IoT Based Sanitary Napkin Vending Machine

Prof. P. R. Rane[1], Anandi Rajandra Mohod[2], Pallavi Gajanan Bhise[3], Pranali Anandrao Manohare[4]
Sakshi Dilip Akolkar[5], Pratik Arvind Khadse[6], Saurabh Kishorrao Bisane[7]
Professor, Department of Electrical Engineering[1]
Students, Department of Electrical Engineering[2,3,4,5,6,7]
P. R. Pote College of Engineering and Management, Amravati, Maharashtra, India

Abstract: *Nowadays women are leading their countries. They are working all over and playing important role in development. During the time of work their health, hygiene should be taken care especially at the time of menstruation. During menstruation women has to regularly change sanitary napkin in every 5-6 hours. Thus, easy availability of napkin is necessary. Thus, easy availability of napkin is necessary. The issue of menstrual hygiene is inadequately acknowledged attention. Our first aim is to provide an easy way of availability of sanitary napkin to women's during the time of menstruation in normal and emergency condition The solution of this problem is installing automatic sanitary napkin vending machine in proper way. In vending machine, the person can refill napkins when stock is out.*

Keywords: Arduino, sanitary napkin, Coin Acceptor, Node MCU

I. INTRODUCTION

The first vending machine was invented in 1880s at England and dispensed postcard.Vending machines exist in many countries and places, automatic vending machines that provide fewer common products compared to traditional machine items are created.A coin dispensary is an automatic machine that offers items like snacks, beverages, cigarettes, toys and tickets to customers after money or a coin or a note or special cards are inserted into the machine.

Social status with health in equalities plays important role to serve the country. According to world health organization, worst health of people is due to lower social economics. Therefore, the solution on this problem is necessary. In all over the world out of total health issue women contribute most of the percent. Thus, women hygiene is most important and is needed to be take care. Most of the health problems of women are cause due to menstrual cycle. Due to unavailability of facilities, almost 23% of girls drop out the school during the time of menstruation. Women in India are still shy of buying napkin from medical shops and other stores. Thus, proper awareness and availability of napkin is very much important. A solution to this problem is installing automatic sanitary napkin vending machine in school, college and public places, working and educational institutions, it would help them to get the napkins as and when they needed.These reasons throw light to the grave necessity of our project to teach and help the women during this era to fulfill needs. Sanitary Napkin Vending Machine makes women's life easier and stress free even during those days.

IoT (Internet of Things) based sanitary napkin vending machines can bring a lot of convenience and accessibility to women who need access to menstrual products. These machines can be connected to the internet and can collect data about inventory levels usage patterns, and even customer preferences. This data can then be used to optimize the supply chain and improve the overall customer experience

II. DISCUSSION

Some of the benefits of an loT based sanitary napkin vending machine include

1. 1 Convenience The vending machine can be placed in public areas such as schools colleges, hospitals, and malls, making it easy for women to access menstrual products without having to go to a store.
2. Accessibility: The machine can be available 24/7, making it convenient for women who may need menstrual products outside of regular store hours
3. Cost-effective: By monitoring inventory levels and usage patterns, the vending machine can help reduce waste and optimize the supply chain, leading to cost savings
4. Personalization: With the help of data collected by the loT sensors, the machine can provide personalized recommendations based on the customer's previous purchases

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However, there are some potential drawbacks to consider as well For example, an loT based vending machine may require a stable internet connection, which may not be available in all locations. There is also the possibility of data breaches and privacy concerns with the collection of personal information.

Overall, an loT based sanitary napkin vending machine can be a useful and innovative solution for improving access to menstrual products. However, it is important to carefully consider the potential benefits and drawbacks before implementing such a system.

III. COMPONENTS

3.1 Coin Acceptor

The following component is coin acceptor used as one of the input devices for vending machine. DG600F Series of coin acceptor is a electronic coin acceptor with high reliability, Which is widely used in amusement facilities, vending machines and so on. The sensors in this coin acceptor check width, coin diameter and fall time of the coin to identify it and it can be programmed to accept coins of any nation, denomination.

Fig.1 Coin Acceptor

3.2 Liquid Crystal Display (LCD)

LCD is used in a project to visualize the output of the application. We have used 16x2 LCD which indicates 16 columns and 2 rows. So, we can write 16 characters in each line. So, total 32 characters we can display on 16x2 LCD.LCD can also used in a project to check the output of different modules interfaced with the microcontroller. Thus LCD plays a vital role in a project to see the output and to debug the system module wise in case of system failure in order to rectify the problem.

Fig. 2 LCD

3.3 Arduino Uno (ATmega328)

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connection to a

computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-toserial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter
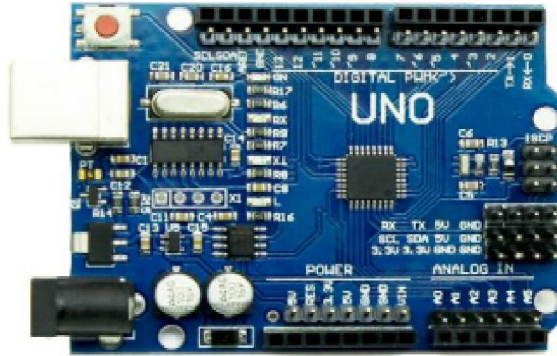

Fig. 3 Arduino UNO

3.4 NODE MCU

Node MCU is an open-source firmware and development kit that is based on the ESP8266 Wi-Fi module. The ESP8266 is a low-cost, low-power Wi-Fi module that can be easily programmed to perform a variety of tasks, including connecting to the internet, interfacing with sensors and actuators, and communicating with other devices.

Node MCU provides a simple and easy-to-use development platform for the ESP8266, with support for Lua scripting language and a range of libraries and modules for various applications. It includes a USB-to-serial converter that allows it to be programmed using a standard USB cable, and can be powered using a USB power supply or an external power source

Node MCU has become popular for a wide range of projects, including home automation. loT devices, robotics, and sensor networks. It is also used in educational settings to teach programming and electronics concepts.

Node MCU provides a powerful and flexible platform for developing loT projects, with the ability to connect to a wide range of sensors, actuators, and other devices, and the ability to interface with cloud-based services such as AWS, Google Cloud, and Microsoft Azure. It is also highly customizable, with the ability to modify the firmware and add new features and functionalities.
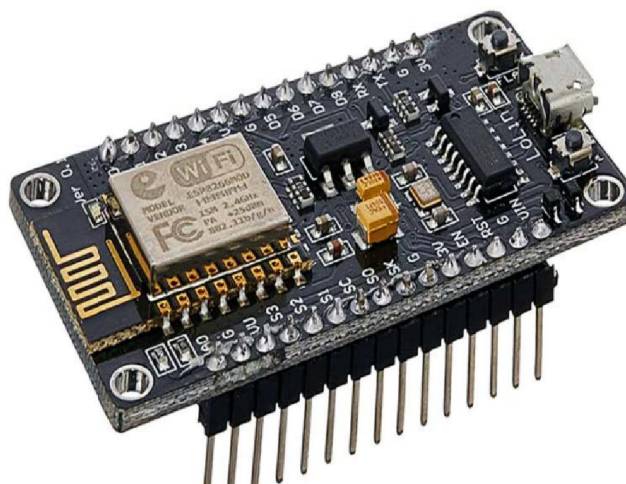

Fig. 4 Node MCU

3.5 Transformer

A step-down transformer is a type of electrical transformer that is designed to reduce the voltage level of an AC power supply. In a sanitary napkin vending machine, a step-down transformer is used to lower the voltage level of the mains

power supply to a level that is suitable for the operation of the various electrical components in the machine. The transformer works by using a primary coil that is connected to the mains power supply and a secondary coil that is connected to the electrical components in the machine. The primary coil is wound with a larger number of turns of wire than the secondary coil, which results in a higher voltage level in the primary coil.As the AC current flows through the primary coil, it generates a magnetic field that induces a voltage in the secondary coil. Because the secondary coil has fewer turns of wire than the primary coil, the voltage induced in the secondary coil is lower than the voltage in the primary coil The output voltage of the transformer is determined by the ratio of the number of turns in the primary and secondary coils. For example, if the primary coil has 1000 turns and the secondary coil has 100 turns, the output voltage will be one-tenth of the input voltage.In a sanitary napkin vending machine, the step-down transformer is typically used to power the electronic control circuitry, the motors that dispense the sanitary napkins, and the heating elements that keep the machine at a constant temperature. The transformer ensures that these components operate at the correct voltage level and are protected from damage due to overvoltage.
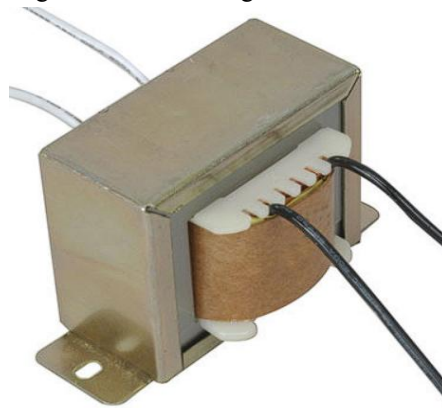

Fig. 5 Transformer

3.6 Motor Driver

A motor driver is an electronic circuit that is used to control the speed and direction of a motor. In a sanitary napkin vending machine, the motor driver is used to control the operation of the motor that dispenses the sanitary napkins. The motor driver receives input signals from the control unit of the vending machine, which instruct it to turn the motor on or off and to change the speed and direction of the motor as required.

The motor driver typically consists of a microcontroller, power transistors or MOSFETs, and other supporting components such as resistors, capacitors, and diodes. The microcontroller generates the control signals for the motor based on the instructions received from the control unit. The power transistors or MOSFETs amplify these control signals and use them to drive the motor. In a vending machine, the motor driver may also incorporate additional features such as current sensing, over-temperature protection, and overvoltage protection to ensure safe and reliable operation of the motor. Overall, the motor driver plays a crucial role in the proper functioning of a sanitary napkin vending machine by controlling the motor that dispenses the sanitary napkins.
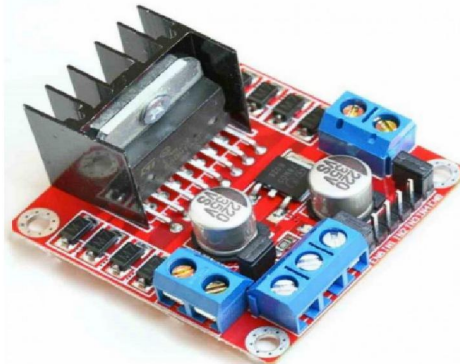

Fig.6 Motor Drive

3.7 Motor

A DC gear motor is commonly used in vending machines, including sanitary napkin vending machines. The motor converts electrical energy from a direct current power source into mechanical power, which is then used to drive the vending machine's dispensing mechanism. In a typical sanitary napkin vending machine, the DC gear motor is connected to a gearbox, which helps to reduce the motor's rotational speed while increasing the torque output. This allows the motor to provide sufficient power to move heavy loads, such as stacks of sanitary napkins, with precision and control. The motor's speed and direction can be controlled by an electronic circuit board, which receives signals from the vending machine's control panel. When a customer selects a product, the circuit board activates the motor, causing the gearbox to rotate and the dispensing mechanism to move. Overall, the DC gear motor plays a critical role in the operation of a sanitary napkin vending machine, ensuring that products are dispensed accurately and reliably.
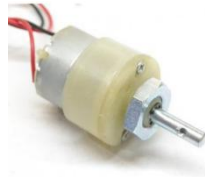

Fig.7 Motor

IV. WORKING

Firstly we give the supply of 230 volts is given to the primary of transformer then transformer step down the voltage to 12 volts. This voltage is given to arduino at the same time supply is given to coin accepter and node MCU.

Coin accepter is work by compare the coin that already inserted in theinsertion slot with the coin that inserted at front hole if the coin is same the coil will accept but if the coin is different the coin will be rejected then coil pulse given to the arduino .Arduino sense the pulse and give signal to the motor drive . motor drive receive the signal from Arduino and transmit the relative signal to motor . Motor start rotating the the sanitary napkin dispense at the dispensing unit at the same time of dispensing the Arduino send the signal to the node MCU. Node MCU is a open source iot platform which sense data . The output of node MCU will given to cloud and how many napkin is remain in the machine will be shown on the mobile. In this we use Things Speak website in which we are able to see number of counts of remaining napkin. In this way the model of iot based sanitary napkin vending machine work.
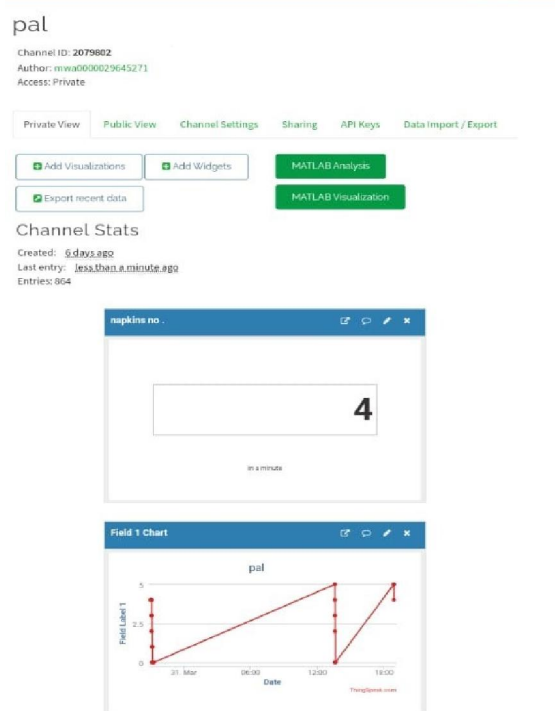
4.1 Block Diagram
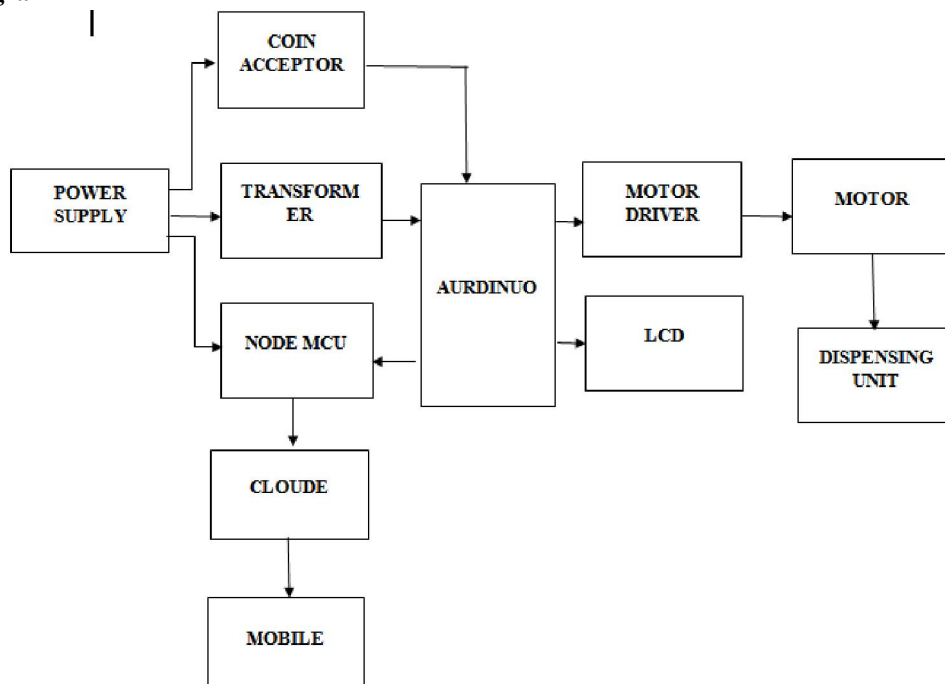
V. RESULT

| Sr.No	Prototype Model	Existing Model
1	Smaller in Size	Larger in Size
2	It is cost effective	It is higher in cost
3	Maintenance is easy	Maintenance is difficult
4	It is Portable	It is not portable
5	It Occupy less space	It Occupy more space
6	It can be control by IOT	It can't control by IOT

Table1

In our system we can control the unavailability of napkin by using think speak.We can monitor number of napkin in the vending machine

5.1 Actual Photo
Front view:
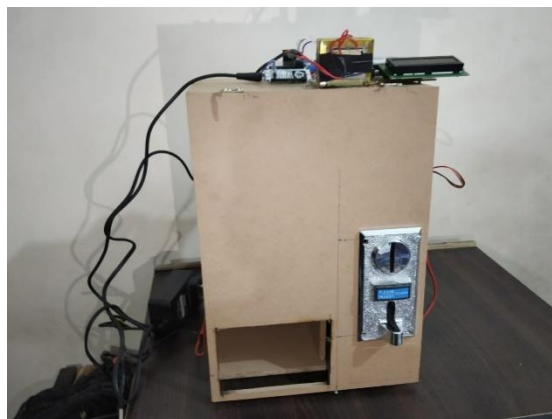
TOP view:
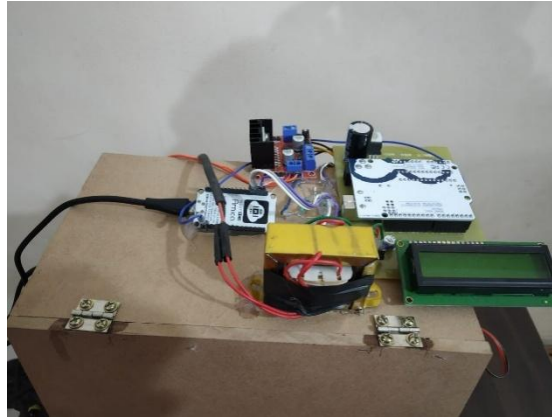
VI. CONCLUSION

The proposed system is that the design of prototype model for an automatic slot machine. The controller part was tested and it absolutely was found that automatic slot machine prototype was working in keeping with the specifications that it absolutely was designed. The prototype model was designed for the implementation of the mechanical structure of a slot machine which finally ends up in vending an item upon the insertion of the coin. In future, vending machines of maximum accuracy and efficiency may be achieved with better design and faster control equipment's. Commencing as a "movement of hygiene" within the rural areas, this is often a self dispensing Sanitary napkin machine which might be easily accessed by all the ladies in rural areas because of the cost efficiency and ease.

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