

# Advanced Low-Cost Security System Using Gsm Communication Module

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**Abstract**— Home security is essential for occupants' convenience and protection. This paper aims to develop a low-cost means of home security system using temperature, passive infrared and proximity sensors. Data from all these sensors is continually received and processed by arduino Uno board which act as a microcontroller unit. In case of untoward situations, the arduino will trigger an alarm and alert messages will be sent to user's mobile via GSM. The temperature sensor LM35 is used to prevent fire accidents by detecting the increase in temperature beyond a certain limit. The low-power Passive Infrared (PIR) detectors take advantage of pyro-electricity to detect a human body that is a constant source of infrared radiation while proximity sensor uses Hall Effect principle to detect any intrusion through doors and windows. Thus the system ensures home safety as well as security.

**Keywords:** - LM35, PIR sensor, Arduino Uno, GSM, Hall-effect proximity sensor

## I. INTRODUCTION

Safety and security of any living or working place is one of the most primary concerns. The increasing risk of fire accidents and new ways of burglary have made it crucial to enhance safety as well as security through the use of modern technology.

Today's security systems include CCTV surveillance which are very costly and many of these systems do not trigger any alarm if intrusion or fire is detected. Thus a cost-effective and fast-reactive security system is needed.

Our design is a prototype of such system which consists of three sensors- LM35 temperature sensor, PIR sensor and Hall-effect proximity sensor; a microcontroller unit-Arduino Uno board and a SIM300 GSM module. Arduino Uno is the processing and controlling unit of this system which receives and processes the data from all the sensors. The GSM unit act as an interface between arduino and user's mobile and is responsible for communication between them. The mobile phone can be used as a controller from anywhere in the world if the GSM network is available to switch on/off the system and to receive the alert messages. The thermal sensors will be placed at fire-prone areas like kitchen and around geysers. They will continuously send the temperature values to arduino. If the temperature value exceeds a certain set temperature value then arduino will trigger an alarm and send an alert message to the mobile station. PIR sensors can be installed at drawing room and those rooms where valuables are kept. They detect the presence of human in the home and generate pulses which are read by the arduino. According to the pulse received by microcontroller, an alarm is triggered and a call is established to mobile station through a GSM modem and thus warns the presence of human in the home to owner-occupier. The proximity sensors can be attached to doors, windows or any possible access points. If there is intrusion through any of these access points, then the sensor will

detect it, generate pulses to be read by arduino and then the procedure similar to that of PIR sensor is followed. established to mobile station through a GSM modem and thus warns the

## II. BLOCK DIAGRAM

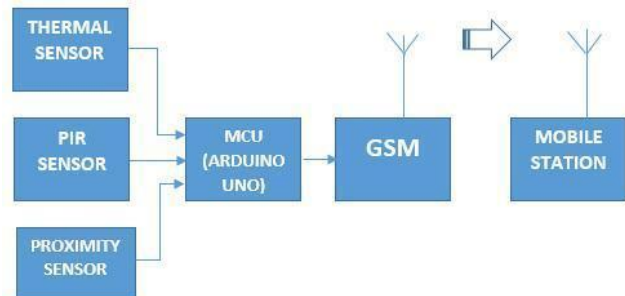


Fig.1: Block diagram of prototype

The block diagram of the system is shown in figure 1. As mentioned above, the system comprises two units. The microcontroller unit consists of three sensors. The data from the sensors is continually processed by the microcontroller and an alert is sent to the mobile station via GSM if something is sensed or something reaches beyond the limit in case of a temperature sensor.

## III. WORKING CIRCUIT

The system will remain in deactivated mode initially. It is activated by sending a particular SMS from the phone to GSM. Taking into account the time taken for complete evacuation, system may take a while to activate all the sensors once the message to turn on is received. After the activation the system will work as follows.

### A. Proximity Sensors-

These sensors are attached to the windows and doors. They will get activated once a burglar tries to open any door or window. The alarm will be set on and alert message will be sent to user's phone.

### B. Pir Sensor –

suppose the burglar is able to get into the house without being detected due to malfunctioning of proximity sensor and enters into the coverage region of the PIR sensor, then output pulses are generated. These pulses are then taken as input by arduino unit. The unit then waits for a pre-defined time of maximum 30 seconds and checks for that signal again. This is done to avoid false triggering. If signal still exists, then the same protocol as that of proximity sensor is followed.

### C. Temperature Sensor

The temperature sensor LM35 will constantly send the room temperature values to arduino. If temperature value is above a certain level, say 45°C, arduino unit triggers an alarm and sends a warning message to mobile station through GSM

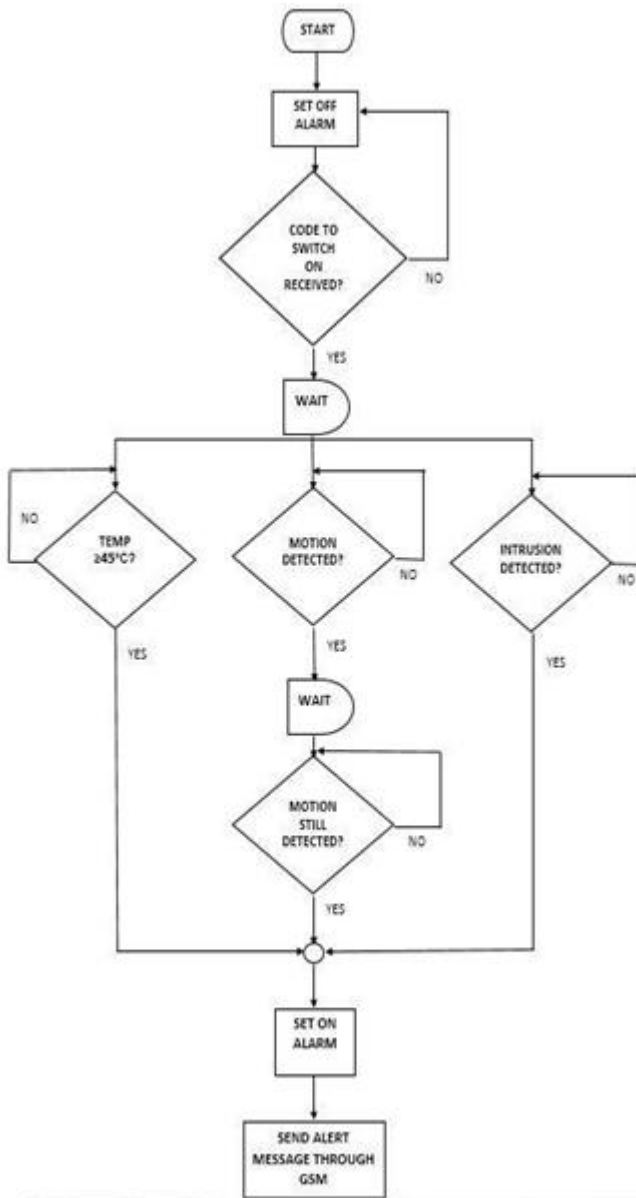


Fig. 2: Working Algorithm

Figure 2 shows the algorithm of system's working. The user can deactivate system as per his/her will by just sending a particular deactivation message through his phone.

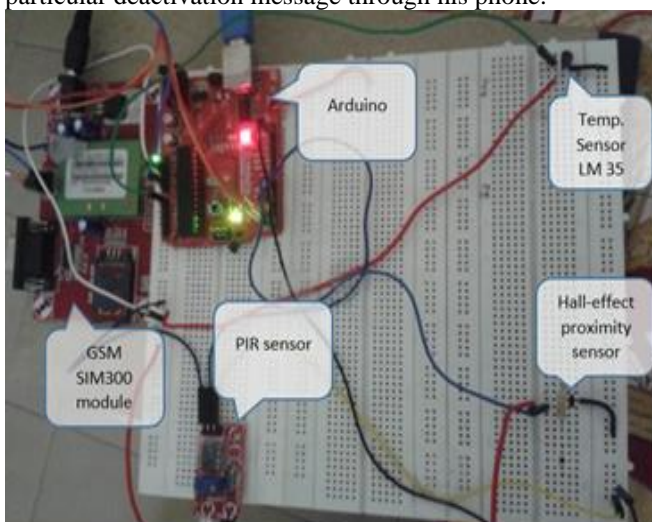


Fig. 3: Snapshot of implemented circuit

#### IV. CONCLUSION

In this paper the importance of home security measures are elaborated using easily available programmable sensors like the PIR and Hall Effect proximity sensor. Further the work on advanced security measures including the face detection technique with the help of CANNY's edge detection is under development. Also this system can be improvised with the inclusion of Voice Pattern Analysis using IC APR9600(voice recording IC) with advanced Digital Signal Processors and finger print reading which can be added to the current installation of security system so as to eliminate any occurring ambiguities in the current system. Also the work for developing a smart GUI using an Android application is under the purview with Ethernet servers using an HTTPS internet website, so as to communicate with the standalone system from anywhere. This will also help in the versatility and bring down the operation cost

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