

# Home Safety System using GSM Technology

Ulka Hemant Khadke<sup>1</sup> Vinayak Sopan Sonavane<sup>2</sup> Neha Anil Bhavsar<sup>3</sup>

<sup>1,2,3</sup>Department of Computer Engineering

<sup>1,2,3</sup>SSBT COET, Bambhori, Jalgaon., North Maharashtra University, Jalgaon.

**Abstract**— Safety is a significant issue in today's world. Pupils spend lots of the time away from the home. So they cannot understand what incident happened at their home. In this paper, we have developed a safety system that interfaces with a mobile device. The mobile device and safety system communicates via GSM. This system provides the gas leakage detector, Smoke Sensor and Temperature sensor which will detect gas leakage, smoke and temperature. The sensors and detectors are connected to microprocessor 89v51rd2 and Control the arrived situation and inform the user by sending the SMS through GSM Modem.

**Key words:** GSM (Global System for Mobile Communication), SMS (Short Message System), Microcontroller

## I. INTRODUCTION

In recent years the environment devices can be converted into smart devices using by computing technologies. Pervasive computing vision is environments that are getting saturated with communication as well as computing capability, but prettily integrated with human users.

The objective of this system is to provide a cost effective solution that will provide security and controlling of Home appliances remotely. Security is considered as a major issue when it comes to the smart home system. In the recent years a number of pervasive systems and algorithms were implemented and proposed for security measurements based on wired networks. Initially mobile phones were developed just for communication. But now this scenarios has changed by means of text messages, have overtaken the usage of voice calls, so voice communication is become just one aspect of a mobile phone. A Home Security System should provide security and safety features for a home by alarming the residents from accidental, natural or human dangers such as: flooding, fire, leakage. The prime concern of this system is to provide total safety.

Home safety is a major aspect in daily life. If any accident happened at home, people are not aware about happened accident at that moment, there are many situations which may harm our home's safety and people cannot take any action against it immediately. The proposed Home Safety System monitors the home appliances. Use of GSM technology provides safety alert to user on their mobile phones when user is away from home. Modules such as smoke detector, gas leakage detector, temperature sensor are provided in this home safety system. Proposed system consumes less power as compared to existing system.

If the LPG gas is detected in quite large quantity then LPG gas sensor will send the signal to the microcontroller and microcontroller will switch off the gas valve using solenoid valve. Notification of this is also sent to the user through SMS. In any case, if temperature

gets increased above the certain limit because of any accident or any heating device then temperature sensor will send signal to the microcontroller and it will switch ON the cooler through relay or driver circuit. Also the user will get the notification through SMS that temperature is increased. In certain area where any kind of smoke is not allowed and if smoke is detected because of accident or fire then smoke sensor will send the signal to microcontroller. Then microcontroller will switch ON the exhaust fan through driver circuit and also the user will get the notification. The GSM module system uses mobile network makes home automation system safer from internet hackers.

## II. LITERATURE SURVEY

Smart home is not a new concept for science society but, it is still away from people's vision and audition. As various electronic technologies are converging, the field of automation system is expanding. Various smart home systems have been proposed where the control is via Bluetooth, internet based, etc. Bluetooth capabilities are good and most of current laptop or notebook, tablets and cell phones consists built-in adaptor that will indirectly reduce the cost of the system. However this Bluetooth limits the control to within its range of the environment, while other systems are not much feasible to be implemented for low cost solution [1].

Wi-Fi based home automation system is already present. It uses a PC (with built in Wi-Fi card) based web server that manages the connected devices which is located at home. The users can manage system locally (LAN) and control the system remotely (internet) [2].

A similar architecture is proposed where the actions are coordinated by the home agent running on a PC. Other also presented internet controlled systems consisting of a dedicated web server, a web page and database for interconnecting the devices. Those systems use a PC which leads to a direct increase in cost and high power consumption [3].

The one presents a voice activated smart home automation system. This smart home system provides graphical user interface (GUI) using Microsoft Visual Basic software hosted by a PC, and uses Speech Recognition Engine. The signal is transmitted via Radio Frequency link to the microcontroller of home automation system where home appliances are interacted. Here again problem of high cost and high power consumption due to the PC [3][4].

Security is the main concept for individual. Everyone wants to live safely in his home. Each and everyone wants to keep secure from various incidents like theft in their house or accidents caused due to LPG gas leakage or accidents due to fire in their homes. The LPG gas is commonly and widely used for cooking. So in kitchen we find that LPG gas cylinder. However due to some reasons, LPG gas might leak from these cylinders.

And because of this leakage, fire might be ignited and it can cause the blast of gas cylinder. This can damage the house or at the worst case, it can cause life threat to the person living inside the house. Another problem or fear is about fire in our house. There could be various reason of this fire being ignited or house getting caught in fire. Reason of fire can be the electrical short circuit or due to some other things like candles or oil lamps kept inside the house or because of fireworks in festival season. The detection of all these problems earlier is really necessary. The fire lighted is sometimes small but if proper attention is not given to it or if proper actions are not taken to control the fire, then it can convert into big problem as this fire can spread in complete house. Same with LPG gas leakage, if gas is detected and if it is controlled on time then it can avoid a big accident [5-8]. To overcome all the above stated disadvantages of existing system we have designed a GSM based home safety system. It can avoid these undesirable situations, hazardous and harmful conditions like LPG gas leakage, increase in temperature and smoke due to fire.

### III. PROPOSED SYSTEM

The system uses the GSM for communication purpose. The GSM provides wide coverage as GSM association estimates 92% of the global mobile market using the GSM standard. The proposed system provides reliable security, effortless installation and easy access.

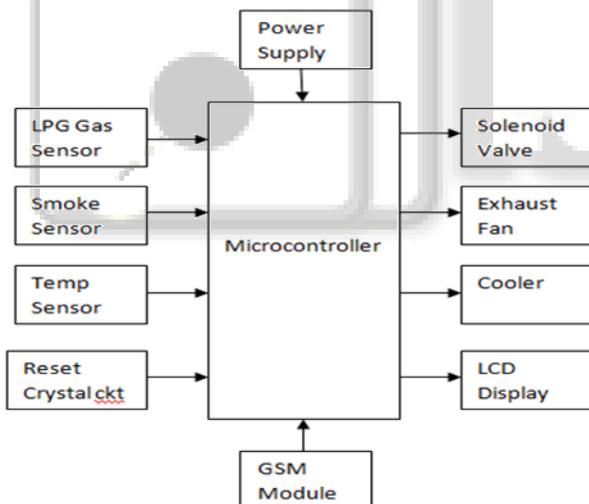


Fig. 1: Block Diagram of Proposed Home Safety System  
In this work computer or internet connection is not required, once programmed, thus ensuring easy installation and portability. The gas sensor, smoke sensor and temperature sensor are mainly connected to the microcontroller as shown in fig.1. If sensor detects any uncertain condition, it will immediately send a signal to microcontroller. The microcontroller performs specified action over it as well as it will send a SMS on user's mobile using GSM module. This system minimizes the overall cost and also reduces the energy usage.

The home safety system is designed for safety using GSM module, in which user get message if certain accident will occur in our absences or presence. For detecting any possibility of accident here we are using

different types of sensor like LPG gas sensor, smoke sensor, temperature sensor.

If LPG gas is detected in large quantity then LPG gas sensor will send the signal to the microcontroller and microcontroller will switch off the gas valve using solenoid valve. The notification of this prevention is also sent to the authorized person through SMS. In case, if temperature gets increased above limit because of fire or any accident or any heating device or short circuit etc. then temperature sensor will send signal to the microcontroller and it will switch ON the cooler through relay or driver circuit. Also the authenticate person will get the notification through SMS that temperature is increased. If in case, in certain area where any kind of smoke is not allowed and if smoke is detected there because of accident, smoking or fire then smoke sensor will send the signal to microcontroller. Then microcontroller will switch ON the exhaust fan through driver circuit and also the authenticate person will get the notification.

By constructing this type of security system for home, we can prevent most of the accidents and thus it cannot harm to human beings and the environment.



Fig. 2: Complete Project Model

### IV. COMPONENTS OF PROPOSED SYSTEM

#### A. Microcontroller:

All 89V51RD2 devices have separate address spaces for program and data memory. In this, the logical separation of program and data memory allows the data memory to be accessed by 8-bit addresses, which is quickly stored and manipulated by an 8-bit CPU. The 16-bit data memory addresses can be generated through the DPTR register. Program memory (ROM, EPROM) can only be read and not written to. There is up to 64k byte of program memory. In the 89V51RD2, the lowest 4k bytes of program are on-chip. All program memory is external in the ROM less versions. The read strobe for external program memory is the PSEN (program store enable).

Data Memory (RAM) occupies a separate address space from Program Memory. The lowest 128 bytes of data memory in the 80C51 are on-chip. Up to 64k bytes of external RAM can be addressed in the external Data Memory space. The lowest 128 bytes are on-chip in the ROM less version. The CPU generates read and write

signals, RD and WR, as it is needed during external Data Memory accesses. The external Program Memory and external Data Memory may be combined if desired by applying the RD and PSEN signals to the inputs of an AND gate and using the output of the gate as the read strobe to the external Program/Data memory.

#### B. LPG Gas Sensor:

The MQ-6 gas sensor has high sensitivity to LPG, Propane and Butane, also response to Natural gas. The sensor can be used to detect different combustible gases, especially Methane; it is with low cost and suitable for different application. The sensitive material of MQ-6 gas sensor used for sensing is SnO<sub>2</sub>, which with lower conductivity in clean air.

- 1) Characteristics:
  - Good sensitivity to Combustible gas in the wide range
  - High sensitivity to Propane, Butane and LPG
  - Long life and low cost
  - Simple drive circuit

#### C. Smoke Sensor:

The cadmium sulfide (CdS) or light dependent resistor (LDR) whose resistance is inversely dependent on the amount of light falling on it is known by many names including the photo resistor, photoconductor, photoconductive cell, or simply the photocell. A typical structure for a photoresistor uses an active semiconductor layer that is deposited on an insulating substrate. The semiconductor is generally lightly doped to enable it to have the required level of conductivity. The contacts are then placed either side of the exposed area.

As the name suggests, LDR is a type of resistor whose working depends upon only on the light falling on it. This resistor behaves as per amount of light and its output directly varies with it. In general, LDR resistance is minimum (ideally zero) when it receives maximum amount of light and goes to maximum (ideally infinite) when there is no light falling on it.

A critical factor which decides LDR's working is the frequency of light which should cross a threshold value so as to make LDR respondents.

- 1) Features:
  - Quick Response
  - Reliable Performance
  - Epoxy or hermetical package
  - Good Characteristic of Spectrum

#### D. Temperature Sensor:

The two main types of semiconductor temperature sensors are temperature sensitive voltage sources and temperature-sensitive current sources. The voltage output from this circuit increases by 10 mV for each degree centigrade that its temperature is increased. The sensor will give a meaningful output for temperature range of -55 to +150 degree centigrade if and only if the output is connected to negative reference voltage. The output is adjusted to 0V for temperature of 0 degree centigrade. The voltage as an output can be amplified to give the

voltage range user need for a particular application. The accuracy of the device is about 1 degree centigrade.

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in deg. Celsius). LM35 temperature sensor can measure more accurately than using a thermostat. The LM35 generates the higher output voltage than thermocouples and may not require that the output voltage be amplified.

#### E. GSM SIM 300 Module:

This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. The advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, remote control, data transfer and logging can be developed easily. The modem can either be connected to PC serial port directly or to any microcontroller. It can be used to make/receive voice calls or send and receive SMS. It can be used in GPRS mode to connect to internet and do many applications for control and data logging. In the GPRS mode one can also connect to any remote FTP server and upload files for data logging.

This GSM modem is a highly flexible plug and play quad band GSM modem for direct and easy integration to RS232 applications. Supports features like SMS, Voice, GPRS, Data/Fax and integrated TCP/IP stack

- 1) Features:
  - Reliable for 24x7 operations with Antenna
  - Status of Modem Indicated by LED
  - Simple to Use & Low Cost
  - Quad Band Modem (QBM) supports all GSM operator SIM cards

## V. DISCUSSION

- 1) Remote indication: With the use of GSM technology owner of the house or industry get a remote indication through SMS. So even if a user is away from home or industry, he or she will be intimated about the hazardous or undesirable conditions / situations inside the house.
- 2) This home safety system is fully automated. As this system is installed inside the home or industry, it does not require any human interaction to operate it. With the use of this system user can save the life of a person in the home / industry. Since the accidents caused due to fire and LPG gas leakage can cause life threat.
- 3) The property and various materials inside the house and industry are saved from fire.
- 4) This system is Cost effective and also Fast and efficient.

## VI. RESULT

The developed GSM based home safety system gives a good response to the sensor and sends SMS when it detects the LPG gas, fire or temperature is increased

above desired levels. The time taken by the system to deliver the SMS is dependent on the coverage area or range of the specified mobile network. If the network is available for mobile then the SMS is delivered in 15-20 seconds.

#### VII. CONCLUSION AND FUTURE SCOPE

A home safety system using GSM technology actually significantly can prevent problems that happened to present home automation system. This system will enable the user to control their home appliances by using SMS. The GSM based home security system has been designed and tested with the mobile network. The communication of home is through the SMS which has been working on all mobile networks. The user can get alerts about the accident, anywhere through the GSM technology, thus making the proposed system location independent. Web camera to see what is going inside the home by sitting in an office or somewhere. Also can implement other related modules like wind sensor, fire detector.

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