CHAPTER 2
GSM BASED FIRE SECURITY SYSTEM
2.1 BLOCK DIAGRAM

The GSM based Fire security system module block diagram and detailed circuit is shown in the figure 2.1 mainly consists of

1. Micro controller
2. GSM Modem
3. Temperature Sensor
4. POWER Supply Unit
5. Analog to Digital Converter
6. MAX – 232

2.1.1 MICRO-CONTROLLER

Atmel /Phillips 89S52, CMOS 8-bit Micro Controller from Intel family, with 8k bytes of flash programmable and erasable ROM and 256 Bytes of internal RAM. The entire functionality of the GSM Smart SMS Service is under the control of Micro controller. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcomputer, which provides a highly flexible and cost effective solution to many embedded control applications.

2.1.2 GSM MODEM

Smart Modem is a multi-functional, ready to use, rugged and versatile modem that can be embedded or plugged into any application.
Figure 1.2 Network Areas
Figure 1.3 Locations areas

Figure 1.4 MSC / VLR Service areas
Figure 1.5 PLMN Network Areas
Figure 1.1 Architecture of GSM elements
Figure 2.1 GSM based Security System
The Smart Modem can be customized to various applications by using the standard AT commands. The modem is fully type-approved and can directly be integrated into the system.

2.1.3 TEMPERATURE SENSORS

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35’s low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. The LM35 series is available packaged in hermetic TO-46 transistor packages.

2.1.4 POWER SUPPLY UNIT

Power supply unit is used to provide a constant 5 volts, 1.5 Amp supply to different ICs. LM 7805 voltage regulator IC shown in the figure 2.2 is used to get +5V regulated power supply. The LM7805 is simple to use. By connecting the positive lead of unregulated DC power supply to the Input pin of LM 7805 and the negative lead to the common pin, the output pin of LM7805 gives +5V DC.
Figure 2.2: LM7805
2.1.5 ANALOG TO DIGITAL CONVERTER

The ADC is used to convert the analog voltage to digital. The ADC0808, ADC0809 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logic. The 8-bit A/D converter uses successive approximation as the conversion technique.

2.1.6 MAX 232

MAX232 line driver is used to convert the RS232’s signals to TTL voltage levels that will be acceptable to the 89S52’s TxD and RxD pins and vice versa. In 89S52 microcontroller port pins are TTL compatible. They require a line drive to make them RS232 compatible. One such a line driver is the MAX232 chip.

2.2 DESCRIPTION OF THE SYSTEM

This system describes the design of an intelligence embedded GSM based fire security system and its integration to wireless system for fast and reliable communication. This system is particularly useful

- TO ELIMINATE ROUTINE TASKS:

There was always a need of efficient usage of workforce this was possible by Automation. Routine tasks, which hardly require any
attention, were automated for proper usage of manpower involved in routine jobs. This in turn reduces the chance of human errors, which generally occur during monotonous jobs. Particularly automated measurement and control systems form essential process of industrial automation which should be done properly otherwise this could cause serious damages.

- **TO REDUCE RISK FACTOR OF HUMAN LIFE:**

  Worker safety was another important factor behind automation. As the physical well being of worker has become a national objective with enactment of occupational safety and health act in 1970. Automation has reduced the involvement of workers in hazardous and dangerous jobs especially in chemical and nuclear industries. This technology is making work safer and has reduced the Risk factor involved.

  This system is based on the concept of a GSM mobile network through microcontroller interfacing.

This system has three main units.

- Microcontroller
- GSM modem unit
- Temperature detection unit
The various registers (TCON, SCON, Ports, Baud Rates) of the microcontroller are initialized by the software program.

The GSM modem unit has SIM insertion tray in which the active SIM card of the any GSM network is inserted. The microcontroller is connected to a GSM modem which has the sender SIM card and transmits the typed text through GSM network. So an activated SIM card from any GSM mobile telephone service provider along with the GSM mobile service network in the present environment are necessary to use GSM modem.

The temperature detection unit includes a temperature sensor LM35 which is the negative temperature coefficient detector, which means as the temperature raises resistance decreases. This semiconductor device has range upto 200°C. This temperature sensor is a resistive transducer.

When a fire accident occurs, the temperature sensor senses increase in temperature. The temperature sensor converts the temperature to the proportional voltage. This sensor is connected at the inverting terminal as variable resistor. As the temperature varies the resistance also changes. So a comparator circuit is used to detect any voltage variation due to variation in resistance.
A simple op-amp comparator is designed when inverting input is grounded the slightest input voltage is enough to saturate the op-amp. This happens because when the Non-inverting voltage is larger than the inverting voltage; the comparator produces a high output voltage.

At the non-inverting point a resistance value is set to maintain 9.8 V at this point when the temperature is below the 50°C the resistance is very less hence the voltage at inverting point is high hence the output is low. Once the temperature goes above 50°C then the resistance fall below the cutoff point and the non-inverting voltage is high than inverting voltage so the output goes high which is connected to the microcontroller.

The microcontroller will send a message that “FIRE ACCIDENT” has occurred to a predefined number in the SIM, which is the nearest fire station number using GSM modem. To interface the microcontroller with modem AT commands are used. These AT commands together with the microcontroller provide the features, which complete form, a single application.