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Automatic Sanitary Napkin Dispensing and Disposal Machine

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ABSTRACT: women hygiene is utmost important and is to be taken care of, especially in the time of menstruation. During periods women has to change their sanitary pads for every 4 to 5 hours. Thus, the easy availability of napkins in all the areas are not possible. On the other hand, Improper disposal of napkin can lead to various problems which includes large heaps of pads all over, bacteria cause infection, unhygienic environment, etc. most of them dispose their used pads into the toilet. It may block the drainage system. The solution of both of this problem is installing automatic sanitary napkin dispensing and disposal machine. This system aims to work on IOT based sanitary napkin dispensing and disposal machine. Both the operations are operated in fully automatic manner. For vending, the user can use 3 types of payment methods such as coin mechanism, UPI payment, RFID. The SMS will send to the concern person automatically when stock is out for the purpose of refilling the napkin. For disposal small grinder is used to grind the used pads for instant burning and reduce the current and heat necessity. Ash generated after disposal can be flushed out automatically into the drainage system. Integrating both the operation in a single unit reduces the cost of the device. By installing vending and disposal machine in school, collages, industry and in rural areas contribute towards eco-friendly environment.

KEYWORDS: portable, Internet of Things, dispensing, disposal, RFID, UPI payment

I. INTRODUCTION

Nowadays humans are mainly focus to develop the country into next level. But one main issue arising with this development is health. out of total health issue women has suffer most of the percent cause due to menstrual cycle. This is because of the unavailability of facilities to dispose the used napkins in school, college, work and travelling time. During the menstruation days women has to change their sanitary pads for every 4 to 5 hours. otherwise they will be easily affected by uterus cancer, rashes, infection and other gynecological problems. The only solution is that installing the napkin vending machine in common toilets. It allows user to immediate access to napkins anytime of the day to meet menstrual emergencies. On the other hand, the disposal of used napkin is very mandatory. Most the women are not changing their pads during their working hours, this is due to the unproper facilities to dispose the used pads. Most of them are dumped their pads into the toilet, it should be block the drainage systems. And some of them throwing it in open areas cause unhygienic environment, and it may spread diseases like HIV. To avoid these problems, the automatic sanitary napkin dispensing and disposal machine is very mandatory. This machine is used to easily access the pads and properly dispose it. both vending and disposal operations in a single machine is used to make the low cost and it will be very helpful for all the women.

II. OBJECTIVES

To design and work of this vending operation is using the three payment method. Which is used for easily accessing the pads when they need. The disposal operation is portable and easy operation. For that the following objectives should be achieved.

- To fabricate and integrate the dispensing machine with disposal machine.
- To give automatic self service to women without anyone's help.
- To reduce the environmental related problem.
- To fill maximum number of pads without any damage.
- To dispose the used pads in hygienic manner and instant disposal is possible.
- To reduce the spreading of blood borne diseases.

III.RELATED WORK

Prof. Meena Ugalde. In “sanitary napkin disposal system” 2020 [1] discussed the sanitary napkin, micro steel gauge filter, incinerator. Also discuss about purify the harmful gas release from the incinerator.

Megha M V. In “design of sanitary napkin disposal system at Thrissur municipality” 2021 [2] discussed the incinerator, design, analysis, menstrual napkins, fuel. Also discussed about the principle of heat being generated when current is passed through a resistance is employed in various household appliances like iron, water heaters.

K. Subash Chandra Boss. In “design of sanitary napkin vending machine” 2020 [3] discussed the portable, IR sensor, vending machine, embedded system. Also discussed about the using of IR Sensor to detect the coin and dispensing and item.

Govind Waghmare. In “design and manufacturing of pad dispensing machine by using online payment gateway” 2020[4]. Discussed about sanitary napkin, dispenser, microcontroller, DC motor, payment gateway.also discuss about the installing vending machine in remote tribal areas and also increasing the number of availability of napkin.

S.Leelavathy. In “easy sanitary pads vending machine and application development” 2022 [5]. Discussed about transportable, vending, sanitary pads. Also discussed about the advanced application and proving free accessing card to dispensing a napkin.

IV.METHODOLOGY

In this project, both the dispensing and disposal operations are works based on the IOT platform. Both of the operations are fully automated.Dispensing operation is controlled by a PLC. The napkin dispenser is designed to work with three payment methods such as coin mechanism, UPI payment method and RFID card. In coin mechanism the smart coin port is used to avoid the duplicated coin. The IR sensor is available to check the napkin dispensed or not. As the user drops the coin or swipes the RFID card or scan the QR code, the coin acceptor or the RFID reader detects the coin or card then the relay turn on when the PLC sends a signal. After the payment is done the relay in turn switches on a motor, which rotates the spring coil to dispense a fresh napkin. The PLC is mainly used to check the availability of napkins in the machine and the SMS will be send to the concerned person to refilling the napkins.For disposal operation, the small size motor is available inside the incinerator part of the machine. So, it is used to cut the used pad into a small. This small pieces are instantly burns with the use of heating coil. It filters the gases passing through and removes any undesirable odor and fumes. So that only filtered and clean gases may be returned to the environment. This project is also aim to integrated and fabricated the dispensing and disposal operations in a single device. So, which is reduce the cost of the device. And possible to place this machine in all common toilets and school, college, working institutions.

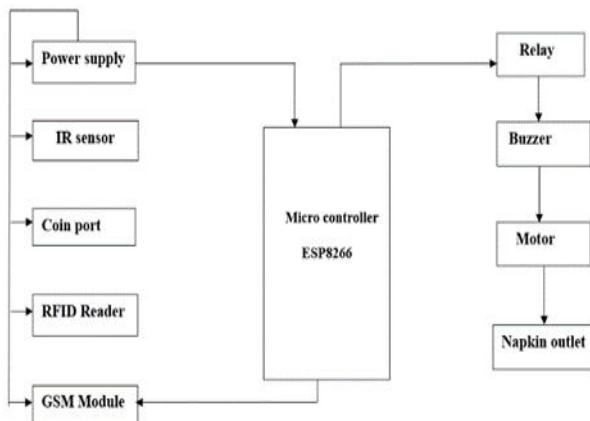


Fig.1.1.Block Diagram Of Proposed dispensing machine

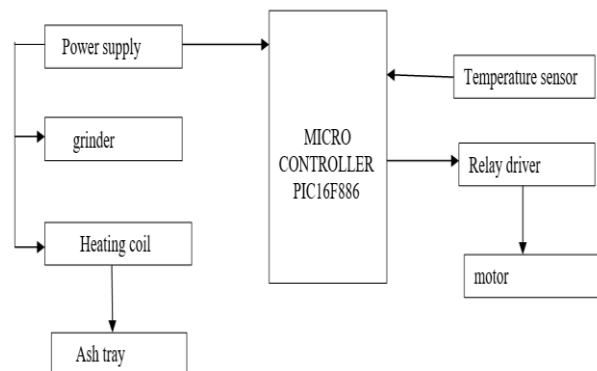


Fig.1.2.Block Diagram Of Proposed Disposal Machine

COMPONENTS RELAY:

Relay is a small electrical device and which is used for the automatic switching process. The relay is used to automatically open and close the circuits when an external signal is occur. This machine uses two relays. One relay is used to switch on the PIC16F886 microcontroller and another is used to switch on the motor results in rotate the spring mechanism.

MICRO CONTROLER:

ESP8266 - It is the wi-fi module which is used for the connectivity purpose. The ESP8266 is a low cost wi-fi microchip that permits micro controllers to associate with a wi-fi system.

ARDUINO UNO-Arduino UNO is a low-cost, and flexible microcontroller. It is a programmable open-source microcontroller board that can be integrated into a variety of electronic projects. Arduino UNO is very easy to use. In this machine the Arduino uno is used for dispensing purpose. And it is used to control the motor, PLC and relay.

PIC16F886 - it is one of the 8-bit microcontrollers made by nano-watt technology. It is preferred by most for multiple functionalities. This system uses pic16f886 microcontrollers for disposal purpose. This microcontrollers has easy programming, and it is based on flash type memory.

RFID READER:

RFID reader is used to detect the RFID card. When the user requiring Sanitary napkinswipe the RFID card, the reader detects the card and initiates action to dispense the napkin.

COIN PORT:

Coin acceptor is a self-checkout application in vending of sanitary napkin. A coin acceptor is a device that is used in automated machines for accepting coins in exchange for goods or services. In this machine 1Rs. Coin, 2Rs. and 5Rs. coin is acceptable. If a consumer does not have 5Rs. change then they can insert 1Rs coin at 5 times. This coin acceptor is fully automatic that it will accept only 5 and multiple of 1Rs. And 2Rs.

IR SENSOR:

An infrared sensor is a small electronic device which is mainly used for motion detection. An IR sensor can measure the heat of an object as well as detect the motion. This machine uses IR sensor for checking the napkin is vended or not. And also it is used for detect the duplicated coins.

LCD DISPLAY 16*2:

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data.

SERVO MOTOR:

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. This system used 4 servo motors along with relay.

GRINDER:

A grinder is used to cut any materials into small parts. This machine has small size of grinder inside the disposal unit. This grinder is used to make a small piece of used pads. This is very benefit for instant disposal.

HEATING COIL:

The machines uses heating coil to burning a grinded piece of napkin and it reduces to ash.

V. EXPERIMENTAL RESULTS

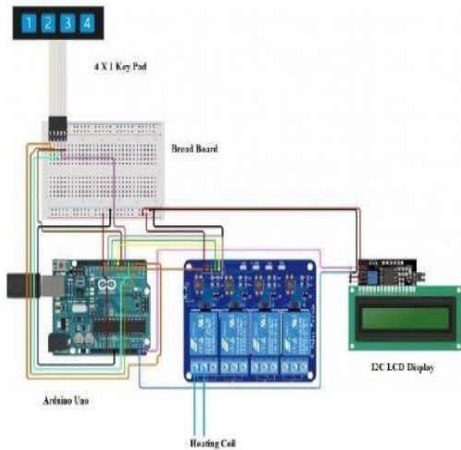


Fig. 2.1. Experimental Setup Obtained Finally For Disposal Operation

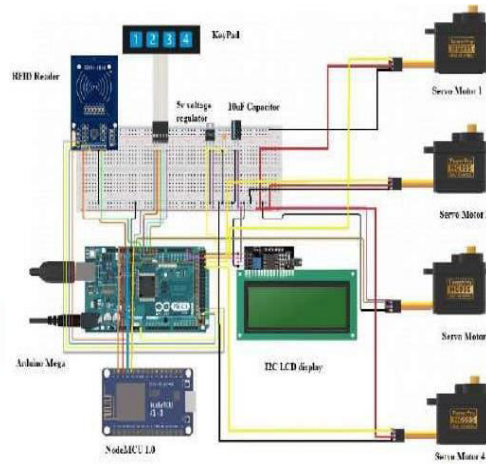


Fig.2.2. Experimental Setup Obtained Finally For Dispensing Operation

VI. CONCLUSION

This machine gives a solution for menstrual time hygienic related problems. This system combines both the dispensing and disposal operation in a single machine and also it has low cost, portable, low temperature, less burning time. This system uses 3 payment method for dispensing purpose. Thus, easy availability of pads make possible in common toilets. The RFID card is very useful for regular user like school, college and work areas.

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