

# Automated Home Safety Through IoT



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**Abstract** The life of every person is getting simplified by the continuous development of different technologies. The age of using manual systems is gone. Now, everyone is dependent on automatic systems. For this, nowadays, the Internet of thing (IoT) is playing a vital role in making things easier and simpler for us. It acts as a developing network by considering a number of objects which can share information among each other and fulfill our work. A huge number of applications are coming forward in this technology. One of the applications of IoT is home-automated system. IoT works more efficiently to save electric consumption. It uses many wireless devices for controlling the functioning of wireless devices used in it. All the gadgets or nodes used in home automation are controlled remotely. All the home appliances were controlled using this automation technology. A large number of wireless sensors are used to detect the room temperature, leakages of gas, short circuit, etc. All these sensors work together and communicate with each other using messages by GSM and then send it to the local-based server installed in the house. Thus, the server coordinates all the sensors to make the home fully automated.

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## 1 Introduction

The concept of home-automated system was heard only theoretically in around 1970s. But this concept came practically by using the concept of IoT. IoT helped to bring this concept fully implemented in real world where the people will not only imagine it but also can experience the real implementation. Even IoT brought up several methods of current safety standards. The flexibility, safety issues, energy consumption issues, etc., made the use of IoT more popular.

In this paper, we have discussed of communicating with the home appliances through some messages when we are at some far distance from home. We have also discussed of how to save the home from any accidents like fire, gas leakage, etc. The project objective is to detect and inform the owner if there will be any chances of accidents inside the home. It mainly emphasizes on room temperature, detecting fire, or gas leakage like LPG, etc. [1]. It works by taking the help of many sensors who will detect any abnormality and will inform the owner through SMS and if possible will take necessary action. For example let us say if the sensors detect that there is any increase in temperature, then it will check for what reason the temperature is increasing and if the sensors will find a drastic increase in room temperature then it will send a SMS to the registered mobile number. The owner after receiving the alert message can switch off the appliances of the house through the cell phone no matter wherever may be the owner at any location. So the main objective of the paper is to examine different criteria's like temperature, any gas leakages or fire then it will take preventions to save the house as well as people as compared to other older systems.

## 2 Literature Review

A lot of research has been done on home-automation systems, a number of techniques had been used for making a number of improvements in automating the home appliances. The motive behind making home automation is to control the home appliances remotely irrespective of the distance. By taking the help of Internet, the appliances are connected to each other and communicate with each other [2]. And through this project, we can also monitor and control the accidents that are likely to occur in our daily life like fire in house, gas leakages, etc. Through the help of sensors, the abnormality of the home is detected and informed to the owner to take necessary action. The people of modern era want everything under their fingertips. And the security of home and its appliances are very important for the owners. They always try to monitor and control their home appliances being at any location [3]. The common problem of people is that they forget to switch off the appliances when they are going out somewhere. So by using IoT technologies, we can easily switch on or switch off the home appliances through our cell phone using Internet.

### 3 Proposed System

The system works by taking the help of different sensors installed at different places inside or outside the house to monitor the changes or check for any abnormality in the house. All the sensors are connected to a server which is installed locally. The sensors communicate with each other within the network and work accordingly [4]. The maximum and minimum values of the sensors are set and displayed on the monitor. If the values exceed the set values of the sensors, then it is estimated that there is some abnormality faced by the sensors of the network. And the SMS regarding the abnormality is sent to the owner, and the owner can take necessary action [5] as shown in Fig. 1.

Sensors for monitoring and controlling temperatures: The system contains some sensors that will monitor the temperature of the appliances. The output of the device is given in terms of resistance current or voltage. To connect the sensors with the microcontroller, the sensor's output is converted to digital form [6]. One of the most common and well-known temperature sensors is LM35. This sensor gives the result in degree Celsius. So the voltage output of the device or sensors increases with the increase in degree Celsius and decreases with the decrease in degree Celsius.

Sensors for monitoring and controlling fire: The system contains some fire sensors that will detect the weak DC signals of the appliances that were sent to the igniters through the AC power. These sensors consist of some IR sensors, some comparators, and LED. At a range of about 700 nm or more, the flame or wavelength can be

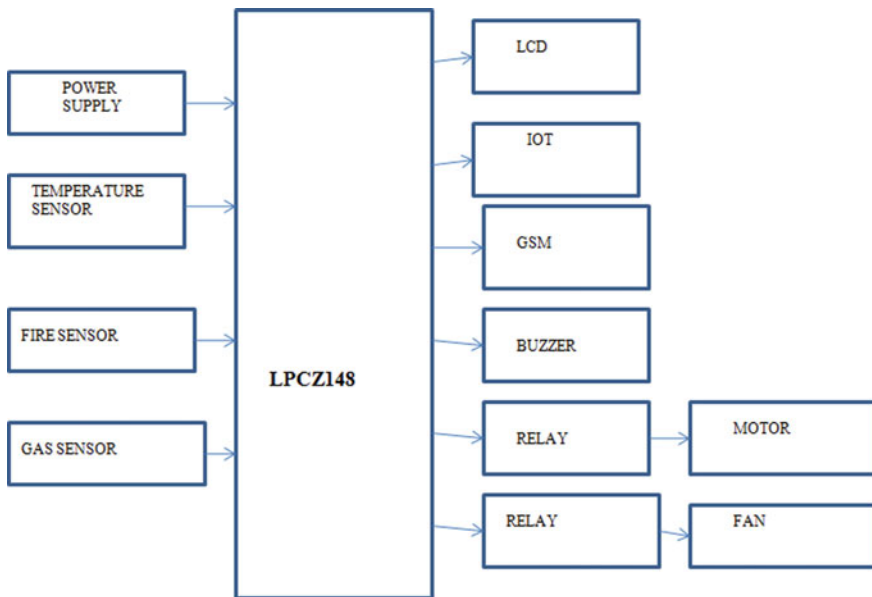


Fig.1 Block diagram of proposed automated security system

detected. The more the distance, lighter is the flame, which means they are inversely proportional. The sensors connected to the microcontroller will direct the signal to a motor which will get ON when any fire is detected and at the same time, an alert message is sent to the registered mobile number [7].

**Sensors for detecting GAS leakages:** The system contains some sensors which are used to detect any type of GAS leakages, as it is the more important area for safety system. These sensors are able to detect LPG, some propane, smokes, and H<sub>2</sub> gases within a very quick response time. These sensors are used to detect some of the dangerous or flammable gases. When the gas leakages are detected, it delivers an alarm for informing the owners about the accidents that can happen. Some of the sensors are also used to detect the concentrations of different gases which are volatile in nature.

**Communicating through GSM:** One of the globally recognizable standard in digital data communication is GSM. GSM is widely used to transfer data among each node through voice. As in this project, we have used around 51 numbers of frames and around 26 number of frame structure. And the data rate used in their communication is around 9.6 kilobits per second. The microcontroller communicates with each other by sending messages. Time division multiple access is used to break the frequencies into different time slots. The benefit of using GSM is that multiple users can use the same frequency channel for their communication without any traffic congestion. GSM also takes the help of SIM card for Internet connection so that they can communicate with the microcontroller as shown in Fig. 2. **Wireless devices like Wi-Fi:** As we are dealing with a system that runs wirelessly, so there must be a powerful wireless device that can help the electronic gadgets of the system to communicate with a broad bandwidth without any traffic congestion. In this case Wi-Fi brings a solution for a smooth flow of data among the devices. Wi-Fi works together with Bluetooth to bring forward a new dynamic system.

## 4 Simulation Result

The entire system was designed and installed as per the flowchart we have designed. All the stimuli were taken under a controlled surrounding to avoid any type of accidents. According to our flowchart as shown in the flowchart figure, first the temperature of the room is tested and checked whether the devices are working properly or not, similarly fire and LPG are also tested for checking the working of the devices. The abnormalities were detected by the sensors and messages were sent to the user for necessary action. The microcontrollers attached in the system also worked properly and the values were displayed accordingly in the LCD. Detector abnormalities like motor sprinkler and buzzer worked perfectly at the time of their action.

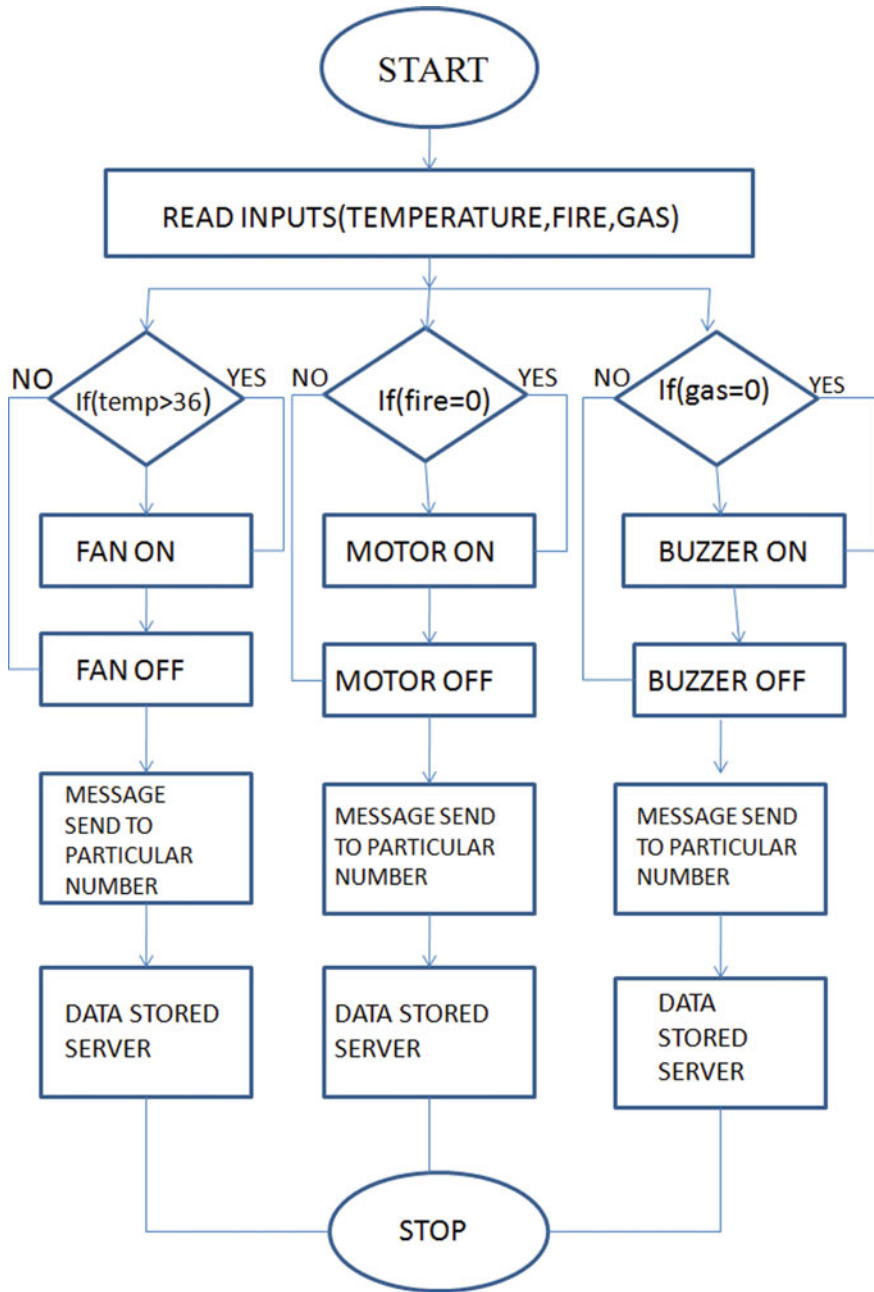


Fig. 2 Flowchart of the proposed system

## 5 Comparison with Other Systems

- a. As compared to previous home-based automatic systems like “Smart Gas Level monitoring,” this project can not only detect the gas leakages but can also take necessary action to prevent fire.
- b. If we will compare the “wireless home automation system using IoT algorithm,” then in that system, the home automation is not carried out by taking so many sensors to prevent any mishaps. But, in this system, we have taken temperature sensor, gas sensor, and fire sensor to prevent any mishaps.
- c. In comparison with the system of “Home Automation using Cloud Network and Mobile Devices,” our system has local servers installed in nearby areas so that it will not take much time to save and retrieve the data from the cloud. Thus, our system will work faster.
- d. If we will compare with other systems older than 2016, then the sensors used in our system are quite better, faster, and cheaper. Our system sensors work much accurately and perfectly than older systems.

## 6 Conclusion

Through this paper, we have discussed about many safety issues that can occur in a home. We tried to find out some solutions regarding the accidents that may happen inside the house. We included a number of devices in our project in order to bring safety smartly. Devices like detectors, microcontrollers, communicating devices, and techniques were used to bring out the safety issues solution through this paper. The advantages of the proposed system were already discussed, comparison with other systems was also done which will have definitely a good impact on the researchers.

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