IoT Based Smart Cashless Vending Machine for Sanitary Napkin Dispenser

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ABSTRACT

A vending device is an automatic machine that provides sanitary napkins to customers after digital payment mode. This idea can be implemented through the usage of cashless charges. The main drawback of the existing coin-operated system is no mechanism available for the person refilling the napkins to know about the status of napkins available in the system, So, this work aims to install an Automatic napkin dispenser in public toilets, schools, hospitals, etc. And this Automatic Vending machine will give the availability of napkins to the owner and the machine will provide a napkin with UPI payment options. Enhance, Smart Cost-effective system.

Keywords: sanitary napkins, Vending Machine, cashless, Digital payment, Smart system

1. INTRODUCTION

During the first three days of menstruation, they need to change their sanitary napkins every three to four hours else they will be easily getting affected by uterus Cancer and Toxic Shock Syndrome (TSS)[1]. TSS can affect anyone who uses tampons for a long time. So there is a need to make the sanitary napkins easily available to them, which can be achieved by vending machines. Napkin Vending Machine is a personal hygiene product for women. It allows immediate access to napkins any time of the day to meet menstrual emergencies. It also saves women from the embarrassment faced while buying napkins at the shop. Installing vending machines in the working area and educational institutions would help them to get the napkins as and when required.

Nowadays the Government of India has taken the initiative and issued the GR (Govt. Circular No. D. O. No.4-160(10)/2013-NCW Dt 03/09/2014) to install the vending machine which can provide sanitary napkins in an emergency. We are promoting the Menstrual Health of women and adolescent girls by ensuring the availability of quality Sanitary Napkins through Sanitary Napkin Vending Machines. \For the same on 1st March 2018 government has circulated GR (Asmita 2018/   Parka. 33/ Yojana– 3) which says that the sanitary napkins should be provided to girls who come under the age of 11yrs to 19yrs in schools. Given the stigma and

social taboo associated with/sanitary napkins, the majority of the girls/women, feel embarrassed and hesitate to go to the commonly known, manned, and often crowded conventional/medicine outlets for sanitary napkins, resulting in unsafe practices, and the use of unhygienic materials during menstrual periods.

To Overcome this there is a need to make availability of sanitary napkin vending machines. IoT-based sanitary napkin vending machines will provide the napkins just by scanning the QR code on the machine. In this paper, we come up with a vending machine that provides the napkins immediately to the concerned person. Once the payment is done using the QR code it will show the payment is done or not on the LED and if it is successful then the napkin is provided via outlet.

2. LITERATURE REVIEW AND OBJECTIVE

The plan is to make the sanitary napkin vending machine using a QR code that provides the napkins once the payment is done just by scanning the code. In the earlier works, the basic idea of vending machines like water vending machines, Pepsi vending machines all work on the mechanism of coin or RFID cards. The coin is inserted into the vending machine through the coin inserter and the product is supplied via the outlet of the machine[2]. There are various drawbacks of the previous system. Coin-operated vending machines have the major drawback that the coin inserted in the vending machine if it is duplicated will still provide the napkins [3]. The user has no idea of whether napkins are available in the machine or not.

The main objective of this paper is to have Immediate access to napkins any time of the day to meet menstrual emergencies**.**

3. BLOCK DIAGRAM AND HARDWARE REQUIREMENT

BLOCK DIAGRAM:
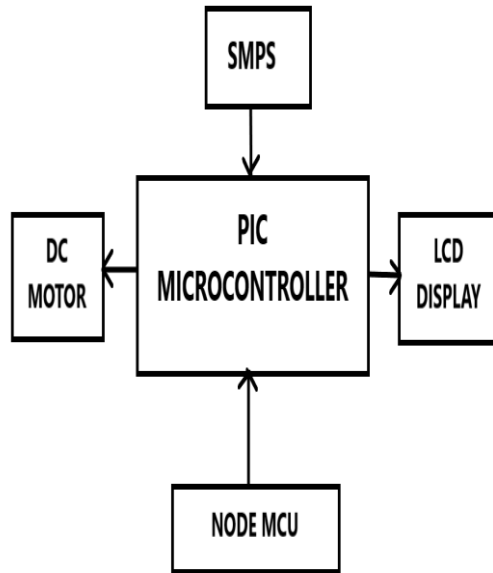
Figure 1: Block Diagram of IoT-based smart cashless vending machine for sanitary napkins dispenser.

Methodology

An intelligent sanitary napkin vending machine is controlled by a microcontroller and is designed to work with a QR code. The components used in this project are the power supply, node MCU ESP2866, DC motor spring, LCD. The power supply is used to supply power mainly to ESP8266. ESP8266 is used to send a message to the concerned authority, the motor driver is used to drive the motor, the motor is used to rotate the spring, spring is used to store the napkins[6]. At last, the Microcontroller controls all components of this project. As the user scans the QR code, checks whether the payment is one or not if it is successful, the microcontroller runs the program and if not, then the LCD will show payment is not successful. After successful payment, the user gets the sanitary pad via outlet. Then it checks for the availability of napkins, The Microcontroller keeps track of the availability of napkins in the machine. When the user scans the QR code the QR Reader reads it and sends a signal to the Microcontroller[5]. The microcontroller sends a signal to the motor driver L293d, which in turns ON the motor. As the motor rotates the spring mechanism starts to rotate for a pre-set amount of time, during which the napkin is dispensed. Once a napkin is dispensed, the count of napkins available is updated in the Microcontroller. As the count reaches a pre-set value, the Microcontroller initiates sending an SMS via an ESP8266 module.

HARDWARE REQUIREMENT:

1. SMPS

The AC to DC conversion part in the input section makes the difference between AC to DC converter and DC to DC converter. The Flyback converter is used for Low power applications. Also, there are Buck Converter and Boost converter in the SMPS types which decrease or increase the output voltage depending upon the requirements. The other type of SMPS includes Self-oscillating fly-back converter, a Buck-boost converter, Cuk, Sepik, etc.

The AC input supply signal 50 Hz is given directly to the rectifier and filter circuit combination without using any transformer. This output will have many variations and the capacitance value of the capacitor should be higher to handle the input fluctuations. This unregulated dc is given to the central switching section of SMPS.

Fig.2: SMPS (Switch mode power supply)

2.PIC Microcontroller 16F877A

The PIC microcontroller PIC16f877a is one of the most renowned microcontrollers in the industry. This microcontroller is very convenient to use, the coding or programming of this controller is also easier. One of the main advantages is that it can be write-erased as many times as possible because it uses FLASH memory technology. It has a total number of 40 pins and there are 33 pins for input and output. PIC16F877A is used in many pic microcontroller projects. PIC16F877A also has many applications in digital electronics circuits[11].

Fig. 3: PIC Microcontroller 16f877A

3. DC Motor

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in a part of the motor. DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of the current in its field windings[10].


Fig.4: DC Motor

4. LCD Display

It is an electronic display module and has a wide range of applications. It can display 16 characters per line and it has 2 such lines. The 16x2 LCD is capable of displaying 224 different characters and symbols. Here the LCD display is used to show whether the payment is done successfully or not[9]. A liquid-crystal display (LCD) is a flat-panel display or another electronically modulated optical device that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead of using a backlight or reflector to produce images in color or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock. They use the same basic

technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement.
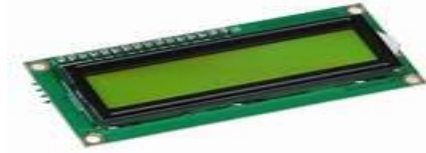
Fig.5: LCD Display 16*2

5.NodeMCU ESP8266 WIFI Module

ESP8266 is a WIFI module that has integrated TCP/IP protocol which gives the microcontroller access to the microcontroller to the WIFI network. It is pre-programmed with an AT command set firmware. It is mostly used for the development of IoT embedded applications.
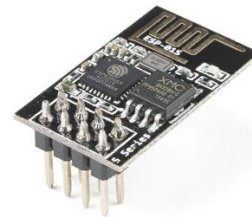
Fig. 6: ESP8266 WIFI Module

6. Vending Coils

Vending coils are spring-like structures that are connected to servo motors and move according to the PWL pulse given to the motors. The user tests how much rotation of the coil is required to dispense the product down.

Fig.7: Vending coils

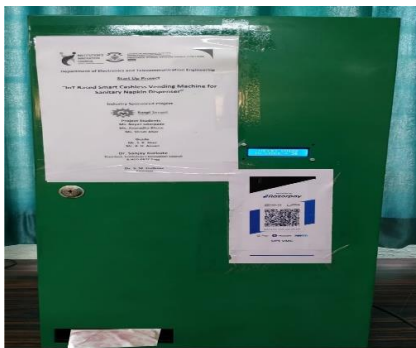## 1.   RESULTS AND DISCUSSION

1)Sanitary Napkins Vending Machine

Fig.8

1)Scan the QR code

Fig. 9

2)After successful payment napkin will Dispense

Fig.10

• The IoT-enabled feature ensures that real-time and detailed report is available online, regarding the number of dispensed sanitary pads and amount collected.

• The machine will instantly notify whenever there is a shortage of sanitary pads in the machine.

• Sanitary Napkin Vending machine can be wall-mounted at the Ladies' restroom facility at your premises for easy and private access.

• Online payment-based sanitary pad dispensing unit eliminates the risk of infection.

• Women can check the availability/unavailability of the sanitary pads from the display unit

• Napkin loading on a spiral; eases the process of dispensing or adding sanitary pads safely and securely.

• Contains QR-based UPI payment, can pay an amount instantly using phone-pay or google pay.

• Vendor can have a complete inventory of the products in a vending machine

• UI, Database, and mechanism can be extended to other vending machines like snacks, general goods, baked goods, etc.

2. CONCLUSIONS

The proposed system is the design of the finished model for an IOT based sanitary napkin machine with a digital payment method and vendor inventory system. The controller unit was tested and it's working as expected, it's able to dispense napkins based on the user. Based on the results of the research, it can be concluded that this UI, database, and mechanism can be extended to other vending machines. There are big opportunities for the entrepreneur to make a business of sanitary napkins using vending machines in public places. Moreover, a good businessman not only has to be good at finding business opportunities with nice prospects but also should be able to stand as a solution to the stipulation of society, including vital necessities.

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