GSM based Wireless Security System

Prof.Amit Kukreja, Abhishek Pardeshi, Shweta Chari, Deenanath Gupta, Aditi Gupta

***Abstract*— Home/ Bank/ Office security has been a major issue where crime is increasing and everybody wants to take proper measures to prevent intrusion. The project is aimed at developing the security of home against Intruders, Gas Leak and Fire. In any of the above three cases, any one is met while the user is out of the house, then the device sends SMS to the emergency number provided to it and also display it on LCD connected to it. The paper consists of a background into the area of 89s52 microcontroller, gas sensor, fire sensor, and GSM modem, how they are interfaced to each other and AT (Attention) commands set used in communication. This system can avoid these undesirable situations and hazardous conditions like LPG gas leakage, fire ignition and theft.**

***Index Terms*— GSM; Security system; monitoring; SMS; Microcontroller; touchpad; LCD.**

I. INTRODUCTION

Security is everyone's main concern. Everyone wants to live securely in their house. Everybody wants to keep themselves safe or secure from various incidents like theft in their house or accidents caused due to LPG gas leakage or accidents due to fire in their house. Now a days many times we hear news about house robbery or theft in some houses, bungalows, flats. These robberies or thefts take place when nobody is in house or in some cases, we find that robbery take place even if people are in their houses. Another bad news we hear is about accident is caused or blast happens because of LPG gas cylinder leakage. In house, we find that LPG gas is commonly and widely used for cooking purpose. However, due to some reasons, LPG gas might leak from these cylinders, and because of this LPG gas leakage, fire might be ignited or it can even cause the LPG gas cylinder blast which can damage the house or in even worst situations, it can cause life threat to the people living inside the house.

Another problem /fear is about fire in our house. There can be various reasons of this fire being ignited or house getting caught in fire. Reason of fire can be electrical short circuit or due to some other things like candles or oil lamps kept inside our house or because of fireworks in festival season. Early detection of all these problems is really necessary. Sometimes fire lighted is small but if proper attention is not paid to it or if proper actions are not taken to control this fire, then it can get converted into big tragedy as this fire can spread in complete house. Also, in case of robbery, it would be beneficial if we can blow some alarm. Let's take an example that we are out of our home and theft is going on in our house. In such case, if we are intimated about theft then we can inform our neighbors and then they can take some appropriate action so that this theft can be avoided. Let's take another problem; sometimes the key of our home is lost. If we do not replace our lock and if these keys are found by thieves then it can cause robbery. We all know that duplicate key can be created within few minutes.

These are the disadvantages of traditional locking system which uses a key and a lock. Hence, a touchpad and GSM based door lock has been used in this project.

To overcome all the above stated disadvantages of existing system, this GSM based home security system has been designed. It can avoid these undesirable situations and hazardous conditions like LPG gas leakage, fire ignition and theft. The primary aim of this project is to provide total security from all aspects.

II. SYSTEM

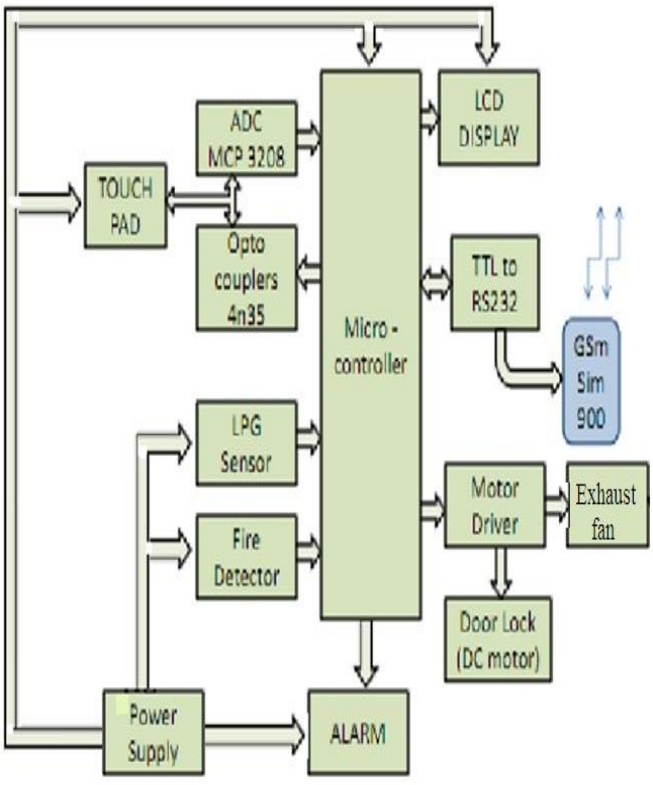

Fig 1. Block diagram of GSM based wireless security system

The main components of the circuit are:

Manuscript received March 09, 2015.

Prof. Amit Kukreja, Pursuing Masters in Engineering in Computers from K. J. Somaiya College of Engineering, Vidyavihar, Affiliated to University of Mumbai.

Abhishek Pardeshi, Currently pursuing B.E. in Electronics and Tele-communication from K. J. Somaiya Institute of Engineering and I.T., Mumbai.

Shweta Chari, Currently pursuing B.E. in Electronics and Tele-communication from K. J. Somaiya Institute of Engineering and I.T., Mumbai.

Aditi Gupta, Currently pursuing B.E. in Electronics and Tele-communication from K. J. Somaiya Institute of Engineering and I.T., Mumbai.

Deenanath Gupta, Currently pursuing B.E. in Electronics and Tele-communication from K. J. Somaiya Institute of Engineering and I.T., Mumbai.

Microcontroller 89s52:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

Features of 89s52:

• 8K Bytes of In-System Programmable (ISP) Flash Memory– Endurance: 10,000 Write/Erase Cycles

• 4.0V to 5.5V Operating Range

• Fully Static Operation: 0 Hz to 33 MHz

• Three-level Program Memory Lock

• 256 x 8-bit Internal RAM

• 32 Programmable I/O Lines

• Three 16-bit Timer/Counters

• Eight Interrupt Sources

• Full Duplex UART Serial Channel

• Low-power Idle and Power-down Modes

• Dual Data Pointer

GSM SIM900:

This GSM Modem has a simple to implement RS232, TTL Serial used to send SMS, make and receive calls, and perform other GSM operations by simple AT commands through a serial interface from microcontrollers and computers. All modem operations(sending and receiving messages, calls, etc) can be carried out by sending AT commands to this virtual serial port though a serial terminal program. Most programming languages allow sending and receiving serial commands to a serial port and can be used to write software that can operate the modem without the need to implement any complex interface.

This GSM module is built with the advanced SIM900 engine, works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz. It is very compact in size and easy to use as plug in module. The Modem is coming with RS232 interface, which allows you to connect directly to PC or microcontroller /Arduino.

Fig 2. GSM Module

Features of GSM SIM900:

• Power supply: Single supply voltage 9V to 12V (DC).

• Onboard power ON and Network indication LED.

• Onboard provision to select the power on mode of SIM900A (manual or auto) using jumper.

• RS232 output to connect directly to computer.

• Serial TTL onboard pin to directly connected to microcontroller.

• Onboard Audio (speaker and microphone) interface pins.

• Onboard PWM and ADC channels.

16x2 alphanumeric LCD:
This LCD can display alphabets along with numbers on 2 lines each containing 16 characters.

Touchpad (TTP 229):
A capacitive touchpad through which user can enter the password.

MQ-6 Gas Sensor:
This sensor can detect all types of flammable gases. The output of the sensor goes LOW as soon as the LPG sensor senses any gas leakage from the storage. This is detected by the microcontroller and the LED & buzzer is turned ON.

Fire sensor:
The Fire sensor is used to detect fire flames. The module makes use of Fire sensor and comparator to detect fire up to a range of several meters.

Exhaust fan:
The leaked gas is pushed out in the environment using this exhaust fan so that the concentration of gas in the leakage area becomes low.

DC motor:
The motor will be rotated if the user entered password is correct and the door will be unlocked.

Motor driver L293D:

L293D is a typical Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. One port is used to drive a motor used in door lock. The other port is used to drive an exhaust fan.

ADC 3208:
Analog to digital converter is used to convert the analog information obtained from touchpad into digital information.

Voltage regulator 7805:
Voltage regulator is used to provide regulated power supply to the microcontroller.

Max 232 IC:
It is an IC that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals.

System description:
The system on the basic level is a security system. It consists of a human interface using a touch screen. This kind of interface gives a easy to use feature without applying pressure as compared to the traditional buttons. Using touch makes the system complex, in terms of programming logic and interfacing circuit which is a tradeoff for user interface, switch de-bouncing effect and power . Mostly the security systems such as locks use the mechanical key. This can be risky when key is lost. In the proposed system, user has a password which acts as a key to unlock the system. On top of that, if the user tends to forget the password, there is a SMS based password recovery technique where the authorized phone number is used. For enabling the SMS facility the system uses a GSM modem (SIM 900).
Password based security is not the only feature, the systems also provide an alert when any one enters a incorrect password for more than 3 times, simultaneously ringing the alarm. on top of that, it has a unique password for all the users, unique password recovery technique. These are the software features which the system provides.
For some safety measures couple of sensors are interfaced to the systems which gives a timely alert for gas leakage and fire, if detected. The alert is in the form of SMS to all the users and the buzzer alarm to the people available in the vicinity.

III. WORKING

When the system is turned on, the microcontroller and all the devices interfaced to it are initialized. When any user wants to enter the house, they can open the door by simply entering the password using the touchpad. If any unauthorized individual tries to access the system by entering the incorrect password, all the users will get notified about the intruder alert if the entered password is incorrect more than three times. This system also has a password reset mechanism. If the users forget the password, they can simply reset it by pressing *12# on the touchpad and then entering the user ID (e.g. '1' for user 1, '2' for user 2, and so on). By this, the users will receive their new password on their mobile number via the GSM modem interfaced to the system. Also, in case of Gas leakage, the users will receive alert on their cell phone and the exhaust fan will be turned on in the house so that the concentration of flammable gas becomes less. For this, the MQ-6 gas sensor is used which can detect all types of flammable gases. Another feature is safety against fire ignition caused due to various reasons (e.g. Short circuit, etc). In this case, the fire station as well as the user will get alert via SMS about the fire ignition in the house. The fire station will also receive the user's residential address so that the necessary precautions can be taken by them.

IV. RESULTS

Fire alarm system: In this system, the buzzer is turned on as soon as the temperature is crosses a predefined value. Also, the fire station and all the users are notified through SMS about the fire ignition.

Theft alert system: When the entered code is incorrect for more than three times, all the users are notified through SMS about the intruder alert. Also, the buzzer is turned on.

Gas leakage system: As soon as any flammable gas is detected by, the users are notified through SMS about the gas leakage. Also, the exhaust fan is turned on so that the concentration of gas in the leakage area becomes low.

V. CONCLUSION

This paper deals with the design and development of fire detection, intruder alert and gas leakage alert system for homes, banks, laboratories, hotels and large commercial establishments to forewarn and initiate measures for accidental cases. The GSM modem provides the information to the users in all the cases. This is a reliable and efficient system for fire alert, gas leak alert and theft alert through GSM mobile communication.

REFERENCES

[1] Ushie James Orgi, "Design and construction of door locking security system using GSM", Volume 2, IJECS (JULY-2013).

[2] Jayashri Bangali, Arvind Shaligram, "Design and implementation of Security systems for smart home based on GSM technology", International Journal of Smart Home, Volume 6, (2013).

[3] Toufiqul Islam, Syed Asif Abdullah, "Enhanced wireless control system for smoke & fire detection", Volume 5, IJCEE (April 2013).

[4] Patra, Manoj Kumar, "Design of a GSM based digital door lock", NIT Rourkela, July 2013.

[5] Nikhil Agarwal, G.Subramanya Nayak, "Microcontroller based home security system with remote monitoring", IJEDSP (2012).

[6] S. Rajitha, T. Swapna, "A security alert system using GSM for Gas leakage", Volume 3, IJVES (September 2012).

[7] Tanvira Ismail, Devoleena Das, "GSM based Gas leakage warning system", Volume 3, IJARCCE (April 2014).

[8] Mazidi, Muhammad Ali, "The 8051 Microcontroller and Embedded Systems",Second Edition, Prentice Hall, 2007

[9] V. Ramya, B. Palaniappan, "Embedded system for hazardous gas detection & alerting", Volume 3, IJDPS (May2012).

Prof. Amit Kukreja, Pursuing Masters in Engineering in Computers from K. J. Somaiya College of Engineering, Vidyavihar, Affiliated to University of Mumbai. Completed graduation from Thadomal Shahani Engineering College, Bandra, Affiliated to University of Mumbai. Currently working as an assistant professor in Electronics and Telecommunication department in K. J. Somaiya Institute of Engineering and I.T., Mumbai

Abhishek Pardeshi, Currently pursuing B.E. in Electronics and Tele-communication from K. J. Somaiya Institute of Engineering and I.T., Mumbai.

Shweta Chari, Currently pursuing B.E. in Electronics and Tele-communication from K. J. Somaiya Institute of Engineering and I.T., Mumbai.

Aditi Gupta, Currently pursuing B.E. in Electronics and Tele-communication from K. J. Somaiya Institute of Engineering and I.T., Mumbai.

Deenanath Gupta, Currently pursuing B.E. in Electronics and Tele-communication from K. J. Somaiya Institute of Engineering and I.T., Mu