



# Smart home system based on IoT

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## Abstract

In this era, IoT (Internet of Things) is the most emerging technology which is improving day-by-day. According to a survey the IoT growth will be from USD 170.57 Billion in 2017 to USD 561.04 Billion by 2022, at Compound Annual Growth Rate (CAR) of 26.9%. IoT is the smart technology which used to control the devices from anywhere we are. In this project we are going to discuss on how to control and provide security to our home appliances. There are many others ways to get control and other security to our home appliances but we are trying to implement that by using our method. So, to provide security to our home appliance we are using a micro-controller, sensors, buzzer and a GSM module. The micro-controller is used to get control over the home appliances we are connected with and the sensors will give the information about what is happening over there, and if there is any threat the buzzer connected there will make the noise and makes alert and through the GSM module the information will be sent the registered mobile number. By, seeing this message will can get alert and provide security to our home appliances.

**Keywords:** IoT, Home Automation, Security, GSM module, Sensors, Micro-controller, Smart homes.

## 1. Introduction

Smart Homes are those whose house-hold appliances are connected through internet which can be controlled and monitored remotely. When these house-hold appliances are connected over internet with proper architecture and protocols it can be called as Smart Homes. Smart Homes make very easy over the automation task. There are many ways in which we can provide security to our home appliances. Now, we are going to use a micro-controller, sensors, buzzer and a GSM module to provide security to our home appliances. Here, we are going to use 8051 micro-controller (AT89S52), buzzer, two sensors namely tilt sensor and ultra-sonic sensor and finally a GSM module.

### Hardware Requirements:

1. Microcontroller
2. Ultrasonic sensor
3. Tilt sensor
4. GSM Modem
5. LCD
6. Buzzer

### MICRO-CONTROLLER:

Micro-controller is nothing but a chip which can be used to control over the devices connected over it through a program which can be dumped into it. Micro-controller is a programmable-device. Both Micro-controllers and Micro-processors are mainly used in the work of embedded systems.

### ULTRA SONIC SENSOR:

Ultra-sonic sensors are the controlling devices which work on the sound waves to calculate and measure the distance of a specified object from the sensor. It has two parts mainly the receiver and transmitter. These are the key features of ultra-sonic sensor to calculate the distance.

### TILT SENSOR:

Tilt sensor is the sensor used to detect the orientation and inclination. They are very small, ease-to-use, low cost, low power. They are also called as ‘Mercury Ball’ sensors or ‘Rolling Ball’ sensors.

### GSM MODEM:

GSM (Global System for Mobile communications) is a cellular technology used for transmitting mobile voice and data services. It supports voice calls, data transfers and transmission of SMS (Short Message Service).

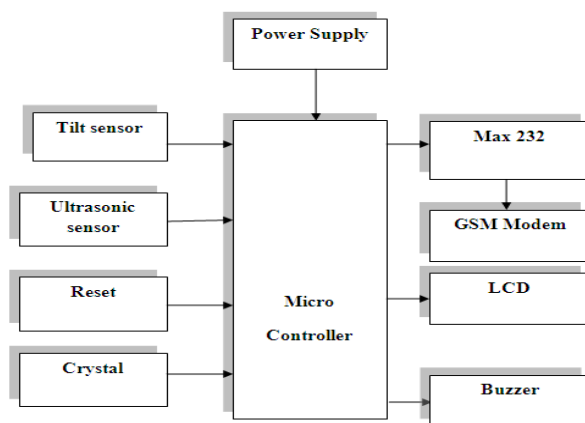


Fig. 1: Security Based Block diagram

**LCD:**

LCD means Liquid Crystal Display. It has an ability to display the numbers, characters and graphical notations. Ease for programming and mostly very effective in the use of characters and graphical notations.

**BUZZER:**

A buzzer is an electronic device used in automobiles, home appliances like Owens and in some games. It consists of number of switches which determine the if conditions and sounds a warning in the form continuous beeping sound.

## 2. Related Work

There are many related works based on IoT. Now-a-days if we take smart environment systems IoT is ruling over it. Concepts like 'Detection of fire in the forest' in this we monitor the combustion gases and some fire conditions to get alerted, 'Earthquake early detection' in this we monitor the control over the tremors in the specific places.

In the security aspect we have like 'Explosive and Hazardous Gases' in this we detect the gas levels and leakages in industrial applications, factories and in the mines. Coming to the retail we have mostly the 'NFC payment' in this the payment is based on the location or any activity in the public transport.

Now coming to the Agricultural aspect we have so many of the applications from IoT. 'Golf courses' in which we are using selective irrigation in dry zones to reduce the resources of water required in the green. And the other is 'Green houses' in which we take control over the climatic conditions to increase the production crops and their quality.

Coming to the health point of view IoT has a vast increase in it. 'Patient surveillance' in this we monitor the conditions of the patients in the hospitals and in their homes. 'Fall detection' in this we are going to assist the old people or disabled people who are living independently.

And last coming to the Domestic and Home automation we have 'Energy and Water use' in which we are going to monitor the consumption of energy and consumption of water supply to save the resources and cost. 'Intrusion Detection system' in this we are going to detect the opening of the doors and windows violations to prevent intruders.

## 3. Proposed Work

We are using sensors like tilt and ultrasonic and a micro-controller. Tilt is used to find whether if any person trying to open the lockers which are present at our homes or industries. If anyone tries to open then at that time sensors get activated and send the alert message to the predefined number that was already stored in the microcontroller. Ultrasonic sensor is used scan the movements, if anyone moves in front of that sensor then it will also send a alert message to the predefined number.

When an obstacle comes in front of the ultrasonic sensor, it transmits a ultrasonic wave from the transmitter and when it reaches the obstacle it reflects back and is received by the receiver. Then the distance between the obstacle and sensor is calculated. If the distance between them is minute, then it sends an alert message.

When the lockers are tried to access then the movement is detected by the tilt sensor and if any deflection comes it alerts us with a

Message. The movement is detected by the mercury ball inside the tilt sensor, when the locker is moved the mercury ball inside gets deflected with its angle. So, the sensor gets activated.

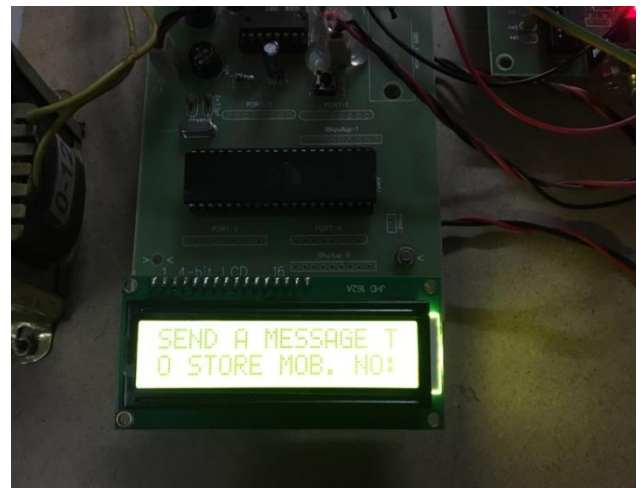
A GSM module is used as interface between the sensors and the person and in case of any threats detected by the sensor it takes the output of the sensor and accordingly sends a message to us. A Transformer is used to give power supply to the kit. The AT89S52 (micro-controller) is used Micro-controller for the display of the messages. The two sensors tilt and the ultra-sonic are also

connected to the micro-controller. Whenever these sensors detect threat this micro-controller reads that data and gives as a output. This output is taken by the max232. And the max232 gives the text format to the GSM module and then it sends the message to the pre-defined phone number with the alert message.

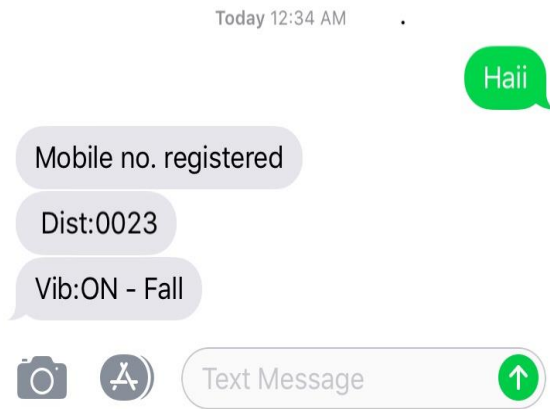


## 4. Results and Discussions

When the kit is on, a sim must be inserted in to the GSM slot and when the sim gets its signal we must reset the kit. Whether the sim got its signal can be monitored by the small bulb beside that slot, it blinks continuously. When there is no signal and when the signal of the sim is activated it blinks with a delay. Then it displays a message on the display to register the mobile number. When the message is displayed like that we have to send a message to that sim from which mobile you want to register. After sending the message you will receive a message from that as mobile number is registered. When we register the mobile number the alert messages will be set only to that registered mobile number. Including that a buzzer gives the sound and alerts the surrounding people.



After registering the mobile number as said in the above when there is any type of intrusion, the ultra-violet sensor gives the distance of the object as the message by calculating the object distance from the sensor. It helps to monitor that when-ever we are not in the home if anyone tries to steal the objects it will make an alert as they have to come near the object to steal them. Likewise, it plays a major role in the home security. Now, coming to the tilt sensor as it gives inclination if we insert in our door lockers if anyone tries to open when we are not in the home it senses the inclination as the locker of the door will be rotating and sends an alert message. Including, to these a buzzer is also connected to intimate the people around and take the necessary actions to overcome that problem.



## 5. Conclusion

From this paper, we conclude that by using these types of sensors we can monitor the theft and opening of the lockers by connecting those through internet and these are controlled with the micro-controller. And, further if you want to improve you can add both the controlling and monitoring to provide high security. Finally, concluding that on the basis you want the security the sensors should be selected and used and for any number of sensors we use only one micro-controller is sufficient. In this the cost will be reduced and according to the usage the performance will also be improved.

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