



# Security System using Arduino Microcontroller

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**Abstract:** Security has been becoming an important issue everywhere. Every person wants his home, industry; bank etc to be secured Home security is becoming necessary. Now days as the possibilities of intrusion are increasing day by day. In this paper, home security system has been designed that has a special feature and which make a dial with the owner of the house to inform him that his house has been hacked. Arduino card was used, which is considered one of the modern programmable device and utilize from speed dial function in mobile phone. Here, our application uses Arduino as it's controller. This paper aims to develop a home security system using PIR sensor & Magnetic sensor, LM35 [Temperature sensor], data from all these sensors is continuously received and processed by Arduino UNO board which act as microcontroller unit. A low power passive infrared i.e PIR detectors take advantage of pyro-electricity to detect a human body that is a constant source of infrared radiation, while magnetic sensor works to detect intrusion through doors & windows. The temperature sensor LM35 is use to prevent fire accident by detecting the increase in temperature beyond a certain limit thus the system ensures home safety as well as security.

**Keywords:** PIR Sensor, Magnetic Sensor, LM35, GSM, Arduino UNO.

## I. INTRODUCTION

In day to day life home security is very important factor. It is trending issue in 21<sup>st</sup> century.

Security is primary concern everywhere and for everyone. every person wants his home, industry, banks etc to be secured. This project describes a security system that can monitor an industry & home. This is a useful and simple security system. here, our application uses arduino as it's controller to detect the presence of human and immediately buzzer alerts is given to intimate others. The temperature sensor LM35 is used to prevent Fire accidents by detecting the increase in temperature beyond a certain limit and buzzer alerts also magnetic sensor use to detect intrusion through doors & windows and also intimate buzzer alerts.

This paper is based on embedded system where microcontroller is use for home security. This system can operate using cellular phone with the help of GSM technology. This system is to implement microcontroller based controlled module that receives it's instruction and command for cellular phone over the GSM network. This microcontroller then will carry out the issued Commands and then communicate the status of a given applicants or device back to the cellular phones.

## II. BLOCK DIAGRAM

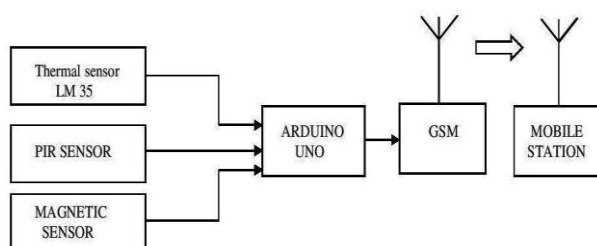


Fig : 1 Block Diagram of Prototype

This block diagram is a system shown in figure 1 as mentioned above the system comprises two units. The microcontroller unit consist of three sensors. The data from sensors continuously processed by the microcontroller and an alert is send to the mobile station via GSM if something is sensed or something reaches beyond the limit in case of a temperature sensors.

## III. WORKING CIRCUIT.

The system will remain deactivated mode initially. It is activated by sending a particular SMS from the phone to GSM. Taking into account the time taken to complete evacuation, system may take a while to activate all the sensors once the message to turn on is received After the activation the system will work as follows.

### ij) MAGNETIC SENSOR.

These sensor are attached to the windows and doors. They will get activated once a burglar tries to open any door or window. The alarm will be set on and alert message will be sent to user's phone.



Fig.2: Magnetic Sensor

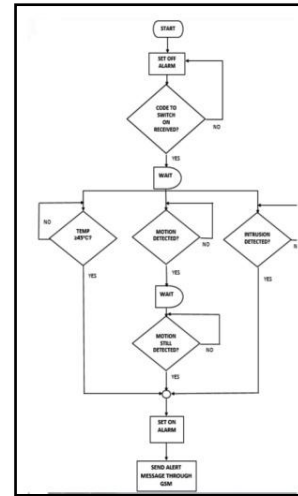


**ii]. PIR SENSOR.**

Suppose the burglar is able to get into the house without being detected due to malfunctioning of magnetic sensor and enters into the coverage region of the PIR sensor, then output pulses are generated. These pulses are then taken as input by arduino unit. The unit then waits for a pre-defined time of maximum 30 seconds and checks for that signal again. This is done to avoid false triggering. If signal still exists, then the same protocol as that magnetic sensor is followed.



**Fig3. PIR Sensor**



**Fig.4.1: Working Algorithm**

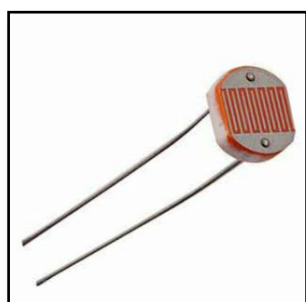
Shows the algorithm of systems working. The user can deactivate system as per his/her will by just sending a particular deactivation message through his phone.



**Fig.3.1: Different Types of PIR Sensors**

**iii]. TEMPERATURE SENSOR [LM35]**

The temperature sensor LM35 will constantly send the room temperature values to arduino. If temperature value is above a certain level, say 45<sup>0</sup>c, arduino unit triggers an alarm and sends a warning message to mobile station through GSM.



**Fig.4: Temperature Sensor [LM35]**

**iv]. GSM [GLOBAL SYSTEM FOR MOBILE]**

The system has two parts namely hardware and software. The hardware architecture consist of a stand alone embedded system. That is based on 8 bit microcontroller [at mega 328]. A GSM handset with GSM modem and a arduino phone. The GSM modem provides the communication media between the homeowner and the system by means of SMS, message via arduino phone. The SMS message consists of commands to be executed. The format of the message consists of commands to be executed. The format of the message is predefined. The SMS message is sent to the GSM modem via the GSM public network as a text message with a definite predefined format once the GSM modem receives the message, command sent will be extracted and executed by the microcontroller. Cellular phones containing SIM [Subscriber's identifying module] card has a specific number through which communication takes place. The mode of communication is wireless and mechanism works on the GSM [Global system for mobile communication] technology.

The microcontrollers initializes the At modem during this initialization the microcontrollers configures the modems UART speed, message format etc to be used after the initialization is complete the microcontroller continuously checks the modem for any new message upon receipt of a message. The microcontroller reads the message and extracts the command and authentication information. The authentication information may be the remote users mobile phone number or a text string send along with the message for command after the authentication is varied the microcontroller then sends an SMS to the user through the AT modem starting the status of current situation.



Fig5. GSM [Global System For Mobile]

UNO without worrying too much about doing something wrong. Worst case scenario you can replace the chip for a few dollars and starts over again.

#### ii) Different Sensors:

1. PIR sensor
2. Magnetic sensor
3. LM35 (Temperature sensor)

#### iii) GSM module:-

GSM is an international standard for mobile telephones. It is an acronym that stands for Global system for mobile communications. It something referred to as 2G, as it is second-generation cellular network. This is a very low cost and simple Arduino GSM-Shield. We use the module SIMCOM SIM900. It is the cheaper module now available in the market.

#### v). ARDUINO UNO.

In this system we required Arduino UNO, remote controller. By connecting all connection correctly apply a simple C or C++ code on Arduino sensor senses the motion so that it will get alert to user.

#### iv) Buzzer:

An electrical device that makes a buzzing noise and is used for signalling.



Fig6. Arduino UNO



Fig 7. Buzzer

### III. SOFTWARE REQUIREMENT

#### Arduino Environment ARDUINO 1.6.1:-

It is the open source software (IDE) makes it easy to write code and upload it on the microcontroller board. It runs on various platforms like windows, mac OS and Linux. The environment is written in Java and based on other open source software. Arduino programs are written in C / C++

#### 2. Hardware Requirement

- i) Arduino Uno
- ii) Different sensors
- iii) GSM module
- iv) Buzzer

#### i) Arduino Uno:

The Uno is a microcontroller board on the AT mega 328P. It has 14 digital input / output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller simply connect it to a computer with a USB cable or power it with a AC to DC adapter or battery to get started. You can tinker with your

### IV. FUTURE SCOPE

Android app will also develop for easily use. In Android app there will be direct buttons for on or off the system or to receive the OTP.

For more security purpose camera module can also be implemented on the system. If any person attempt to enter in home with more than three time wrong password then at that time camera module will be activated. And camera module will capture the image of person who trying to attack on system.

#### i) PROBLEM FACED:

In this system GSM shield is a very important part for communication between mobile phone and microcontroller GSM Shield required the SIM card, due to range fluctuation or busy network sometimes GSM shield will not work properly.

#### ii) SOLUTION:-

To problem with this connection is that, while programming Arduino uses serial ports to load program



from the Arduino IDE. If these pins are used in wiring, the program will not be loaded successfully to Arduino. So we have to disconnect wiring in Rx and Tx each time we burn the program to arduino. One the program is loaded successfully can reconnect these pins and have the system working! To avoid this difficulty, we are using an alternate method in which two digital pins of arduino are used for serial communication. We need to select two PWM enabled pins of arduino for this method. This method is made possible with the software serial library of arduino. The library replicates hardware functions and handles the task of serial communication.

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## V. CONCLUSION

In this paper, a novel architecture for flexible home security and monitoring system using Arduino microcontroller is proposed and implemented.

The important of home security measures are elaborated using easily available programmable sensors like the PIR sensor, LM35 (Temperature sensor), by implementing this type of system we can secure entry point of our. Home as well as for more security we can use various sensors.

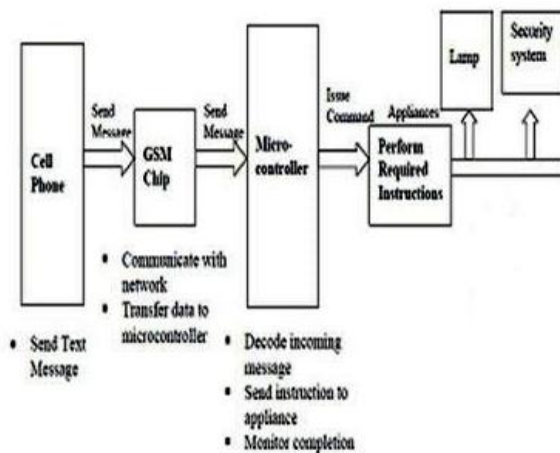


Fig8. Block Diagram of home security System

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