

GSM based home security system

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Abstract— Security is one of the main concern of the present day. Security not only from the rising crime but also from the day to day accidents. In this present world of technological advancement proper measure should be taken to maintain the security and the comfort of homes, banks and offices. By using proper security systems billions of rupees spent on departments like fire brigade, police, etc. can be brought in control.

This project aims at integrating the features of home automation with that of security system to build a concrete home control system.

The project takes into consideration of all the existing products and merges them together to create a system which will not only provide automation to the building but will also take into consideration of all the security features of the building. The project uses gas sensors to detect any gas leakage that might occur in the building. It is also equipped with smoke and temperature sensors to look out if any fire breaks out in the building. It also features the function of intrusion detection by proper placement of passive infrared sensor (PIR sensor). All of the above sensor is well connected to a centralised microcontroller section which will generate a proper output in case of any tragedy. Various security services number can be feed into the system so that a prior generated message can be transmitted to that number in case of any emergency. In depth study of the previous systems have been done so as to improve the performance of the system from its predecessors.

Index Terms— GSM, Sensor, Security System, Microcontroller.

I. INTRODUCTION

In today's world of technological advancement and automation, home automating system has made its mark and is also becoming one of the rapidly developing sector of application-based technology. The past idea of a comfortable living have changed widespread since the advent of the digital and wireless technologies. Smart homes, or in simple terms, homes that are fully automated, pre-programed to carry out some predefined tasks, respond to certain situations and also change according to the needs of the user takes up the new definition of comfortable homes. The smart homes are expected to perform tasks such as temperature control, lightning and entertainment control, security and emergency response and many such others. They are expected to be controlled and automated from near or from a distance.

Among all these one of the main concern of the people is the security. Everyone wants to live securely in his/her home. Security from various incidents like theft, burglary, invasion, and many more. Not only these but also people want security from various household accidents like gas leaks, fire, LPG (Liquefied Petroleum Gas) cylinder blasts and other such

accidents. Nowadays, it is almost a common site in the newspapers that robbery took place in a house, or miscreants barged into a house and committed offence against the women or even murder. Not only these but also we find that the LPG gas cylinder (that is used for household cooking and is a common item in various part of the world) leaked, these leakage if caught on time can be easily stopped but if not then fire can easily break out. LPG gas blast can sometimes be so dangerous that it can damage an entire block of houses. Such situations are very dangerous and most of the time life threatening, not only to the person in the house but also to the persons living in the surrounding of the house. Fire is not only caused by this but another common cause of fire is electric short circuit. Improper grounding or old and weary wires can most certainly cause short circuit which eventually breaks up into a fire. Oil lamps and candles kept in the house can also lead to fire. Early detection of all these is very essential to prevent accidents which are life threatening. Fire how small it may be if not properly tended might convert into a big tragedy.

Let's consider a situation, most of the houses are equipped with mechanical locks, which is very easy for an expert thief to crack. In such a scenario a theft or a robbery can easily take place. But this project comes with a locking keypad which is not easy to crack into. Along with this all the windows and the doors are equipped with PIR sensors so that even in case of a break-in, an alarm will be sounded and a message will be automatically transmitted to the nearest police station. In another such situation if a fire breaks out then a message will be transmitted to the nearest fire brigade department so that a swift action can be taken.

This project consists of three basic modules along with a GSM modem. The GSM modem is used to send the message to the respected authorities in case of emergency. The first module consists of lock keypad which can be used to lock the doors. If more than three attempts are made emergency signal will be sounded. The second module consist of intruder checkers which consists of an array of PIR sensors to detect the presence of a person in the house. Lastly the third module is the fire detection module which consists of LPG gas sensors and temperature sensors.

II. 8051 MICROCONTROLLER

The 8051 microcontroller belong to the Intel MCS-51 family is a Harvard architecture, CISC instruction set, single chip microcontroller (μ C). It was developed by Intel in the year 1980 for application in the embedded system. It became very popular in the 1980s and early 1990s. It was originally developed using the NMOS technology. But later CMOS technology was used as it consumes less power than its predecessors. It uses 8-bit word for its instruction and data. All of the above architecture can be programed using 8051 assembly language, they all share certain common features along with them having their own special features.

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Some of the features of 8051 microcontroller are:

1. It has 64 kB of on-chip memory.
2. It has 128 bytes of chip data memory.
3. It has 4 register banks
4. It has 128 user defined software flags
5. It has 8-bit data bus
6. It has 16-bit address bus
7. It has 32 general purpose registers each of 8-bits
8. It has 2 16-bit timers
9. It is equipped with 3 internal and 2 external interrupts
10. It has 4 8-bit ports
11. It has a 16-bit program counter and data pointer

III. PIN DIAGRAM

The 8051 controller is a 40 pin DIP package. The pin diagram of the 8051 microcontroller is shown below:

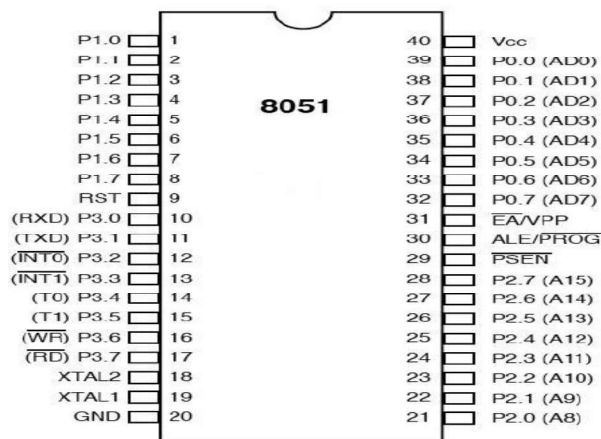


Fig.1. Pin diagram of 8051 microcontroller

IV. BLOCK DIAGRAM

The block diagram of the above project is shown below:

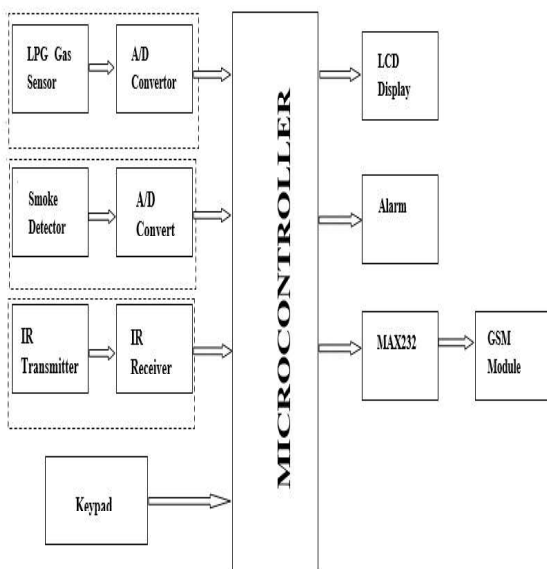


Fig. 2. Block diagram

The different segments of the block diagram is explained below:

1. The first segment deals with the detection of the LPG gas leakage. It uses MQ-5 semiconductor combustible gas sensor for detecting the presence of LPG gas and then sends the analog data to the analog to digital (A/D) convertor.
2. The second segment deals with the case of fire break-up. It uses REC46C190 photoelectric smoke detector for detecting the smoke and then sends the analog data to the analog to digital (A/D) convertor.
3. The third segment consists of the PIR array which detects the infrared rays coming from a human presence and sends it to the microcontroller
4. The fourth segment consists of the keypad used in the locking of the doors when going out.
5. The output section consists of a LCD display, an alarm and a GSM module for giving the proper output according to the inputs.

All of the above components is connected to the central microcontroller 8051 which regularly monitors the inputs from the above elements and takes the proper decision according to the algorithm. The LCD present is a 16x2 alphanumeric display. The keypad consists of 0 to 9, escape, enter and menu key. The menu key can be used for changing the pin for locking the house. The GSM module used in this project is the SIM900 module.

V. FUNCTIONAL DIAGRAM

The functional flow diagram of the project is shown below:

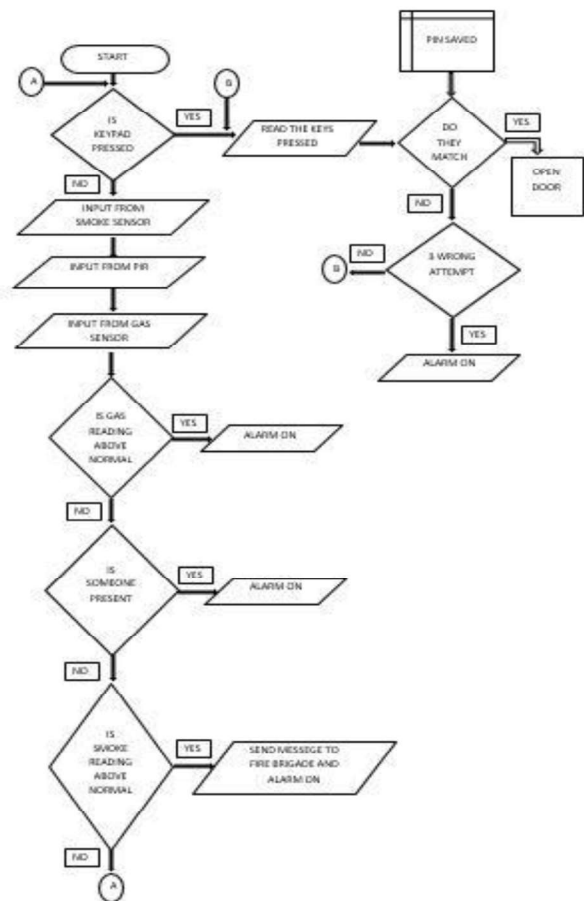


Fig. 3. Flow Chart

The above flow diagram shows the process by which data is processed inside the system. The keypad is placed as an

interrupt with the microcontroller. If any key is being pressed the microcontroller stops the processing and checks for the password. The PIR sensor continuously monitors the space, if it feels the presence of any person when the room is supposed to be empty then an alarm sounds. Along with all the alarms a message signal is also send to the number of the owner of the house.

VI. CIRCUIT DIAGRAM

The circuit diagram of the system is shown below:

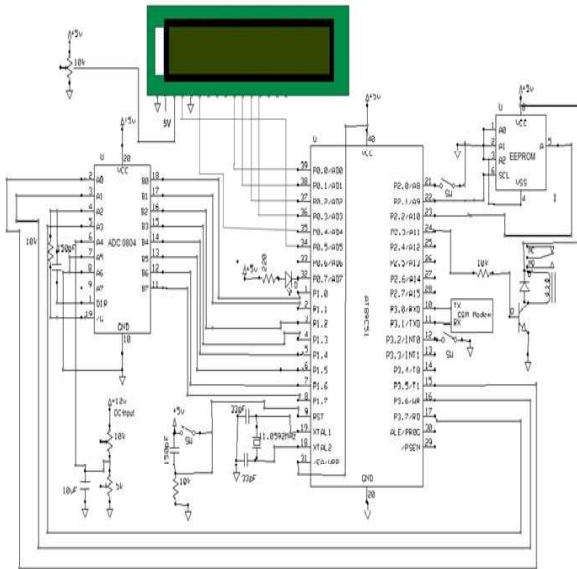


Fig. 4. Circuit Diagram

VII. FUTURE DEVELOPMENT

1. Fingerprint sensor instead of keypad can be used, so that only authorised personals will be able to access the main directory
2. Other sensors can also be implemented in the same model. For example wind speed sensor or seismometer can be implemented so that warning during a calamity can be sounded.
3. All of such houses may be centralised by one single server.

VIII. CONCLUSION

The project describes the use of microcontroller in the development of the GSM based home security system which can help detect and prevent various accidents by warning the person responsible in the right time. Various accidents occurring due to fire and LPG leakage can be prevented by incorporating the above project in the homes. Along with these protection from criminal activities like theft, robbery can also be prevented.

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Diptanil Chaudhuri is a student in B.Tech, in Krishna Institute of Engineering and Technology, Ghaziabad. He has done a lot of project in embedded systems and is also leading a team of enthusiastic engineering students in the college's robotics team. He is a dedicated and compassionate student committed to the field of research.