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DESIGN AND DEVELOPMENT OF AUTOMATED MEDICINE VENDING MACHINE FOR HEALTHCARE SERVICES

Prathibha S
Assistant professor
E and C dept
Government engineering college Ramanagara

Abstract. The need for access to basic healthcare is essential to the development of a healthy society. This project presents a machine that can provide such care in areas where a medical store may not be feasible or feasible.. After the user selects a medicine, pays the required amount, the program verifies the amount received and dispenses the medicine. This provides an all-encompassing solution for those seeking immediate symptomatic relief for trivial health issues. . In addition, it eliminates the need for long lines at clinics for trivial ailments like colds and headaches. These situations are exacerbated in places affected by epidemics or pandemics. These days in this fastly moving world, appliances that are automatic are being preferred. This is the biggest advantage of our project. Automated dispensing machines decentralized medication distribution systems that provide dispensing, and tracking of medicines are recommended together as a potential mechanism to enhance efficiency and patient safety, and they are now widely utilized in many hospitals. There is no doubt that these medicine vending machines can improve the efficiency of medication distribution, but their capacity to decrease medication errors is controversial and it depends on many factors, including how users can design and implement these systems. From this concept, we conclude that the automatic medicine vending machine is technically feasible to the peoples. It gives the availability of medicines all the time, also in rural areas. It is very helpful; it gives ease of access also. It is sales person-less service that is based on a microcontroller.

Keywords:Healthcare,Vending Machine,pandemic,Microcontroller

INTRODUCTION

Inequalities in health are intimately connected to socioeconomic position. Those who are in bad health are more likely to be poor, and the poor are more likely to be in poor health. According to the World Health Organization, people in lower socioeconomic groups have the lowest health outcomes within countries. Health appears to have a substantial social component that is linked to education and information availability. Poverty involves poor income, low education, social marginalisation, and environmental

degradation in terms of health. Most impoverished people in most nations are caught in a vicious cycle in which poverty creates illness, and illness breeds poverty. Although our project may not be an original concept in its whole, it may nonetheless be valuable. Particularly in emerging countries such as 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. Nowadays in this fast moving world, appliances which are completely automatic are preferred. This is the biggest advantage of this paper. other advantage would be the use of smart card instead of coinsA 16-bit PIC microcontroller is in charge of the entire system. Automated dispensing devices are decentralised medicine delivery systems that allow computer controlled storage, dispensing, and tracking of medications, and they are now widely employed in many hospitals. There is little question that these devices can improve drug distribution efficiency, but their ability to prevent medication mistakes is debatable and depends on a variety of factors, including how users design and operate the system. Nonetheless, we are confident in arguing that automated dispensing technologies increase patient safety. On patient care units, automated dispensing equipment allow safe pharmaceutical storage as well as computerised tracking of the use of narcotics and other regulated drugs.

An automatic medication vending machine with a self-contained on-site medicines dispensing mechanism and storage for a variety of medicines that may be distributed based on the user's needs. Stepper motors for administering medication and a huge storage area for tablets are among the machine's most important components.

LITERATURE SURVEY

Suhail Beg et al. proposed an FSM based automatic dispense machine[1] which has an expiry date feature using VHDL, in this paper the author described Finite State Machine based automatic dispense machine using Xilinx ISE 14.2. This machine accepts money as an input to dispense the products and returns back the money without dispensing the product to the customer if the product is out of date. Thus, it can be useful to ensure the good quality of the product along with quantity and cost.

Singh [2] proposed a touch screen based automated medical Vending machine and 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. Steven Woodbine, The Complete Vending Machine. Published on 18 May 2011.

- There are a large variety of medication administration assistance devices for non-professional 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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OBJECTIVES

- Diagnosis is always a concern for the people living in rural area.At the same time medicine availability also has a major impact excluding the factor about complete cure.
- The aim of this prototype is that temporary relief is to be given out that can give people a better chance for resisting the health from withdrawing before they are able to reach doctor.
- Major advantage is thatpeople would be able to access the drugs via patient kiosks in public places such as drug stores, malls, bus, railway stations, on highways, areas where medical stores are limited. Initially the user has to swipe his/her smart card to activate the machine. Once he has an access to the device, he can submit his disease' s symptoms through the touch screen.
- once his medicine is decided by the s/w, he will be given some coin like tokens from an outlet. Once he receives the tokens, a message will be displayed on the screen that the user has to put these tokens in particular medicine box area
- As the user puts the tokens in the specified boxes, he will receive one tablet from that box. Thus he will get a onetime dose on the basis of his disease symptom.

BLOCK DIAGRAM

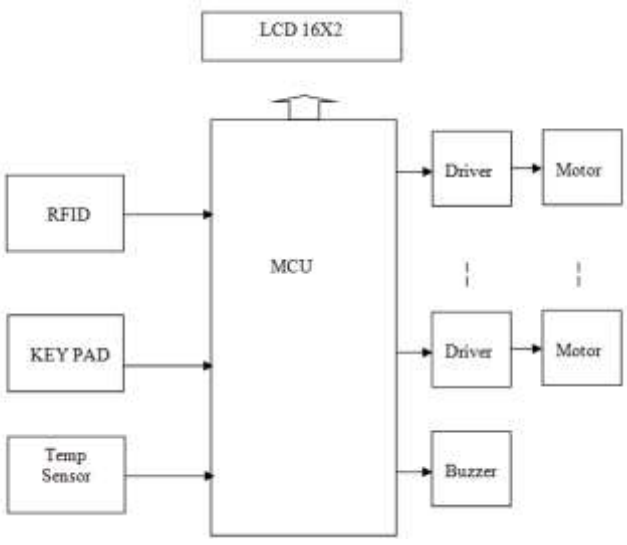


Figure1: Basic block diagram

The block diagram shows RFID tag connected to the microcontroller unit when patient scans his corresponding RFID tag in the scanner. After scanning the medicine has to be selected using key pad. The microcontroller is connected to dc motors through motor driver. When signal is received from microcontroller, it sends pulses to Motor driver and it dispenses the medicine through rotating springs. The medicine drops at the bottom of the machine which is then collected by the user. Temperature also monitored using temperature sensor and displayed on LCD.

MICROCONTROLLER (PIC16F877A)

We are using Peripheral Interface Controller PIC16F877A microcontroller.The PIC16F877A is a low power, high performance CMOS 16-bit microcontroller.

High-Performance RISC CPU:

- Only 35 single-word instructions to learn.
- All single-cycle instructions except for program branches, which are two-cycle.
- Operating speed: DC – 20 MHz clock input DC – 200 ns instruction cycle.
- Up to 8K x 14 words of Flash Program Memory, Up to 368 x 8 bytes of Data Memory(RAM), Up to 256 x 8 bytes of EEPROM Data Memory.
- Pinout compatible to other 28-pin or 40/44-pin PIC16CXXX and PIC16FXXXmicrocontrollers.

Peripheral Features:

- Timer0: 8-bit timer/counter with 8-bit prescaler.
- Timer1: 16-bit timer/counter with prescaler, can be incremented during Sleep via externalcrystal/clock.
- Timer2: 8-bit timer/counter with 8-bit period register, prescaler and postscaler.
- Two Capture, Compare, PWM modules Capture is 16-bit, max. resolution is 12.5 ns. Compare is 16-bit, max. resolution is 200 ns.PWM max. resolution is 10-bit.
- Synchronous Serial Port (SSP) with SPI (Master mode) and I2 (Master/Slave).
- Universal Synchronous Asynchronous Receiver Transmitter

(USART/SCI) with 9-bitaddress Detection.

- Parallel Slave Port (PSP) – 8 bits wide with external RD, WR and CS controls (40/44-pinonly).
- Brown-out detection circuitry for Brown-out Reset (BOR).

Analog Features:

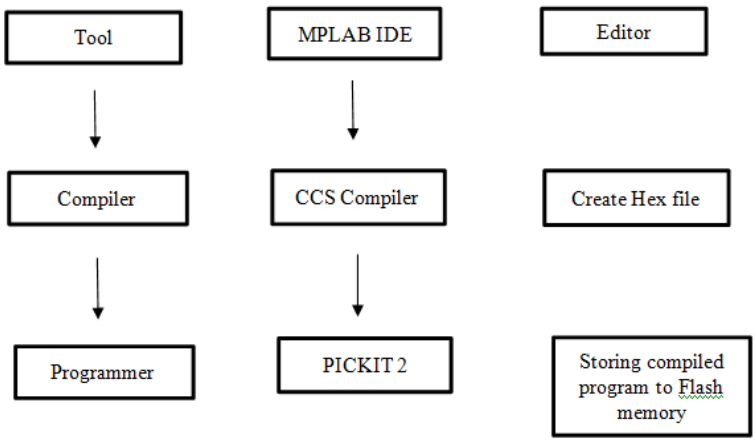
- 10-bit, up to 8-channel Analog-to-Digital Converter (A/D).
- Brown-out Reset (BOR).
- Analog Comparator module with:

- Two analog comparators.
  - Programmable on-chip voltage reference (VREF) module.
  - Programmable input multiplexing from device inputs and internal voltage reference.
  - Comparator outputs are externally accessible.

Special Microcontroller Features:

- 100,000 erase/write cycle Enhanced Flash program memory typical.
- 1,000,000 erase/write cycle Data EEPROM memory typical.
- Data EEPROM Retention > 40 years
- Self-reprogrammable under software control.
- In-Circuit Serial Programming (ICS) via two pins.
- Single-supply 5V In-Circuit Serial Programming.
- Watchdog Timer (WDT) with its own on-chip RC oscillator for reliable operation.
- Programmable code protection.
- Power saving Sleep mode.
- Selectable oscillator options.
- In-Circuit Debug (ICD) via two pins.

PROGRAMMING A MICROCONTROLLER



RFID

Radio frequency identification (RFID) technology promises many consumer benefits. With RFID, goods on trucks, in trains, and in warehouses can be inventoried without unloading and digging through pallets and packaging. Embedded in or attached to consumer products, RFID can improve customer convenience by permitting receipt-free returns and suppressing post-sale theft. As a personal identification device, RFID already enables keycard holders to quickly enter secure buildings and pass through toll gates. But, as new communications and information storage technologies often do, RFID has also raised a variety of privacy concerns. Responding to the call of activist groups, state legislators have begun pushing legislation, and the Federal Trade Commission has instituted hearings to consider whether this nascent technology should be regulated. As yet, RFID tags have seen limited deployments, so there is little real-world experience on which to ground discussions of the merits or demerits of regulation. As RFID technology comes into full use, various social forces will constrain it more suitably than would government regulation. RFID users face economic incentives and consumer preferences that will direct the technology' s evolution in harmony with consumer interests. Meanwhile, consumers' easy access to defensive techniques and countertechnologies will complement existing laws that already protect privacy. An unlikely threat to privacy, RFID technology will help producers, marketers, and retailers take major steps toward better understanding—and therefore better serving—the entire mix of consumer interests. Legislation to restrict the technology would be premature given the social forces that will shepherd RFID' s comfortable assimilation into commercial and consumer society. Prompt deployment of,

and experimentation with, RFID would best serve the interests of the public and the economy.

Understanding RFID

Before grappling with its policy implications, it is important to understand RFID technology, its limitations, and its significant advantages over predecessors like bar codes and static ID cards. RFID (sometimes also called dedicated short range communication, or DSRC) uses the radio frequency portion of the electromagnetic spectrum to uniquely identify objects. Good old radio communications and new efficiencies in fabrication and miniaturization go into RFID devices that can help organize the production and delivery of goods, and enable personal identification in efficient new ways. RFID is poised for use as an alternative to bar codes, those boxes of vertical bars and spaces that represent numbers and other symbols. The most familiar example of a bar code is the Uniform Product Code found on most consumer goods today. RFID is already used in some identification cards, in transportation access cards, and in the shipping and logistics industry

RFID Components

RFID systems consist of three components in two combinations: a transceiver (transmitter/receiver) and antenna are usually combined as an RFID reader. A transponder (transmitter/responder) and antenna are combined to make an RFID tag. An RFID tag is read when the reader emits a radio signal that activates the transponder, which sends data back to the transceiver.

CCS COMPILER

CCS provides a complete, integrated tool suite for developing and debugging embedded applications running on Microchip PIC MCUs and dsPIC. Development tools offered by CCS include an optimized C compiler, in-circuit programmers/debuggers, production programmers and complete development kits that contain all hardware, software and accessories needed to jump start your product development.

This integrated C development environment gives developers the capability to quickly produce very efficient code from an easily maintainable high level language. The compiler includes built-in functions to access the PIC microcontroller hardware.

Implementation of Circuit

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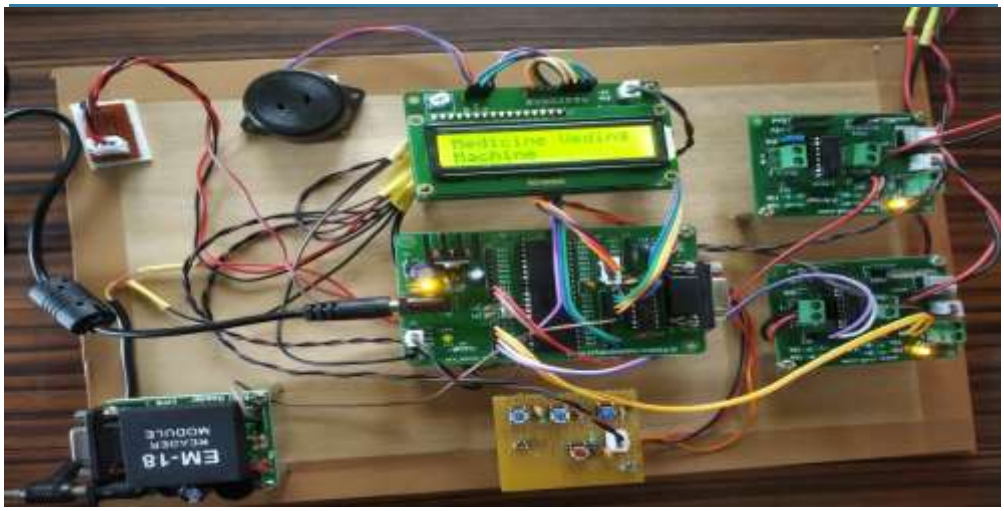
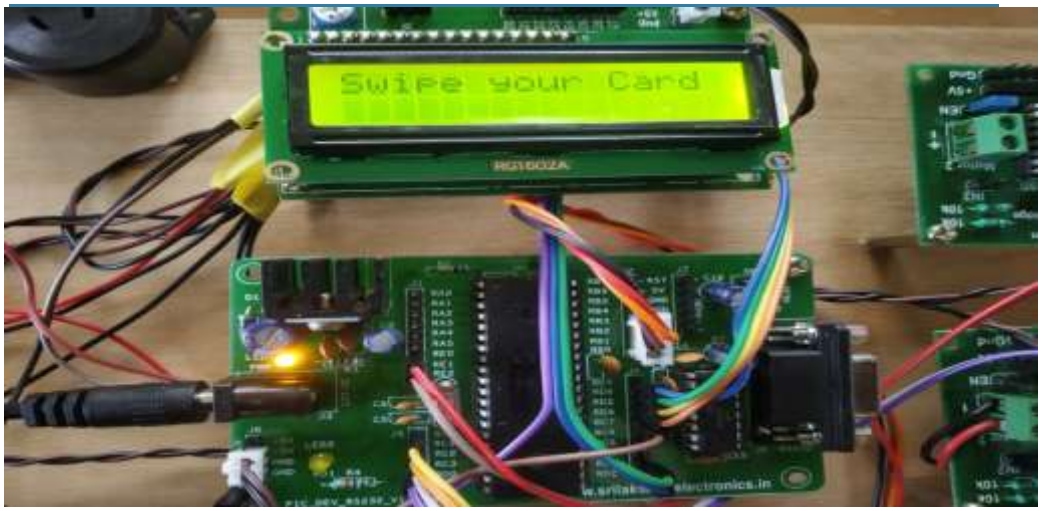


 Intial Stage of medicine vending machine



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b) RFID Tag using EM 18, it wills going to scan the card

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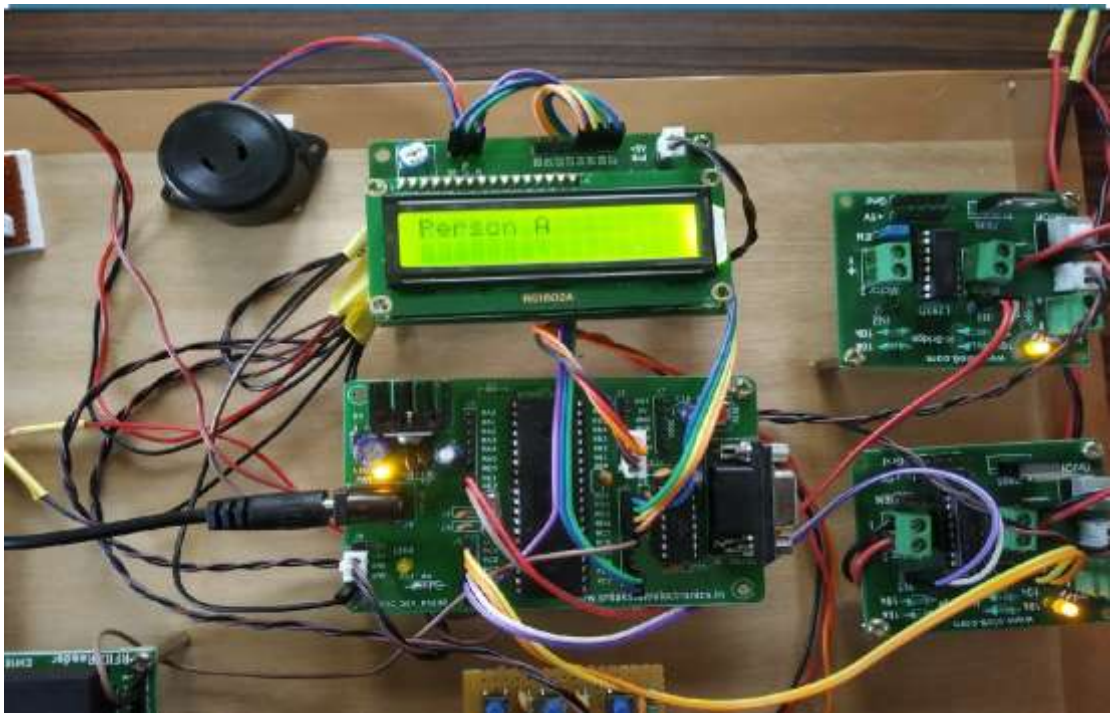
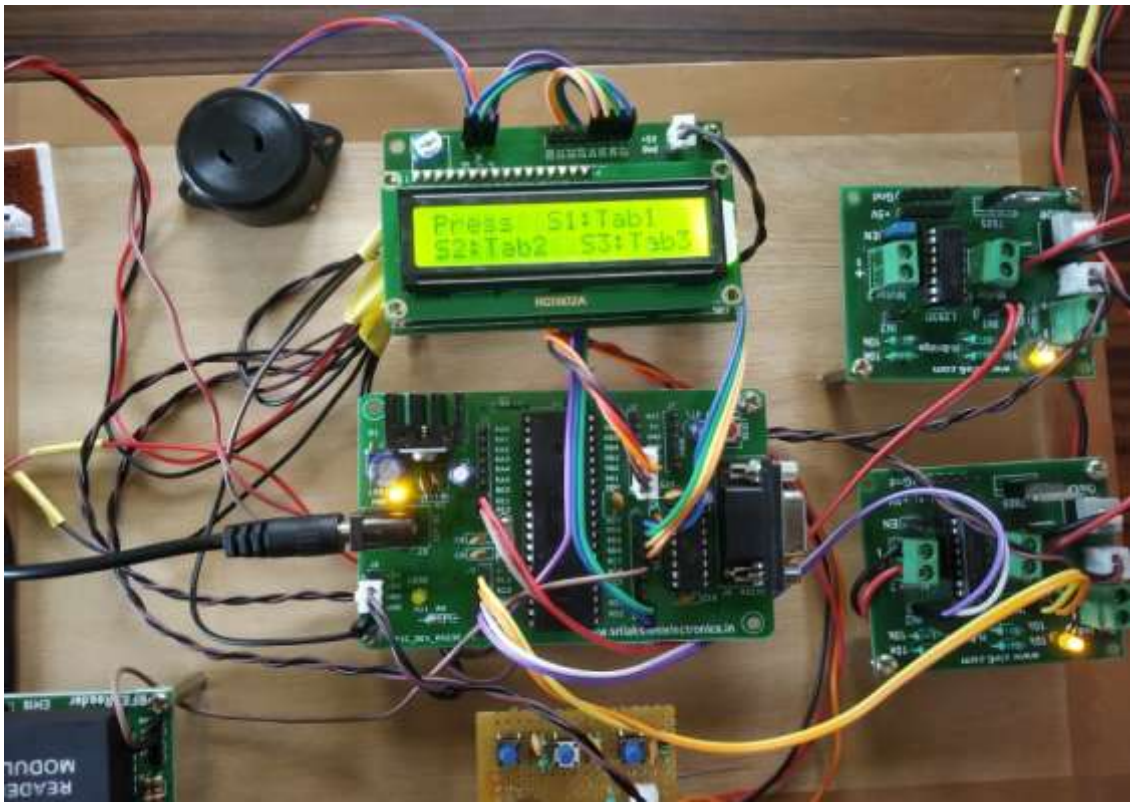


c) EM 18 scan the card and it provides the correct information about the user.



d) Once the card has been scanned the LED display the message as Press S1:Tab1 , S2:Tab2 , S3:Tab3.

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RESULT

The medicine dispensing machine provides a flexible, simple and robust solution at a very moderate cost to extend basic healthcare to all places. With minimal hardware and software changes, the machine can be customized to suit any type of terrain and climate. This machine will be extended to add an intelligent medicine unit, which sends a refill notification message to the nearest chemist when the number of medicine strips decrease below a certain level.

CONCLUSION

From this concept we are conclude that, the automatic medicine vending machine is technically feasible to the peoples. It is based in PIC micro-controller provide GSM service. It gives availability of medicines all the time, also in rural areas. it is very helpful and it gives ease of access also. An automatic medicine vending machine with a self-contained on-site pill dispensing mechanism and a storage facility for the plurality of pills that can be dispensed based on the user requirement. Major components of the machine

are, a scanner to take the input from user, a system that includes servo motors for dispensing the medication, large storage space to store the pills, sensors to detect the motion of pills, an inventory monitoring system to keep track of the storage, an industrial standard vertical foam fill machine to pack the medication separately and a non-contact laser inkjet printer to print the description which includes the time at which the medicine must be taken. All these systems are monitored by a central microprocessor, which is programmed to receive input from the user via the scanner and to actuate and control all the necessary components required to dispense the medication requested by the user. The machine can be viewed as an automated pharmacy placed on a commercial scale so that infinite number of user will be able to access it anytime..

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