VISVESVARAYA TECHNOLOGICAL UNIVERSITY

BELAGAVI

A Project Report on

AUTOMATIC MEDICINE VENDING MACHINE

In partial fulfillment of the requirement for the award of the

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In

Mechatronics Engineering

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ABSTRACT

A vending machine is a machine which dispenses items such as snacks, beverages, cologne, consumer products and even gold and gems to customers automatically, after the customer inserts currency or credit into the machine. As the name suggests this is a vending machine that will dispense the required medicine as per the user's choice. It provides an all-encompassing solution to an individual looking for immediate symptomatic relief for trivial health problems. By relieving small symptoms at work, it can completely eliminate both presentism and absenteeism in the workplace. It can also decrease the current costs of open medicine cabinets. By having an over-the-counter vending machine in the workplace, worksites without clinics or pharmacies can benefit from increased work efficiency and avoid underperformance of ill employees. Moreover, it prevents hours wasted waiting in queues at clinics for trivial problems like colds and headaches. This situation gets especially magnified when a location is suffering from a localized epidemic or pandemic.

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CHAPTER 1

INTRODUCTION

Degrees of social status are closely linked to health inequalities. Those with poor health tend to fall into poverty and the poor tend to have poor health. According to the World Health Organization, within countries those of lower socioeconomic strata have the worst health outcomes. Health also appears to have a strong social component linking it to education and access to information. In terms of health, poverty includes low income, low education, social exclusion and environmental decay. The poor within most countries are trapped in a cycle in which poverty breeds ill health and ill health leads to poverty. Our project although may not be an out of the box idea in its entirety, it still could prove useful. Especially in developing countries like India where there are innumerable numbers of people who are unable to avail medicines.

In this project the system will contain four medicines which are available as first aid and without prescription. They are Band-Aids for minor abrasions and cuts, Paracetamol for reducing fever, Vicks Action 500 for common cold and ORS packets for dehydration and other problems involving loss of fluids in the body. Now-a-days in this fast moving world, appliances which are completely automatic are preferred. This is the biggest advantage of this paper.

Several people in India die due to lack of diagnosis in first place and nonavailability of medicine on time. Problem arise when need of some medicine is urgent and drug stores are not open or drug is not available in stock, especially during night time. In remote areas, rural areas and places where public turnover is less, the availability of medicines within the patient's reach is a critical issue. These are some of the main problems that are being faced by the society in present scenario. ATM will help in solving these problems by providing the medicines 24x7.

1.1 Field of invention:

The present invention relates to automatic medicine vending machine, in particular to a machine that has the capability to dynamically receive input from the user and then dispense the required type of medicine. Here, input means to insert the coin and press the button of the required medicine.

1.2 Background of invention:

The growing modern age has also brought with it the dawn of the age of numerous types of diseases. The use of medicine to maintain and regain physical and mental health has been growing at a rapid pace. The doctors prescribe different type of medicine for one particular type of illness.

Today it has become common for a person to take at least one type of pill at regular interval each day. A statistical survey shows that about 21% patients never follow their prescription and 6% patients is not capable of identifying their own medicines. In extreme cases, between 12 and 20% take medicines of other patients. But in case of the elderly people the scenario is awful. They take numerous number of pills at one particular time of the day to maintain their health. Therefore, confusion can arise both concerning the schedule and whether or not the medication has been taken.

This problem has been addressed by a number of personal pill dispensing machine in related art. Wherein the dispenser in preloaded with the medicine to be taken and is programmed to dispense the medication at a particular time of the day and alert the user to take the pills. Sometime, improper loading of the medication can cause some dosage issues. Improper medication is reported to be the most common reason why some patients do not respond properly to medical treatment. Patients sometimes forget to take the pill at a particular time and then try to ‘catch up’ by taking more than prescribed dosage. It becomes difficult to remember when to take the medication when different types of pills are required to be taken at different times. Elderly people frequently do not have sufficient mental alertness to keep track of the frequencies and dosages of their various medicines over a sustained period of time.

1.3 Scope

- By implementing medical ATM, simple medical problems will be diagnosed with an easy reach. This system can be further improved to diagnose the health problem also. A central platform can be provided for patience to interact with specialists of fields through video conferencing i.e. to provide a health ATM service.

- The design and implementation of Health Automatic Medicine Vending Machine is described in the paper. Thus this vending machine will overcome the problem of unavailability of medical facilities at long routes train, highways rural area etc. It can also be implemented at bus depots, railway station, and petrol pumps.

- Health Automated Medicine Vending Machine plays its major role in hostel areas, airports, and rural areas. Implementation of this system reduces man power 24 hours' availability service and also reduces time consumption.

- The automatic medicine vending Machine will cater the needs of the customers with no further human intervention required. The machine is user-friendly and is very simple to operate. With this, labor cost will be minimized and it will also give entrepreneurs the opportunity to attract more customers with this innovation.

- There is no doubt that these machines can enhance the efficiency of medication distribution. Automated dispensing machines provide secure medication storage on patient care units, along with electronic tracking of the use of narcotics and other controlled medicines. Automated dispensing machines enhance rest-dose availability and facilitate the timely administration of medications by increasing their accessibility

on patient care units. This is particularly important in the areas where most people are inaccessible to drugs for minor illnesses.

1.4 Objectives

- To provide a solution to scarcity of Medicine availability in rural areas.
- To design and develop a portable system capable of dispensing variety of medicines based on the needs of consumers.
- To design and develop Cartesian coordinate based vending mechanism used to securely dispense the medicine to the consumer.
- To make the machine cost-effective and user friendly by using latest technological components.

CHAPTER 2

LITERATURE REVIEWS

2.1 Implementation of FSM Based Automatic Dispense Machine with Expiry Date Feature Using VHDL [Apr 2014]

Automatic Dispense Machines are used to dispense various products like Cold Drink Bottle, Coffee, Chips, and Chocolate etc. when money is inserted into it. Automatic Dispense Machines have been in existence since 1880s. The first commercial coin operated machine was introduced in London and England used for selling post cards. The Automatic Dispense machines are more accessible and practical than the convention purchasing method. Nowadays, these can be found everywhere like at railway stations selling train tickets, in schools and offices Automatic Dispense drinks and snacks, in banks as ATM machine and provides even diamonds and platinum jewelers to customers [4]. This paper proposed approach to design an Automatic Dispense Machine with expiry date features using FSM model by VHDL. The expiry date feature is very useful for user if any product is expiring than that product will not dispense and return back the money to the user. We are using FSM (Finite State Machine) modeling to implement our work.

We Implement the FSM based automatic dispense machine using Xilinx ISE 14.2. For verification (Simulation) we used Modalism 10.2a student addition tool from Mentor Graphics Company. We conclude that our design is cost effective and dispense multi products. We also added an expiry date feature that is very useful for common man if any product is out of date or expire machine will not dispense that product and if any person have inserted money for the same product machine will return full amount. At present scenario it is very use full in malls, shopping Complexes, PVRs, railway stations and airports etc. [1]

2.2 Steven Woodbine, The Complete Vending Machine, [Published on 18 May 2011]

There are a large variety of medication administration assistance devices for nonprofessional users. Most of them are manual, providing multiple compartments called pill trays. The pill tray has a number of compartments that can be filled with medication. Each compartment can hold different sizes and combination of medicines. The user is required to take the medicine from each tray each day for a maximum of 28 days. It does not provide any alarm to indicate the time of taking the medicine.

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2.3 Design and fabrication of touch screen based automated medical Vending machine

In this paper the author described medicine vending machine based on IR Standard touch technology as the input to select different medical facilities like First Aid facility, ambulance facility, and direct calling facility via GSM, dynamic GPS, smart card facility and restocking medicine alert.

The software used is visual basic was programmed such that when the patient selects certain facility, it will be served to that patient. Thus it can be helpful in case of illness, small or big accidents and so can be placed anywhere. [3]

2.4 ATM (All Time Medicine) counter for medicine [May 2017]

Malashree.G1et al. proposed the system, in that users may able to get basic OverThe-Counter (OTC) medicine at any time (24x7). Minor illnesses have a strange way of inviting people in the middle of the night when pharmacies are already closed. Over-thecounter (OTC) drugs are a class of medicines sold directly to a consumer without a prescription from a health care professional, as compared to prescription drugs, which may be sold only to consumers possessing a valid prescription. People will able to access the medicine with the help of this machine even at the night time.

With this, first aid can be provided in time to the user. Medicines sold or supplied from a vending machine should satisfy the condition laid down by the Medical Council of India. Medicines which these restrictions apply are mainly aspirin and paracetamol.

Products containing these substances should not exceed 16 tablets in a package for sale. [4]

CHAPTER 3

METHODOLOGY

The basic theme of this paper involves dispensing of medicines as per the user's requirements. The input provided by the user through the keypad is then forwarded to the Microcontroller for processing and for taking the required decisions in order to proceed forward. The Microcontroller, with the help of the motor drivers, drives the concerned medicine cabinet having the medicine that the user needs. These motor drivers control the

rotation of the motor that dispenses medicines from the medicine cabinet. The motor rotates the disk attached to it, which has a cavity. This cavity when coincides with the cavity of the medicine cabinet, the medicine falls and arrives at the outlet. Thus the medicine dispensing function is fully controlled by the motor drivers. The user can then pick up the medicine from the outlet. This is a fully automatic process as no manual support is needed.

3.1 BLOCK DIAGRAM

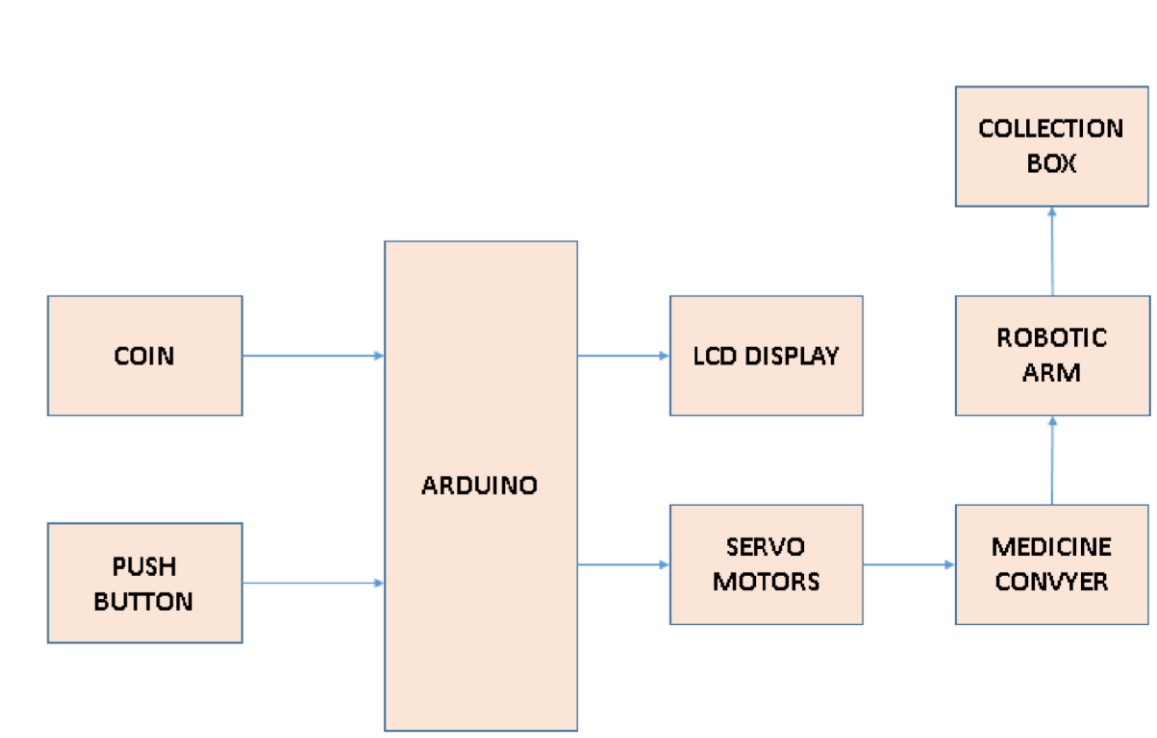

Fig.3.1. Block diagram of Automatic Medicine Vending Machine

3.2 LCD Display

Liquid Crystal Display is an electronic display module and finds a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi

segment LEDs. The reasons being, LCDs are economical, easily programmable, have no limitation of displaying special and even custom characters, animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines.

Fig 3.2.LCD Display

3.3 ARDUINO MICRO CONTROLLER

Arduino is an open source prototype platform which is easy to use as number of required modules can be directly interfaced on to the board and has an understandable software language. The Arduino forms the main heart of the system, the purpose of using this controller is due to the fact that it reduces the interfacing components as it has number of necessary features inbuilt in it. In this system, the main modules which are to be interfaced to the controller are RFID card reader, keypad, TFT display, GSM and servo motor.

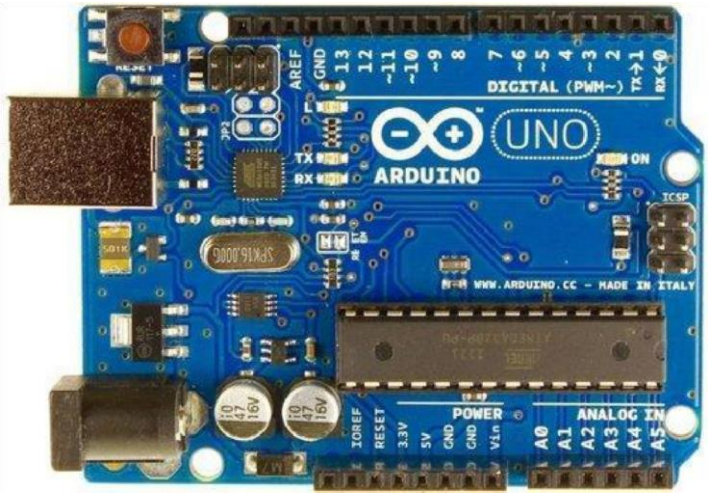

Fig.3.3. Arduino Microcontroller

3.4 SERVO MOTORS

A servo motor is an electrical device which can push or rotate an object with great precision. It is just made up of simple motor which run through servo mechanism. If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. Servo motors are rated in kg/cm (kilogram per centimeter) most hobby servo motors are rated at 3kg/cm or 6kg/cm or 12kg/cm. This kg/cm tells you how much weight your servo motor can lift at a particular distance.

Fig 3.4. Servo motor

3.5 Push Button

A push button is a simple switch mechanism for controlling some aspects of machine or a process. Buttons are typically made out of a hard material usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily be pressed or pushed.

Fig 3.5. Typical Push button

3.6 Stepper Motor Driver A4988

A Stepper Motor Driver is the driver circuit that controls how the stepper motor operates. Stepper drives work by sending current through various phases in pulses to the stepper motor.

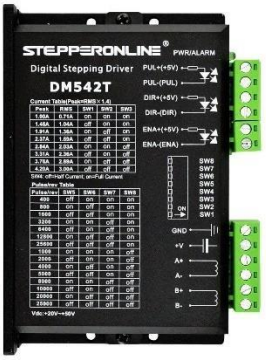

Fig.3.6. Stepper motor driver

3.7 Stepper Motor NEMA17

A Stepper motor, also known as step motor, is a brushless DC electric motor that divides a full rotation into a number of equal steps. The motor's position can then be commanded to move and hold at one of these steps without any position sensor for any feedback, as long as the motor is carefully sized to the application in respect to torque and speed.

Fig.3.7. Stepper Motor

3.8 DC-DC LM2596 Buck Converter

A Buck converter, also known as step-down converter is a DC-to-DC power converter which steps down voltage from its input to its output. It is a class of switched mode power supply typically containing at least two semiconductors and at least one energy storage element.

Fig.3.8. DC-DC Buck Converter

3.9 Lithium Polymer (Li-Po) Battery

A lithium polymer battery is a rechargeable battery of lithium ion technology using a polymer electrolyte instead of a liquid electrolyte. High conductivity solid gel forms this electrolyte. The voltage of a single lipo cell varies from about 2.7 to 3V(discharged) to 4V (fully charged). For lipo battery packs, cells will be connected in series, a specialized charger may monitor the charge on a per-cell basis so that all cells are brought to the same state of charge.

Fig.3.9. Li-Po battery

CHAPTER 4

DESIGN

The design is based on simplicity and the utilizations of low cost materials and components that can be easily available. Figure 4.1 shows the major components of the preferred embodiment which includes a major housing that hold within it the central micro controller, a push button that takes the input from the user; storage space that houses small containers where all the different type of drugs are stored; a conveyor series that takes the pill form storage to packing region, a dispatch area for the user to receive the packed medicine.

4.1 CAED Model of the Automatic Medicine Vending Machine

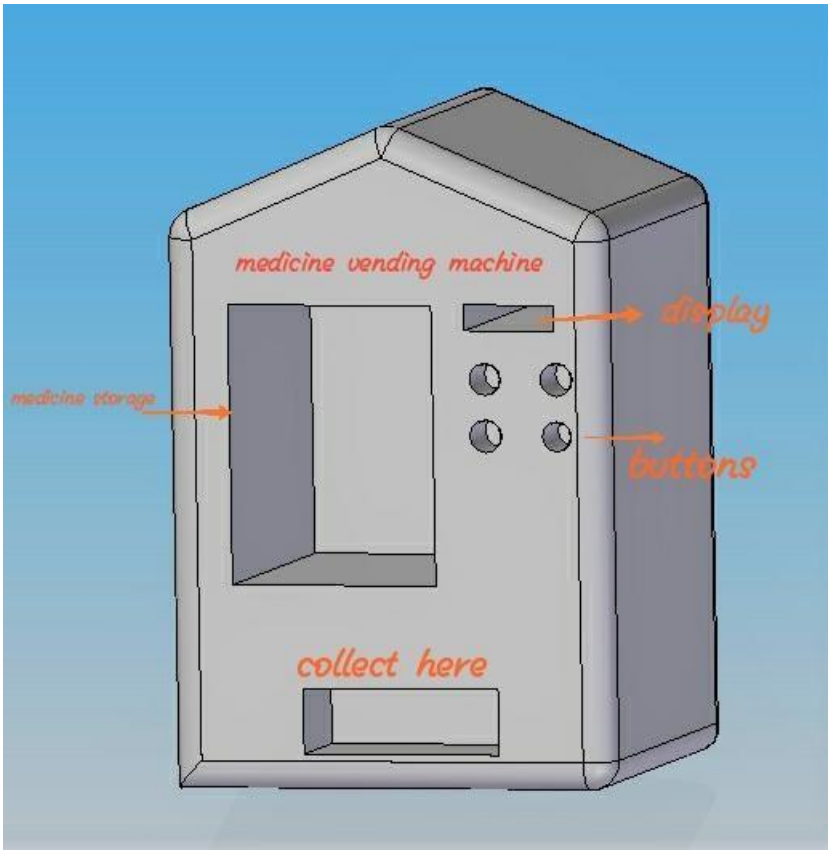

Fig.4.1. CAED Model of Automatic Medicine Vending Machine

4.2 Physical Attributes

Table 4.2 Physical attributes

Volume	**0.8 m^3**
Length	**400mm**
Breadth	**400mm**
Height	**500mm**
Weight	**7kg**

4.3 Over-the-Counter Medications

There are many over the counter medications available without the prescription, which are used to treat the symptoms of many illnesses that don't usually require the help of a physician or health care practitioner.

Table 4.3. Over-the-counter Medications for different symptoms

Symptom	Medication	Example
Pain and Fever	1. Acetaminophen 2. Nonsteroidal Anti-inflammatory Drugs(NSAIDs) 3. Aspirin	Tylenol Nyquil Motrin Advil
Common Cold Cough Sore throat	1. Herbal Remedies 2. Dextromethorphan 3. Guaifenesin	Vicks Formula 44 Pediacare Robitussin
Head ache Ear ache Body aches	1. Ibuprofen 2. Benzocaine 3. Anbesol	Orajel Topex Hurricaine

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