



Project on

HOME SECURITY SYSTEM

Submitted by,

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CHAPTER 1

Introduction

1.1 Background

Nowadays, so many people are used to live far from home for business purpose , job purpose or travelling purpose. So many people have their properties at discrete places. Many people migrated to get job or business from their hometown. It is very difficult for them to secure their properties at various places. Even we can listen or read various news about robbery where it come to know that something is happened at that place after so many days. Even neighbours also unable to know about that things

So , our system is made to inform the owner about something is going on the property. Also this system includes alarm for neighbors so that such types of things can be avoided

1.2 Relevance

In today's age of digital technology and intelligent systems, home automation has become one of the fastest developing application-based technologies in the world. The idea of comfortable living at home has since changed for the past decade as digital, vision and wireless technologies are integrated into it. Intelligent homes, in simple terms, can be described as homes that are fully automated in terms of carrying out a predetermined task, providing feedback to the users, and responding accordingly to situations. In other words, it simply allows many aspects of the home system

1.3 Literature Survey

The researchers gathered information from different sources which give appropriate ideas or what parts to be used in every circuitry involved in this project. From a step by step process, researchers started from writing simple code to more complex. After everything is fixed and tested in virtual simulation,

Same project could have been designed with:

1) 8051 microcontroller

2) ARDUINO

We are using AT89C51 to realize this project because:-

AT89C51 contains 8051 architecture. We already dealt with coding part and simulation part of 8051 in previously. So probability that program can be best increases

1.4 Motivation

So many people are travelling for various purposes far from their home. Even they use conventional locking systems, they are not comfortable about the security of their property. Touring culture is also increasing in India as Indian government started promoting travelling. But many of the people are uncomfortable about the security system at home. So there is a need for such a system which can be in contact with the owner to inform if something happens in the property. This will increase their comfort level while travelling and they can travel tension free.

Also many of news we can read that burglaries happen but even neighbours are also unaware about that. So there is a need for an alarm system so that they take further actions on it. By taking overall things in count we started the system designing which will suitable for owner.

1.5 Aim of the Project

The aim of this project is to implement a simple and affordable, but efficient home security alarm system. The project is designed for detecting intruders and informing the owner by making a phone call and text message

1.6 Scope and Objectives

Automated security systems are a useful addition to today's home where safety is an important issue. Vision-based security systems have the advantage of being easy to set up, inexpensive and non-obtrusive. Home security system for detecting intrusion into a monitored area by an PIR detector. A security system has a free-standing intrusion detector. The free standing intrusion detector has a transmitter coupled with a portable receiver to alert a homeowner that an intrusion has taken

place.

We have some objectives regarding the system :-

- Production of low cost and efficient Home security system
- Production of system which can inform the user irrespective of its position
- Learning the effective implementation of application based on theoretical knowledge
- Improve the knowledge about latest technologies in electronics and telecommunication industry
- Learning and improving communication skills and listening skills
- Improving the work management

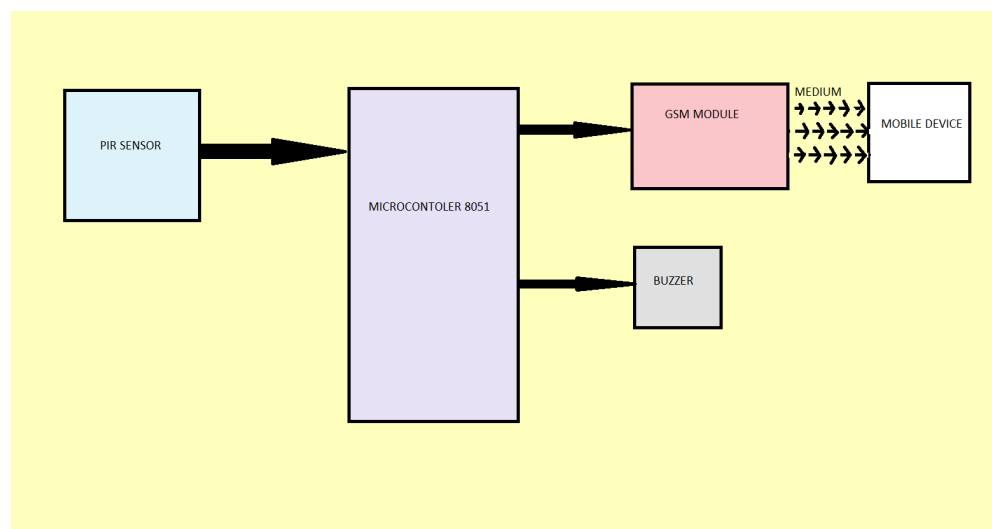
CHAPTER 2

Description of Project

2.1 Technical Approach

The report consists of a background into the area of 8051 microcontroller and mobile communication, how they are interfaced to each other and AT (Attention) commands set used in communication. The Microcontroller based system continuously watching the security issues of your house. If a mishap condition occurs will sense and send a message to your mobile The main components of the toolkit include microcontroller, GSM modem. These components are integrated with the device board and thus incorporate the wireless features. The GSM modem sends the SMS. The AT commands are serially transferred to the modem. In return the modem transmits the stored message through the wireless link. The microcontroller used in this case is AT89C51. In this prototype model, Virtual display is used for simulation purpose. The results presented in the thesis support the proper functionalities and working of the system.

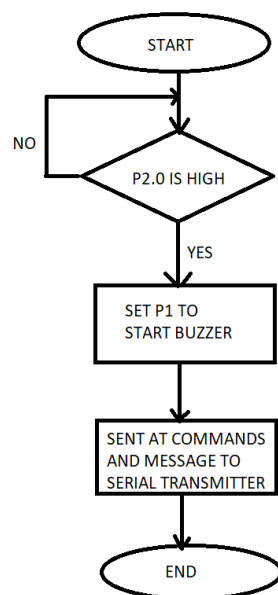
2.2 Block diagram



Every block of this system have its own role so that system can to its work with efficient manner

1. **PIR Sensor :-** PIR sensors are used to detect living being movement. PIR is a Passive Infrared sensor, which detect infrared rays. All living being with a temperature above absolute zero emits heat energy in the form of radiation. These radiation are infrared ray. Human eye cannot see these rays because these rays are radiated at infrared wavelength. When any living being comes in range of PIR sensor, it detects heat of that living being and generate an output. PIR sensor module does not send any rays for detection, its only detects heat (Infrared). You can know more about PIR sensor in PIR sensor circuit.
2. **Microcontroller 8051 :-** This is the heart of the system wherein central processing of data takes place. 8051 microcontroller collects the data or information from sensor and compares it with appropriate prescribed limits. It is programmed by embedded C in Keil software. By receiving the sensor signals, it takes the corresponding course of action by sending commands the GSM module
3. **GSM module :-** The SIM900 is a complete Quad-band GSM/GPRS Module which delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS and Data with low power consumption.
AT commands are used to control GSM module. There are commands for calling and messaging that we have used in this project for sending message. After receiving AT Command GSM Module respond with OK which means GSM module is working fine. Here are some useful commands
4. **Buzzer :-** Buzzer is used as alarming unit which starts ringing once some motion is detected in front on sensor

2.3 Flow chart



Step 1 :-

Initially required power is supplied to the system to start the device

Step 2 :-

In the second step the necessary condition is checked which is a signal from the PIR sensor. According to the condition the system flows either 'YES' side or 'No' side. If the condition is false it returns to the initial stage and checks the pin. If the condition is true, the system follows further things from the Yes side.

Step 3 :-

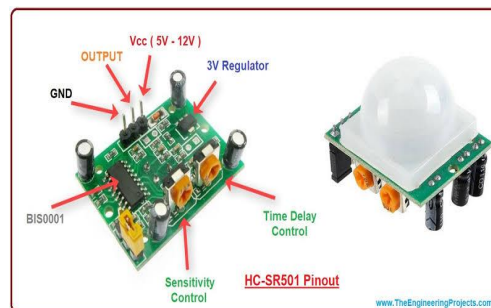
System starts the buzzer by sending the data 0FFH to the port

Step 4 :-

System sends all the commands required for GSM and also message to the serial transmitter pin.

2.4 Hardware resources

1. PIR Sensor(HC SR501) :-



PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

Specifications :-

Operating voltage = 5 to 20 V

Adjustable sensitivity = 3 to 7 m.

High output voltage = 3.3 V

Adjustable time period to stay in high condition :- 5 to 300 sec

High operating range = -15 to 70 °C

Various modes to use the sensor

- a) Single Trigger Mode
- b) Repeat Trigger Mode

2. GSM Module :-



The SIM900A is a complete Dual-band GSM/GPRS module in an SMT (Surface-mount technology) type. Is small and cost-effective, which features an

RS232 interface,allows connection to microcontroller with RS232 Chip(MAX232), Input Voltage of 5 V DC, with a configurable baud rate ranging from 9600-115200 through AT commands. SIM900A is a low power consumption for GSM/GPRS with 900 to 1800MHz.

Specifications :-

Operating voltage = 3.4 to 4.5 V

Low current consumption in sleep mode = 1.5mA

High operating temperature = -30 to 90 °

3. Buzzer :-



Piezo buzzers are simple devices that can generate basic beeps and tones. They work by using a piezo crystal, a special material that changes shape when voltage is applied to it. If the crystal pushes against a diaphragm, like a tiny speaker cone, it can generate a pressure wave which the human ear picks up as sound. Simple change the frequency of the voltage sent to the piezo and it will start generating sounds by changing shape very quickly

Specifications :-

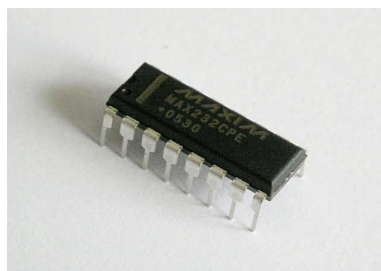
Operating voltage = 4 to 6 V

Sound intensity = 85db(Easily detected upto 12 m distance)

Small size

Low price

4. MAX232 :-



Generally, the MAX-232 IC is used in the RS232 communication system for the conversion of voltage levels on TTL devices that are interfaced with the PC serial port and the Microcontroller. This IC is used as a hardware layer converter like to communicate two systems simultaneously.

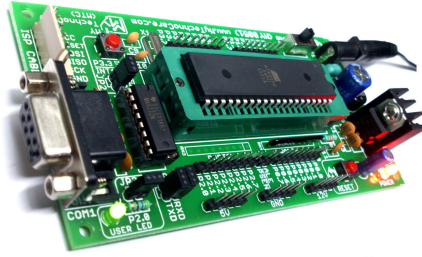
Specifications :-

Operating voltage = 5V

Data rate = 120kbps

Low current consumption = 5mA

5. Microcontroller 8051(AT89C51) :-

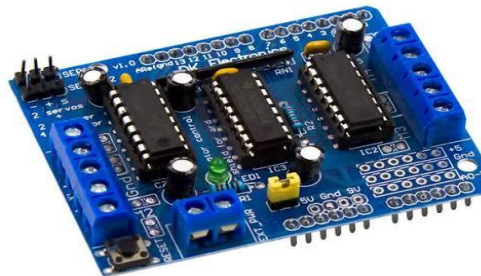


The CPU is the main function and 8051 Microcontroller is used in the home security system. Its basic work is reading the digital input from the PIR sensor and Sending the data to GSM module through serial port via mx232 and to the computer serial port

Specifications :-

Operating Voltage (V) :- 2 to 5.5 V
 Timer/Counter Module :- 16-bit(2)
 External Oscillator :- 3MHz to 24Mhz
 Memory (KB) :- 4KB Flash
 RAM Bytes :- 128 × 8-bit
 Communication Peripherals :- UART

6. L293D motor driver :-



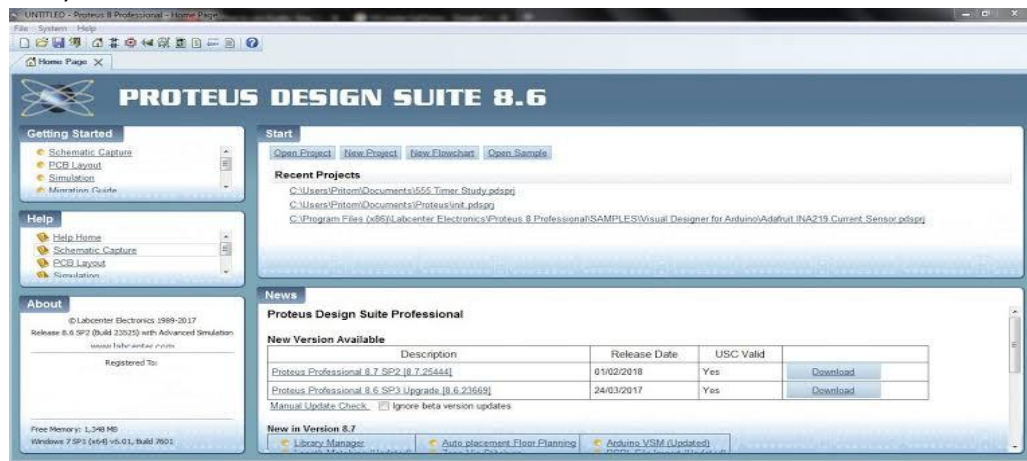
Basic work of motor driver in this particular project is as amplifier. It gives enhanced current and voltage as a output according to signal received from microcontroller unit. This is used to provide the power to buzzer and control the functioning of buzzer as required. Also this device is added here for future use also

Specifications :-

Supply-Voltage Range:- 4.5 V to 36 V
 High-Noise-Immunity Inputs
 Peak Output Current :- 1.2 A Per Channel
 Operation Temperature :- 0°C to 70°C.
 Automatic thermal shutdown is available

2.4 Software resources :-

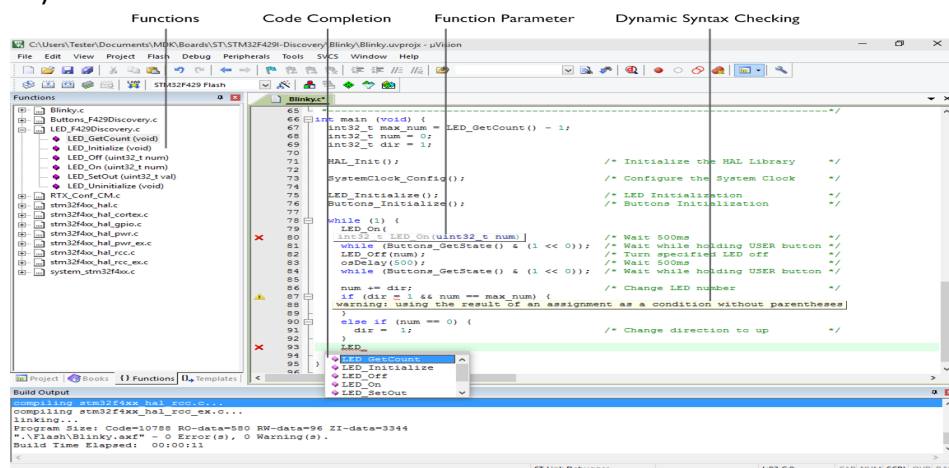
1) Proteus software :-



The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB (Printed Circuit Board) layout design. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation. All PCB Design products include an autorouter and basic mixed mode SPICE simulation capability

The microcontroller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control, temperature control and user interface design. It also finds use in the general hobbyist community and, since no hardware is required, is convenient to use as a training or teaching tool

2) Keil software :-



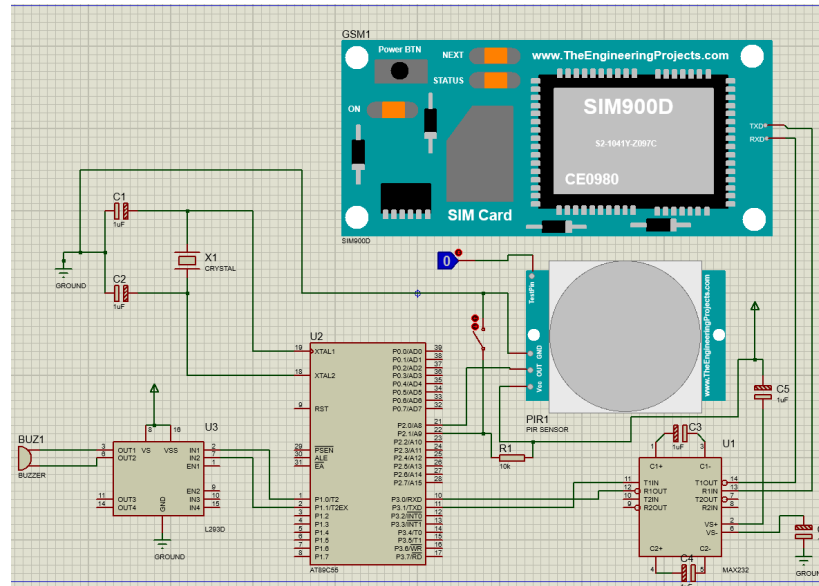
The Vision IDE combines project management, run-time environment, build facilities, source code editing, and program debugging in a single powerful environment. Vision is easy-to-use and accelerates your embedded software development. μ Vision supports multiple screens and allows you to create individual window layouts anywhere on the visual surface. The Vision Debugger provides a single environment in which you may test, verify, and optimize your application code. The debugger includes traditional features like simple and complex breakpoints,

watch windows, and execution control and provides full visibility to device peripherals.

CHAPTER 3

System Design

3.1 Circuit diagram



Circuit diagram consists of 8051 microcontroller, PIR sensor, Buzzer and a GSM module, an UART, Motor Driver. We have connected port 2 as an input port & we have connected pin no 21 & 22 to PIR sensor. When motion is detected we get high voltage at pin no 21.

Once the high signal detected at pin no 21 the microcontroller gives further instructions to buzzer and GSM module. Pin no 1 & 2 of port 1 are connected to a motor driver circuit to adjust the voltage and current requirements of buzzer.

Pin no 10 & 11 are connected to MAX-232 and then output of max 232 is given to the gsm module. GSM module will send sms and call to the number which is given by the user.

3.2 System program coding

```
#include<reg51.h>

sbit PIR=P2^0;

sbit PIR1=P2^1;

void delay(int itime)
{
    int i,j;
    for(i=0;i<itime;i++)
```

```

        for(j=0;j<1275;j++);
    }
    void Serialbegin()
    {
        TMOD=0x20;
        SCON=0x50;
        TH1=0xfd;
        TR1=1;
    }

    void Serialwrite(char dat)
    {
        SBUF=dat;
        while(!TI);
        TI=0;
    }

    void Serialprintln(char *p)
    {
        while(*p)
        {
            Serialwrite(*p);
            p++;
        }
        Serialwrite(0x0d);
    }

    void main()
    {
        //P2=0x00;
        Serialbegin();
        Serialprintln("ATE0");
        delay(50);
        P1=0x00;
    }

```

```

while(1)
{

    if(!PIR && !PIR1)
    {
        P1=0x01;
        Serialprintln("ATD+919821757249;");
        delay(1000);
        // lcdcmd(192);
        // lcdprint("Message Sending.");
        Serialprintln("AT+CMGF=1");
        delay(50);
        Serialprintln("AT+CMGS=\"+919821757249\"");
    }
}
}
}

```

Use and working of each device :-

- PIR sensor :-

PIR sensor detects the motion of any physical body that can be moving in the range of the sensor . This sensor sends the digital signal of 3.3 V at the pin no 21 of the microcontroller which is P2.0. Once the motion is detected it gives high voltage for 5 second to 300 seconds which can be controlled by using the timer control of the PIR sensor. As we have to just send a signal to the microcontroller we are using minimum on time for PIR sensor which is 5 seconds . Also the range of device is controllable which can controlled by using sensitivity control. This range will change according to the application of the device.

- Microcontroller 8051(AT89C51)

This is processing unit of whole system. MC 8051 receives thr digital signal from PIR sensor at pin no 21 which is P2.0 . Once high voltage is detected at pin no 21 microcontroller starts the further process internally according to program loaded in it. After processing , it sends the further signal

or instructions to buzzer from pin no 1 and pin no 2 via motor driver. Also it gives signal for GSM module through Mx232 at pin no 10 which is serial port of microcontroller.

- **GSM module :-**

This is the main device which works as an interface between the system and user. Once it detects the message from the microcontroller via Mx232 it immediately transmit the message on a particular phone number by using a sim card . All the commands for GSM module are included in code written for Mivrocontroler

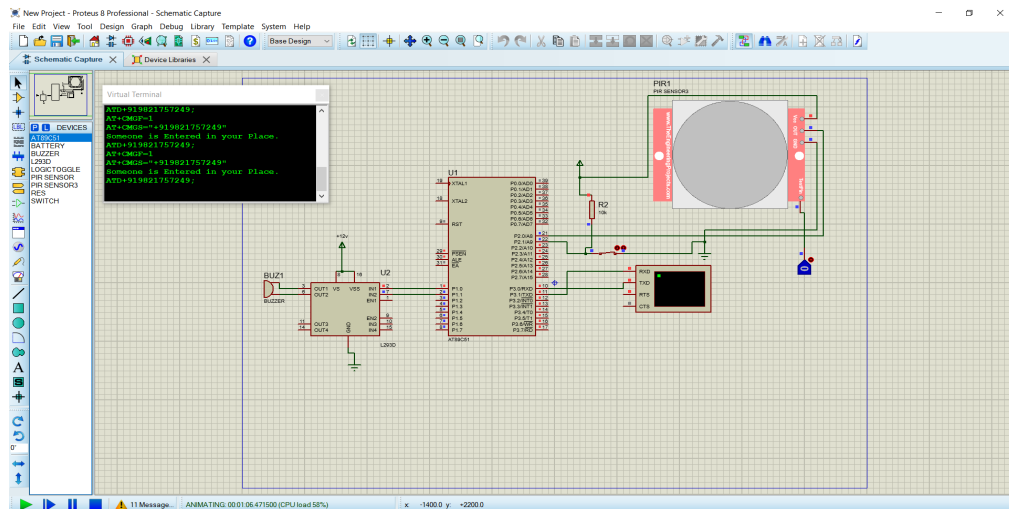
- **Buzzer :-**

As we are using motor driver here this can be any device which produce a sound and needs the supply voltage between 4 V to 36 V as it receives the power from motor driver.

CHAPTER 4

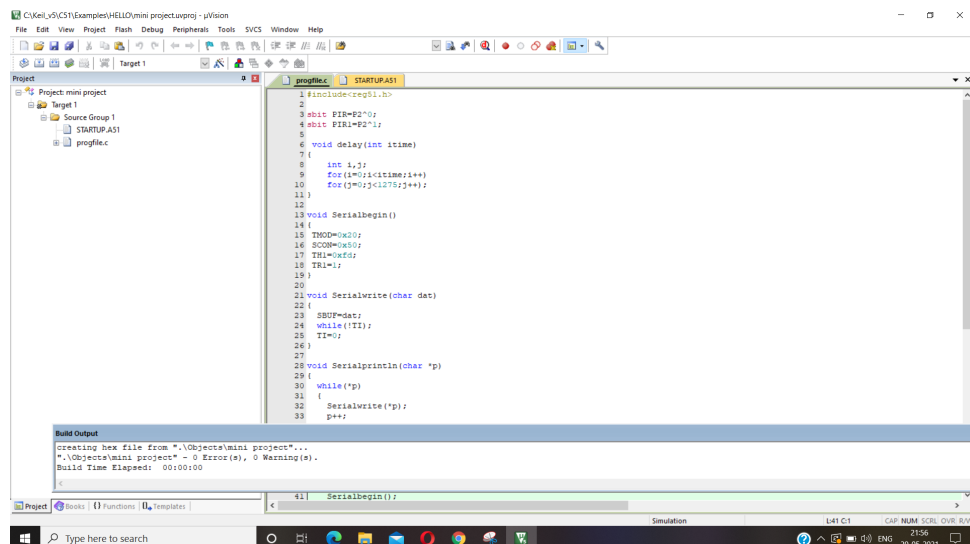
Implementation and Testing

4.1 Implementation



Dia. 4.1

In this first we implemented code of microcontroller 8051 on Keil microvision software as given above in the chapter 3 of system design. Once we got zero error we simulate on Proteus 8.6 software as per the above diagram.



As a whole the coding and designing is done in the presence of three people so it is made by very high precision. So no glitches were found in the system circuit design as

well as code. The only thing happened that we needed to add the libraries for PIR sensor and GSM module to the Proteus software

4.2 Testing and debugging

In the testing phase initially we tested the code for microcontroller on the keil IDE software to test the glitches and problems in the program. Once the program got completely compiled errorlessly in keil microvision software then we formed '.hex' file of the program so that we can test the system on proteus software simulation

In Proteus 8.6 professional we simulated the whole system by making some changes in actual hardware design so that we can see if the system is working or not. First we drew a detailed circuit diagram of the system in Proteus software. Then '.hex' file received from keil microvision software is added to the Microcontroller so that we observe about if any glitches are their or not

As a whole the coding and designing is done in the presence of three people so it is made by very high precision. So no glitches were found in the system circuit design as well as code. The only thing happened that we needed to add the libraries for PIR sensor and GSM module to the Proteus software

CHAPTER 5

Results and conclusion

5.1 Results

A GSM based home security alarm system is designed using 8051 microcontroller, PIR motion detection sensor and a GSM module. When the system is activated, it continuously checks for motion and when the motion is detected, it make a phone call to the owner.

5.2 Conclusion

1. System with low cost have been designed. Price is upto Rs.2000.
2. GSM module based system is designed with some negligible limits on position
3. This project gave us real time experience of how to manage the work

5.3 Future Scope

There are some setbacks are their in the project. We do not have a system which can capture the image of moving body. Also if user is not in the network then it is difficult to inform user. Also it was found that we can include some extra features in the system

1. Locking home after detection of moving body
2. Capturing the photo or video if owner want to capture
3. Inform the POLICE with permission of owner
4. Including password protected door locking system

Bill of material

Sr. No.	Component Name	Quantity	Amount
1	8051 MC	1	250
2.	GSM Module	1	1000
3.	PIR Sensor	1	150
4.	L293D Motor Driver	1	250
5.	Buzzer	1	100
6.	MAX232 UART	1	250
7.	TOTAL	6	2000

References

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