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Design and Implementation of Solar Power Health Products Vending Machine with WiFi Enable Application

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Abstract: Medicine plays an important part in human's life for each circumstance. An automatic medic system is acquainted to reduce the man power, time and energy. It is like an ATM through which we get the expected cash whenever & Wherever. The same framework is followed for the medicine also. Medicines for B.P, diabetics, cold, fever, headache, and first aid medicines like bandage, cotton, ointments, sanitary pad and other regularly utilized items can be obtained. The vending mechanism is controlled by the raspberry pi which is a single board computer and the other part of it is the online webpage portal for a user to pay the bill. The device dispenses out the medicines when the user selects required product and pay for it using his mobile phone via UPI, credentials of user are validated from the database and then specific product is dispense from machine.

Keywords: Raspberry Pi, DC Gear Motor, Spring for Vending, Payment Module, GSM Module.

I. INTRODUCTION

As medical stores are not available at all circumstances, we can set up this machine at any place. Vending machine have the mobility, they are portable and continue to deliver the services.
Customers can easily access the medicines in cases of emergency or whenever required and to avoid faulty distribution of medicines to customers . There are a lot of people in India die due to lack of diagnosis in first place and non-availability of medicine on time . This type of trouble arise when need of some medicine is urgent and medical stores are not open , especially during night time. In remote areas and rural areas where population is less, the patients have to face issue for absence of medicines . These are some of the main issues that are being faced by the society in present scenario. To solve this problem automatic medicine vending machine will provide medicine 24*7 anytime, anywhere.
It provide user-friendly environment to the user to have contact less payment method and delivery of medicine. This make the system easy to use. All the order are placed on webpage which is easy to access and payments are done from (open source) payment gateways. System will also show the

availability of medicine to user. all the data regarding payment, medicine stock can be access by owner of machine easily. All the updation can be done by owner itself into the machine. In the case of payment fail or medicine not dispatch the user can easily contact to owner regarding any query and problem will be solved from owner side itself . looking towards increasing demand of medicine we can place more vending machine so it will be more helpful to user to access it. This machine can be use in offices, schools, railway stations, and many more public places. An automatic medicine vending machine with a inbuilt pill dispensing mechanism and a storage facility for the heaps of pills that can be dispensed based on the user requirement. These machines can enhance the efficiency of medication distribution. Automated dispensing machine improve patient safety.
The automatic medicine vending machine is technically feasible to the peoples. It is based on android application. It is very helpful and it gives ease of access also. Very useful in rural areas where there is no proper pharmaceutical facilities. It provides a major advantage of availability of medicines at any time eliminating the limited opening time of medicals. It can also be installed in many public places along this some worksites. This method reduces the human effort, it is also a step in digitalizing our country. By being at the counter vending machine in the workplace, those working without clinics or pharmacies can benefit from increased work efficiency and avoid underperforming sick employees. It allows the user to select a medicine, pay the required amount via online transactions and dispenses the medicine according to the

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symptoms which is already stored in the database of the machine. It prevents hours wasted waiting in clinics for trivial problems like colds and headaches.

II. EXISTING METHOD

When the RFID card is inserted, the particular user details are read and displayed by the RFID reader. After the valid person is identified, the list of medicines will be displayed, then the user selects the required medicines by entering the respective number of selected drugs using the keypad. After entering the required list, the amount will be calculated according to the medicine and their quantity.

III. OBJECTIVES

1) Many deaths occur at places due to lack of first-aid kits and medicines. Some also don't have any cash for buying the medicines from the pharmacy. Some don't use vending machines due to the hygiene problem.
2) The major objective of this device is to resolve all these problems and provide a user-friendly vending machine which is portable and effective at all over places.
3) This device can also be used inside an organization for its employees at work. This device is used at all over places and used by the public has a particular magnetic chip issued by their organizations.
4) This machine sanitizes the hand of the user to make the machine hygienic, checks the body temperature of the patient so that the person remains healthy as fever is symptoms of most of the diseases and also uses magnetic card module for free of cost product dispense in the emergency situation and finally dispenses the required product.

IV. LITERATURE REVIEW

A. Praveen Kumar, Shailaja Singh, Manu Choudhary, K. Singh Retrieved on: 2020 "Solar Powered Medic Vending Machine". ISBN: 978-1-7281-8337-4/20/$31.00 ©2020 IEEE. In this Paper they discussed that, many vending machines have been made which provides different types of products within different number selections. They can be divided into food vending machines, chocolate vending machines, snack vending machine, glucose water dispensing and many other forms of liquid dispensing vending machines. In concern with the medical field, up till this 21st century, we are not able to provide first – aid kits at all over places like schools, stations, and many more areas which are still under up-gradation. This product is used to dispense first-aid items as well as all the necessary medicines, for the persons who need immediate attention where reaching to a doctor might not be the first step for curing the person. The central point of the concept is to deliver alteration usage in the eyes of the people at places where there is no pharmacy nearby.

B. Viktor P. Semenov, Vladimir V. Chernokulsky, Natalya V. Razmochaeva "The Cashless Payment Device for Vending Machines – Import Substitution in the Sphere of Vending" 978-1-5386-0703-9/17/$31.00 ©2017 IEEE. In this paper the notion of vending and the main tasks of a modern vending company are disclosed, one of the main goals of which is to provide as many payment methods as possible. Vending machines are most often located in large companies, large offices, institutions, and enterprises. The aim of the vending company is to increase the speed of customer service. This paper describes own development - a device for cashless payment. The device allows employee to pay for purchases using electronic passes. This solution allows vending companies not to worry about problems with cash (banknotes and coins), encashment and change, increasing the number of customers served per unit of time, what, in its turn, increases the income of the organization. And for the ultimate buyer, this method of payment saves time greatly.

C. Aneeqa Ramzan*, Saad Rehman, Aqib Perwaiz 'RFID Technology: Beyond Cash-Based Methods in Vending Machine'. 2017 2nd International Conference on Control and Robotics Engineering. This paper characterizes the design, implementation and employment of cashless and secure payment system in vending machine by using radio frequency identification technology, 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. RFID is achieving momentum in a multiple sectors like retail, security, transportation, pharmaceuticals, defense, healthcare etc., and a host of other fields, and now vending machines. Our proposed methodology consists of passive RFID identification cards and reader for consumers, Arduino Mega microcontroller, SPI protocol for RFID and Arduino interfacing, keypad for password protection, liquid crystal display (LCD) for displaying consumer name and current balance, and SMS is sent for notification using GSM module. Spiral coil architecture is supported by DC motors powered by relays in mechanical structure of vending machine. It also describes how such product-oriented RFID card based vending machine can maximum facilitates the system engineering.

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V. PROPOSED SYSTEM

This project describes the methodology of the proposed prototype system. We have created an Android application which is responsible for controlling the entire system. The application stores its data on the database and performs synchronization upon login. It allows the user to select a medicine, pay the required amount via online transactions and get SMS notification. The dispenses the medicine according to the symptoms which is already stored in the database of the machine. The whole system relies on the android application to provide the user interface, control the medicine dispenser.

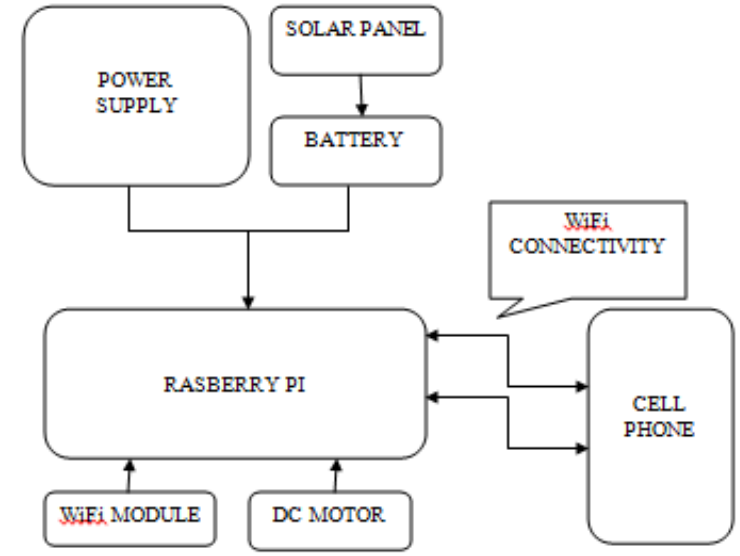

Figure 1: Block Diagram of system

This device is been functioned by the user who is in need of first-aid kits or basic health medicines. This device consists of first-aid kits, sanitary napkins, cough and fever tablets, bandage and pain killer cream for any hairline/muscle fracture, pain killer tablets and one-time usable masks. This device also consists of hand sanitizer and the digital infrared thermometer at the outlet of the vending machine.

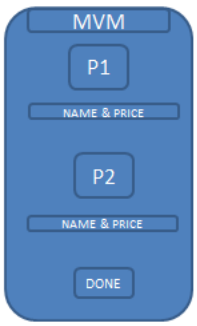

Figure 2: Application View

At the start, the user swipes the magnetic card which is later read by the card reader. Once the card reader reads the card, a message on the LCD screen is been displayed welcoming the user. Then the user is requested to sanitize their hand in the sanitizer section. After this process, the user checks its body temperature. After commencing all these processes, the inner section of the vending machine gets moved out of the power saver mode into the functional mode. Now the user is able to select the product which they need according to the emergency situations in which they are. The user selects the required product number using the keypad and then the product is been dispensed out at the dispensing section using motor driver modules to rotate the aluminum wire to dispense the product. After this process, after some delay, when no card reader is been read or no process takes place within the vending machine, then the machine automatically moves into the power saver mode.

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A. Power supply:

We need a power supply of DC voltage (5V) to run the servo motor, proximity sensor (5V), relay (5V), Coin acceptor unit, raspberry pi 3 (5V). Due to some interruption of power supply, it has a provision i.e. battery. Battery can feed the power to the device and battery can be charged via the solar panel. This work uses a 12 V rechargeable battery.

B. Raspberry pi 3:

This work uses Raspberry Pi 3 Model B. It has used due to its features and performance. It introduces Raspberry Pi as a world's most inexpensive and powerful Single Board Computer. Ever since the launch of Raspberry Pi from 2012, this is worlds cheapest microprocessor unit specially built for learner and makers

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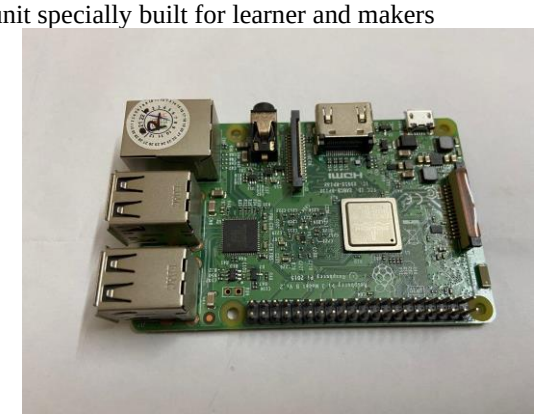

Figure 3: Raspberry Pi 3

The Raspberry pi 3 running raspberries serves as a master control over the other subsystem. It is a single board computer with microprocessor whereas Arduino is considered as microcontroller unit. The Raspberry pi is programmed in Python language. The first main task for the Raspberry pi is receiving and processing the UID from the scan RFID card. As the user drops the coin or swipes the RFID card, the coin acceptor or the RFID reader detect the coin or card and raspberry pi 3 send signal to turn on the relay.

C. Relay:

Our system used two relays. One relay is used to switch ON the raspberry pi 3 and another is used to switch on the motor results in rotate the spring mechanism.

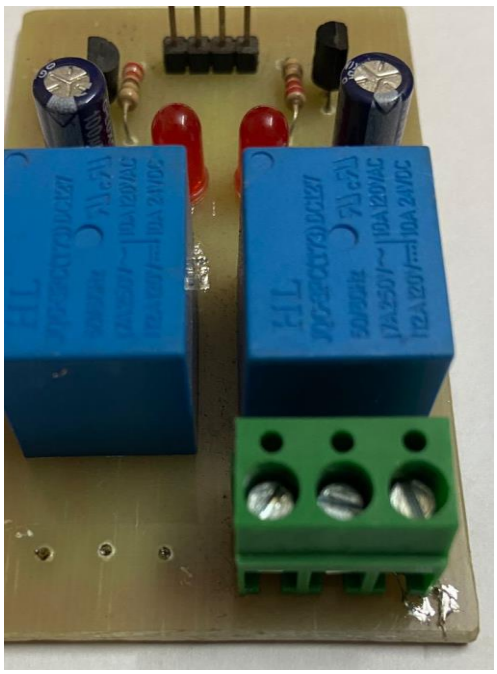

Figure 4: Relay circuit

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VI. RESULT

The system is operational as a proof of concept model and can be implemented in real world scenarios in actual vending machines for business. The machine costs a fraction of what the alternatives available today in market cost. A large number of DC motors can be driven by Arduino MEGA by adding a suitable driver shield to enable the machine to have variety of items. The system can also be modified to add keypad for making the machine support choice of products having same price.

The main problem addressed by the proposed system was delay in purchase and dispatching of product. The system design is in such that the cost and resources required are restricted to a minimal level. This was necessary in order to cut the production cost to an extent where the product will be affordable for the offices and buildings.

Implementation of this machine in schools and colleges will help the students to take the items whenever they are in need of it. Coins were inserted and items were vended successfully. This vending machine can also be useful in the current COVID-19 situation to dispense essential products without any human contact, contamination at any place and any time while helping prevent spread of infection.

VII. CONCLUSION

The automatic medicine vending machine is technically feasible to the peoples. It is based on android application. It is very helpful and it gives ease of access also. Very useful in rural areas where there is no proper pharmaceutical facilities. It provides a major advantage of availability of medicines at any time eliminating the limited opening time of medicals. It can also be installed in many public places along this some worksites. This method reduces the human effort, it is also a step in digitalizing our country. The user is obliged to press the button to take the pill. It reduces human strength, time and energy. It allows the user to choose the required medicine, the method of payment via the Internet and easily dispenses the medicine. It will also reduce the cost of manufacturing.

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VIII.APPLICATION

1.The concept is very much useful in day to day life for common people.
2. This can be implemented everywhere such as shopping malls.
3. It can be implemented on National Highways.
4.It can be installed in Railway stations
5. This medicine vending machine is mostly used in healthcare field.
6. In providing the medical facility at the doorstep to the required one.
7. It will be useful in providing medical facilities in busy areas such as Railway Stations, Airports, markets etc.
8. Provide facilities to people during their journey as this can be installed in the aircrafts, rails and ships.
9. This system can be used by the defense organization such as military, air force etc.
10. It will help rural India to get better medical facilities at much lower costs.