

Smart Medical Refrigerator

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Abstract

In well known, maximum of the sufferers neglect about to take the right clinical direction at suitable instances. There can be probabilities that they don't forget to take the drugs at everyday instances however neglect about the tablet which needs to be taken at that precise time. This is a huge trouble and it's also hard to docs to reveal sufferers constantly. To keep away from those problems, we've got applied this clever clinical fridge. By the usage of this undertaking, we are able to remind the affected person to take the drugs at prescribed timings. This clever clinical fridge signals the affected person if the affected person does now no longer take drugs at that precise time and additionally offers the facts approximately which drugs should be taken. In this undertaking we're the usage of a door sensor to perceive the door beginning and remaining through the affected person at prescribed timings, 16X2 LCD as show supply, it presentations the time and medicinal drug call that are should be taken, a buzzer to alert the affected person and close to through nurses and docs. And additionally we're the usage of one RTC (DS1307) to study the time. To manipulate and method all of the above modules, a controller is used and the microcontroller favoured on this undertaking is AT89S52.

Keywords:- Smart Medical Refrigerator, Microcontroller.

Introduction

In general, most of the patients forget to take the appropriate medical course at appropriate times. There may be chances that they remember to take the pills at regular times but forget the pill which has to be taken at that particular time. This is a big problem and it is also difficult to doctors to monitor patients always. To avoid these problems, we have implemented this smart medical refrigerator. By using this project, we can remind the patient to take the medicine at prescribed timings. This smart medical refrigerator alerts the patient if the patient does not take medicines at that particular time and also gives the information about which medicines have to be taken.

In this project, we are using PC to enter the medicines to be taken by the patient at prescribed timings, 16X2 LCD as display source, it displays the time and medicine name which are to be taken, a buzzer to alert the patient and nearby nurses and doctors. And also we are using one RTC (DS1307) to read the time. To control and process all the above modules, a controller is used and the microcontroller preferred in this project is AT89S52.

Overview of the technologies used

Embedded Systems:

An embedded system can be defined as a computing device that does a specific focused job. Appliances such as the air-conditioner, VCD player, DVD player, printer, fax machine, mobile phone etc. are examples of embedded systems. Each of these appliances will have a processor and special hardware to meet the specific requirement of the application along with the embedded software that is executed by the processor for meeting that specific requirement.

The embedded software is also called “firm ware”. The desktop/laptop computer is a general purpose computer. You can use it for a variety of applications such as playing games, *word* processing, accounting, software development and so on.

In contrast, the software in the embedded systems is always fixed listed below:

- Embedded systems do a very specific task, they cannot be programmed to do different things. Embedded systems have very limited resources, particularly the memory. Generally, they do not have secondary storage devices such as the CDROM or the floppy disk. Embedded systems have to work against some deadlines. A specific job has to be completed within a specific time. In some embedded systems, called real-time systems, the deadlines are stringent. Missing a deadline may cause a catastrophe-loss of life or damage to property. Embedded systems are constrained for power. As many embedded systems operate through a battery, the power consumption has to be very low.
- Some embedded systems have to operate in extreme environmental conditions such as very high temperatures and humidity.

Following are the advantages of Embedded Systems:

1. They are designed to do a specific task and have real time performance constraints which must be met.
2. They allow the system hardware to be simplified so costs are reduced.
3. They are usually in the form of small computerized parts in larger devices which serve a general purpose.
4. The program instructions for embedded systems run with limited computer hardware resources, little memory and small or even non-existent keyboard or screen.

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Hardware Implementation of the Project

This chapter briefly explains about the Hardware Implementation of the project. It discusses the design and working of the design with the help of block diagram and circuit diagram and explanation of circuit diagram in detail. It explains the features, timer programming, serial communication, interrupts of AT89S52 microcontroller. It also explains the various modules used in this project.

Project Design

The implementation of the project design can be divided in two parts.

- Hardware implementation
- Firmware implementation

Hardware implementation deals in drawing the schematic on the plane paper according to the application, testing the schematic design over the breadboard using the various IC's to find if the design meets the objective, carrying out the PCB layout of the schematic tested on breadboard, finally preparing the board and testing the designed hardware.

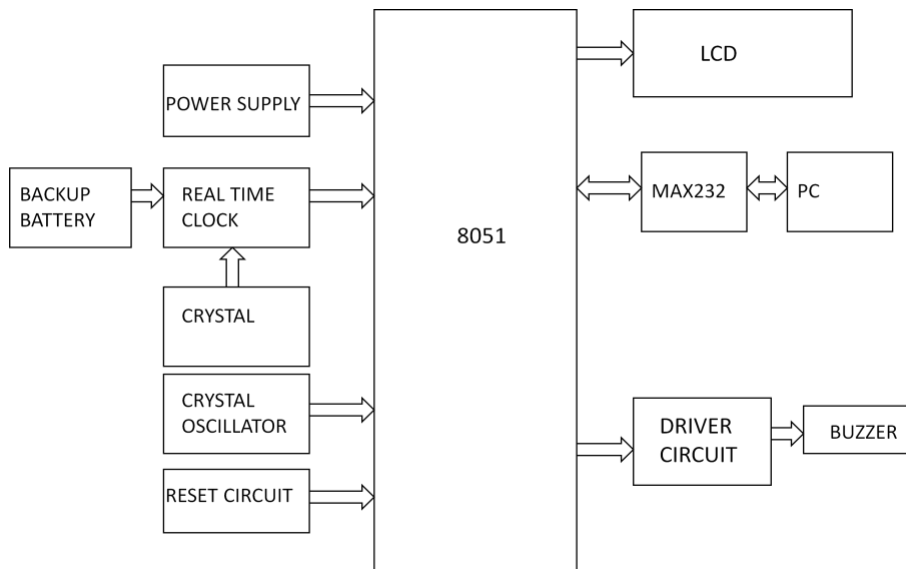
The firmware part deals in programming the microcontroller so that it can control the operation of the IC's used in the implementation. In the present work, we have used the Orcad design software for PCB circuit design, the Keil μ v3 software development tool to write and compile the source code, which has been written in the C language. The Proload

programmer has been used to write this compile code into the microcontroller. The firmware implementation is explained in the next chapter.

Block Diagram of the Project and its Description

The block diagram of the design is as shown. It consists of microcontroller, RTC, LCD and buzzer. The brief description of each unit is explained as follows.

Block diagram



Firmware Implementation of the project design

This chapter briefly explains about the firmware implementation of the project. The required software tools are discussed. The flow diagram of the project design. The firmware implementation of the project design.

Software Tools Required

Keil μ v3, Proload are the two software tools used to program microcontroller. The working of each software tool is explained below in detail.

Programming Microcontroller

A compiler for a high level language helps to reduce production time. To program the AT89S52 microcontroller the Keil μ v3 is used. The programming is done strictly in the embedded C language. Keil μ v3 is a suite of executable, open source software development tools for the microcontrollers hosted on the Windows platform.

The compilation of the C program converts it into machine language file (.hex). This is the only language the microcontroller will understand, because it contains the original program code converted into a hexadecimal format. During this step there are some warnings about eventual errors in the program. If there are no errors and warnings then run the

program, the system performs all the required tasks and behaves as expected the software developed. If not, the whole procedure will have to be repeated again. It shows expected outputs for given inputs when run compiled program.

One of the difficulties of programming microcontrollers is the limited amount of resources the programmer has to deal with. In personal computers resources such as RAM and processing speed are basically limitless when compared to microcontrollers. In contrast, the code on microcontrollers should be as low on resources as possible.

Keil Compiler:

Keil compiler is software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.

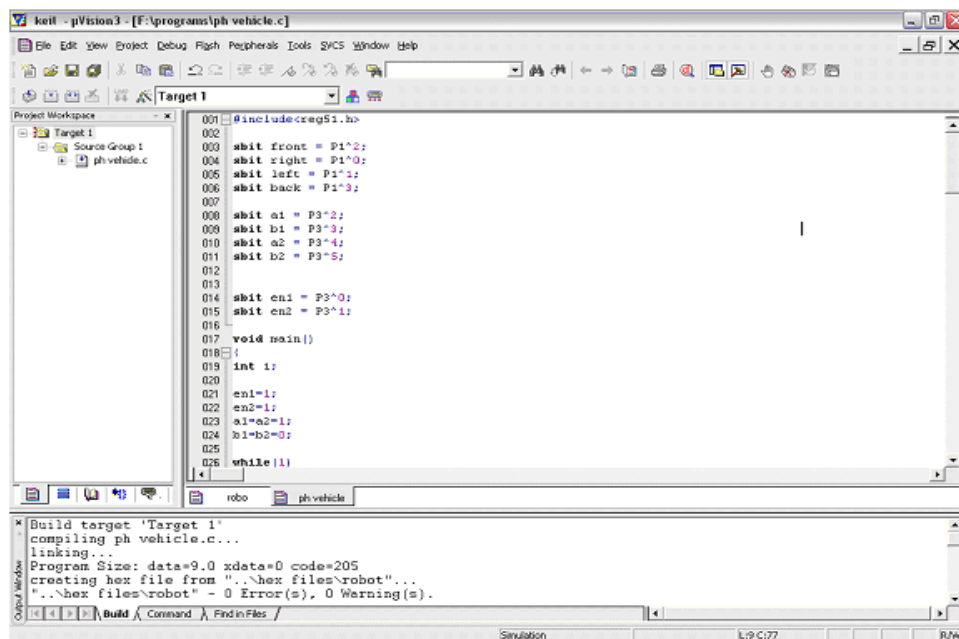


Fig 4.1: Compilation of source Code

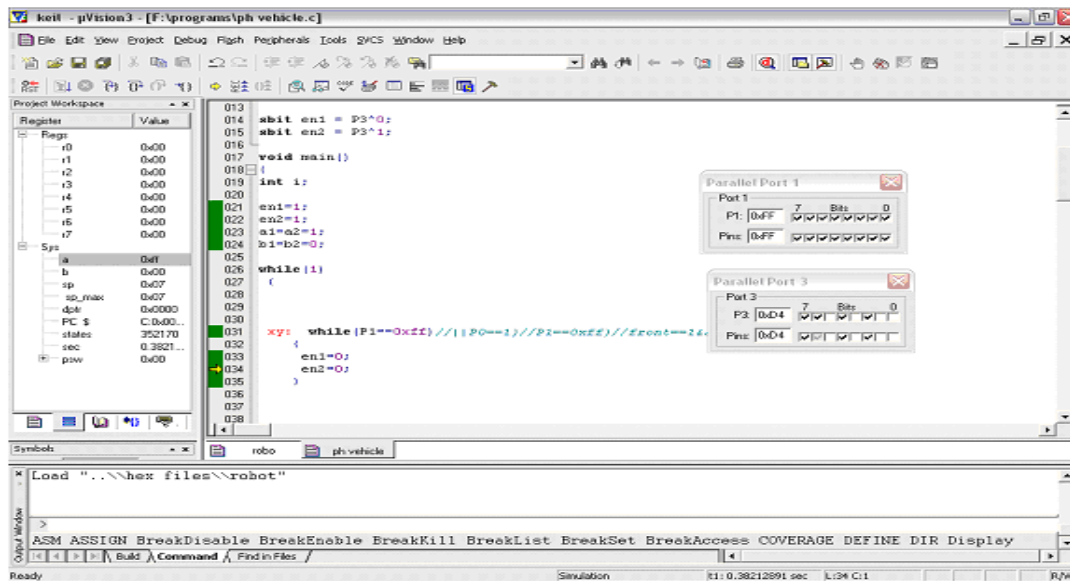


Fig 4.2: Run the compiled program

Proload:

Proload is software which accepts only hex files. Once the machine code is converted into hex code, that hex code has to be dumped into the microcontroller and this is done by the Proload. Proload is a programmer which itself contains a microcontroller in it other than the one which is to be programmed. This microcontroller has a program in it written in such a way that it accepts the hex file from the Keil compiler and dumps this hex file into the microcontroller which is to be programmed. As the Proload programmer kit requires power supply to be operated, this power supply is given from the power supply circuit designed above. It should be noted that this programmer kit contains a power supply section in the board itself but in order to switch on that power supply, a source is required. Thus this is accomplished from the power supply board with an output of 12volts.



Fig 4.3: Atmel 8051 Device programmer

Features

- Supports major Atmel 89 series devices
- Auto Identify connected hardware and devices
- Error checking and verification in-built
- Lock of programs in chip supported to prevent program copying
- 20 and 40 pin ZIF socket on-board
- Auto Erase before writing and Auto Verify after writing

- Informative status bar and access to latest programmed file
- Simple and Easy to use
- Works on 57600 speed

Description

It is simple to use and low cost, yet powerful flash microcontroller programmer for the Atmel 89 series. It will Program, Read and Verify Code Data, Write Lock Bits, Erase and Blank Check. All fuse and lock bits are programmable. This programmer has intelligent onboard firmware and connects to the serial port. It can be used with any type of computer and requires no special hardware. All that is needed is a serial communication ports which all computers have.

All devices have signature bytes that the programmer reads to automatically identify the chip. No need to select the device type, just plug it in and go! All devices also have a number of lock bits to provide various levels of software and programming protection. These lock bits are fully programmable using this programmer. Lock bits are useful to protect the program to be read back from microcontroller only allowing erase to reprogram the microcontroller. The programmer connects to a host computer using a standard RS232 serial port. All the programming 'intelligence' is built into the programmer so you do not need any special hardware to run it. Programmer comes with window based software for easy programming of the devices.



Programming Software

Computer side software called '**Proload V4.1**' is executed that accepts the Intel HEX format file generated from compiler to be sent to target microcontroller. It auto detects the hardware connected to the serial port. It also auto detects the chip inserted and bytes used. Software is developed in Delphi 7 and requires no overhead of any external DLL.



Fig 4.4: Writing the programs bytes onto the microcontroller

Results and Discussions

Results

Assemble the circuit on the PCB. After assembling the circuit on the PCB, check it for proper connections before switching on the power supply.

Conclusion

The implementation of the Smart Medical Refrigerator using microcontroller is done successfully. The communication is properly done without any interference between different modules in the design. Design is done to meet all the specifications and requirements. Software tools like Keil U vision Simulator, Proload to dump the source code into the microcontroller, ORCAD Lite for the schematic diagram have been used to develop the software code before realizing the hardware. The performance of the system is more efficient. The mechanism is controlled by the microcontroller. Circuit is implemented in ORCAD and implemented on the microcontroller board. The performance has been verified both in software simulator and hardware design. The total circuit is completely verified functionally and is following the application software. It can be concluded that the design implemented in the present work provide portability, flexibility and the data transmission is also done with low power consumption.

Working procedure:

The project intends to remind the medicines to be taken by the patients or old people at appropriate timings. The system uses the microcontroller as the heart of the project as it controls all the functions very efficiently.

We are using PC to enter the medicines' names and the time at which the patient needs to take the prescribed medicines. To remind the patient at appropriate timings, the system uses Real time clock. The user can store the predefined timings in the controller's memory. The microcontroller reads the time every second from the Real time clock. The microcontroller not only reads the time from RTC but also compares the read time with the already stored time. If both the timings equal, the microcontroller activates the buzzer and also displays the medicines, to be taken by the user, on the LCD.

The buzzer is interfaced with the microcontroller through the transistor. The transistor acts as current driver that provides the sufficient current to the buzzer. The buzzer is provided the

input from the microcontroller through the transistor. LCD is used to display the related messages and the names of the medicines to be taken by the user.

Applications

This project can be used as medicine reminder.

This project can be used as a reminder for many tasks such as appointments, meetings, parties etc.

References:

1. www.wikipedia.com
2. http://www.zntu.edu.ua/base/lection/rpf/lib/zhzh03/8051_tutorial.pdf
3. http://www.atmel.com/dyn/resources/prod_documents/doc1919.pdf
4. http://microcontrollershop.com/product_info.php?products_id=1078
5. <http://www.8052.com/tutlcd>
6. The 8051 and Embedded system by Mohammad Ali Mazidi
7. <http://www.tpub.com/neets/book2/5.htm>
8. <http://www.kmitl.ac.th/~kswichit/89prog/index.html>
9. http://www.allaboutcircuits.com/vol_3/chpt_7/6.html
10. <http://www.tpub.com/neets/book7/26e.htm>
11. http://www.microdigitaled.com/8051/Software/keil_tutorial.pdf
12. <http://www.sparkfun.com/datasheets/Components/DS1307.pdf>