5V microcontroller like most Arduino use.

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.
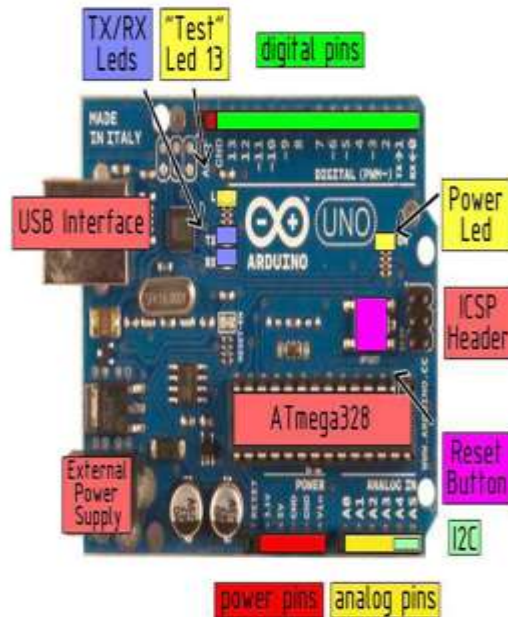

Fig 2: Arduino Uno board

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.

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.

V. PROPOSED METHODOLOGY

The Arduino act as main processor. The vending machine containing an Arduino Uno as a master controller along with ESP8266 WI-FI Module. 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 3.
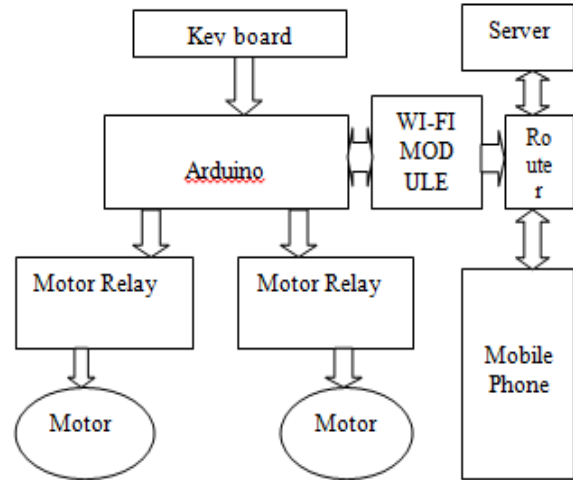

Fig 3: Block diagram

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 stepper motor. Because stepper 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.

A. Mechanism
* An arduino based vending machine is designed.
* The arduino can be programmed with arduino software (IDE).
* The Web page is used to provide cashless payment.
* The Lcd display information and product available at Output of vending machine.

B. 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.

C. Hardware Implementation
* Arduino Uno kit.
* ESP 8266 wi-fi module.
* Candy Assembly.

Fig 5: Candy assembly Smart computerized vending machine enhanced with IoT technology

VI. EXPERIMENTAL RESULT

For our experiment of smart computerized vending machine Enhanced with IoT technology has the webpage to access the nearest vending machine. To know the list of products in vending machine we need to connect the same wi-fi. Then we can select the products from the web page. After payment done in web page we get the OTP to the mobile. The OTP need to be entered into the vending machine to get the selected products

VII. CONCLUSION

This automatic vending machine offer variety of product as well as many different types of payment option and to control consumption of product and also reduce the waste of product. In the recent time use of digital is increasing day by day due to their accuracy and feasibility. 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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