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Sanitary Napkin Vending Machine without any User Technical Handling

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Abstract: In India only 12% women's are uses some sort of feminine hygiene products like sanitary napkins and the percentage of the use of sanitary napkins is much lower in rural areas. So under the waste management program, we have developed sanitary napkin vending machine without any user technical handling as the women's in rural areas are not much educated. Also the women's are still buying sanitary napkins from medical or other stores and they felt shy to buy this. We can provide solution to this problem by installing sanitary napkin vending machine in school, colleges, railway and bus stations and other public places.
Keywords: Sanitary Napkin, Dispenser, Solar panel, PIC controller.

I.   INTRODUCTION

A sanitary napkin vending machine is an automatic self-service machine used for dispensing sanitary napkins against acceptance of coins or maybe there is a process of swipe out an RFID card according to user demand. According to storage the Vending Machine has loading capacity of 1-33, 34-66, 67-99 napkins with display for showing napkins availability. There are two types of Sanitary Napkin Vending Machine, Table top vending machine and wall mounted vending machine. Such type of machine having mechanical coin acceptor and is may be single value coin acceptor or multi value coin acceptor. The machine is made from metal or a material which makes it vandal resistant. . Increasing women's population and increasing awareness about female hygiene and health issues are all expected to spur market attractiveness of sanitary napkin vending machines across the world. There is a need to make sanitary napkins easily available to all the women's even from the rural areas and this can be achieved only by Sanitary Napkins Vending Machines. This vending machine allows immediate access to sanitary napkins anytime of the day to meet menstrual emergencies.

II.   SYSTEM'S OVERALL PROJECT DESIGN

This system aims to develop a Sanitary Napkin Vending Machine without any user technical handling. This system can be controlled by the PIC16F886. The Sanitary Napkin Vending Machine is designed to work with 5 rupees coin. As the user drops the coin of 5 rupees, the coin acceptor detects the coin and controller sends signal to turn ON a relay. The relay then switches ON a vending motor. When these Vending Motor turns ON then it rotates the spring coil to dispense a fresh sanitary napkin. The controller keeps track of the available sanitary napkins in the vending machine and shows up this count on the display. The block schematic of proposed system has been shown below:
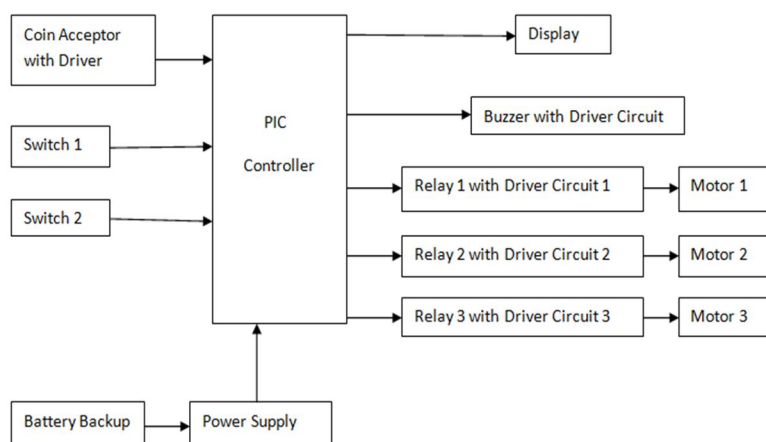

Fig – Sanitary Napkin Vending Machine Block Schematic
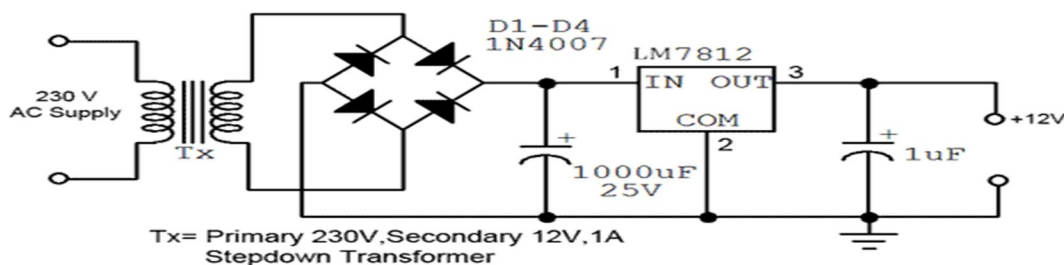
A. Power Supply

Fig- Power supply circuit Diagram

Here the Transformer converts AC electricity from one voltage to another voltage with little loss of power. Transformers work only with AC. In this power supply section Step down transformer has been used as there is a need to reduce the voltage. After that the bridge rectifier has been used. This bridge rectifier can converts a full wave AC to full wave varying DC. The 1000uF 25V capacitor is used to convert the unsmoothed DC of rectifier into smoothed DC. The IC 7805 is 5V fixed three terminals Positive Voltage Regulator and it can protects the circuit from excessive current.
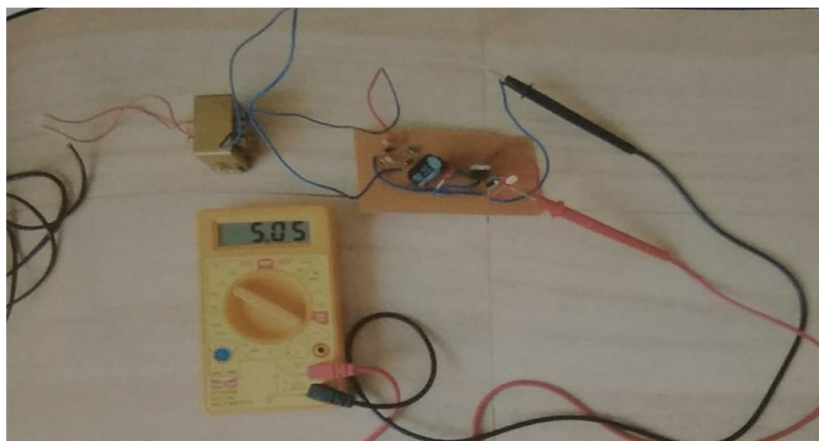

Fig- Snapshot of testing of power supply on multimeter

B. PIC16F886 Controller

Fig- PIC16F886 Controller IC

PIC16F886 is an 28 pin self programming IC. It is having 256 bytes of EEPROM data memory, two comparators, 11 channels of 10 bit Analog to Digital(A/D) converter, one Serial Peripheral Interface(SPI) it can also called as Inter-Integrated Circuit bus or Enhanced Universal Asynchronous Receiver Transmitter(EUSART). All these features make PIC16F886 ideal for more advanced applications in industrial and automotive appliances or consumer applications.

It is software tunable and its software selectable frequency range is in between 8MHz to 32 KHz. It is self reprogrammable under software control. It is having 25 I/O pins. Sink or source current is high up to 25mA. It is having 3 timers timer0, timer1 and timer2. PIC controller is fast and easy to programming and interfacing with other peripherals. Also we can connect analog devices to PIC controller very easily without any extra circuitry. Performance of PIC controller is very fast as using of RISC architecture

C. Coin Acceptor

Fig- Coin Acceptor

The coin acceptor can be used to insert coin for buying the sanitary napkin. It can analyze the coin according to its thickness, mass, size and diameter. After analysis it can sends appropriate signal to the controller through output connections. But first is need to set this coin acceptor. As there is no. of coins, we need to check every coin for minimum 15-20 times. Even we can easily check the accuracy of operation as we had provided it while programming.

D. Relay

Basically relay is a switch which controls (ON/OFF) circuits electronically as well as electromechanically. These relay can be used along with relay driver. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The relay can also used to interface a low voltage electronic circuit to high voltage electrical circuit like a relay can make a 5 Volt DC battery circuit to switch a 230 Volt AC mains circuit. The relay circuit has an two sections: input and output. The input section having a coil which generates magnetic field when low voltage is applied to it. This voltage is an operating voltage. The relays are available in different configuration of operating voltages like 6V, 9V, 12V and 24V. The output sections are having contactors which connect or disconnects mechanically. There are three contactors: Normally Open (NO), Normally Close (NC) and Common (COM). When the input is not provided then COM is connected to NC and when the input voltage is provided then COM is gets energized and connected to NO. There are different relay configuration like SPST, SPDT and DPDT. The three relays used in these system is of 7 Ampere, 12 to 24 Volt DC operating voltage and 0.1 Volt to 230Volt working voltage. .

E. Vending Machine Motor

The vending machine motors used are of 24 Volt DC gear motor. These motors are of small size and having low speed and big torque. These 100x60 mm gear motors provide 5.0Nm torque. These motors are suitable to small diameter, low noise and big torque applications. These motors are having high efficiency and precision.
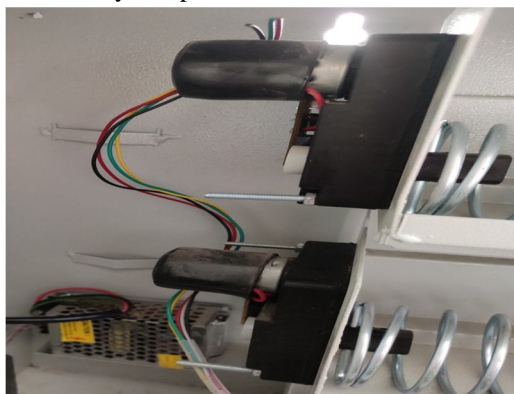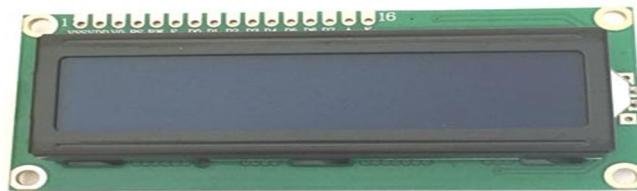

Fig- DC Gear Motor

F. Display

Fig- LCD Display

An 16X2 LCD display are having 16 columns and 2 rows, so it will have (16X2=32) characters in total and each character will have 5X8 pixel dots. The operating voltage of this LCD Display is 4.7Volt to 5.3Volt. A current consumption is 1mA without backlight. It is an alphanumeric LCD Display module means it can display alphabets and numbers. It can work on both 4-bit and 8-bit mode. It can also display any custom generated characters. It is having 8-bit data lines and they can be connected to controller to send 8-bit data.

III. RESULTS

This system is basically built to vend sanitary napkins on dropping of 5 rupees coin. It was observed that the system was successful in this regard. The rejection ratio of coin is very less as about 5%-10%.

IV. CONCLUSION AND FUTURE WORK

Women hygiene is of utmost importance and is need to be taken care of. Women in India are still shy of buying sanitary napkins from medical and other stores. This issue can be solved by fabricating a coin operated Sanitary Napkin Vending Machine. Rather of using simple motors the DC gear motors has been used and this can be rotate 360^0 exactly. So sanitary napkin can dispenses easily in the tray without any problem. Even there we can use RFID card and RFID card reader too instead of coin and coin acceptor.

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