

# HOME AUTOMATION AND SECURITY USING INTERNET OF THINGS

K.Rithu Hebbar<sup>1</sup>, M.Kiran Kumar<sup>2</sup>, K.Surekha<sup>3</sup>, K.Mallika Sobha Devi<sup>4</sup>, K. Sai Akshaya Priya<sup>5</sup>

U.G. Student, Department of CSE, Sree Venkateswara College of Engineering, Nellore, Andhra Pradesh, India<sup>1,3,4,5</sup>  
Associate Professor, Department of CSE, Sree Venkateswara College of Engineering, Nellore, Andhra Pradesh, India<sup>2</sup>

## Abstract:

In modern times, people prefer more of automatic systems rather than manual systems. With the influence of Internet in people's life lots of new technologies are coming up. One of the latest, emerging and trending technologies is the 'Internet of Things'. This technology is expected to rule the world within a few years. Home Automation System uses the technology of Internet of Things for monitoring and controlling of the electrical and electronic appliances at home from any remote location by simply using a Smartphone. It is a low cost, flexible home automation system is presented. It enhances the use of wireless communication which provides the user with remote control of various electronic and electrical appliances.

In our project we present controlling of light, fan (on/off) and monitoring the gas leakage using IOT from remote location.

**Keywords**—IoT, Wi-Fi, Node-MCU, Internet.

## 1. Introduction

### 1.1. Overview

The way of controlling various tools, machinery, industrial processes, and other products using various control systems and with less human intervention is termed as automation. There are several types of automation based on application they can be called as home automation. Industrial automation, building automation etc. Wireless home automation using Internet of Things is discussed.

Wireless home security and home automation are the two aspects. The present built structure of the system provides alerts to the owner on phone calls or messages using the internet if any human movement is observed or sensed near the entrance of his house and rings an alarm optionally upon on the user's way. The provision of sending some alert messages to some security areas in case of severe situation is also built into the system. On the other hand if the owner knows that the person entering his house is not a

known user but an unexpected guest of his then in order of security alarm, the user or owner can make changes such as the opening of door, switching on various electronic tools inside the house which are also joined and controlled by microcontroller in the system to invite his guest. The same will be done when the user himself enters the room and by virtue of the system he can make required arrangements from his step of the door so that as soon as he enters his home he can make himself more comfortable without physically having the same set of sensors the two problems of home security and home automation will be solved on a daily basis.

Home automation is the way of controlling home appliances automatically using several control system techniques. The electrical and electronic appliances in the home such as fan, lights, lights which are out door, fire alarm, timer for kitchen etc. can be controlled by several control techniques.

Home automation is the way of controlling home appliances automatically using several control system techniques. The electrical and electronic appliances in the home such as fan, lights, lights that are out door, fire alarm, and timer for kitchen is controlled by several control techniques.

### 1.2. Wireless Home Automation Using IOT:

There are several techniques for controlling home appliances as if IOT based home automation on cloud. Wireless home automation involving IOT is a new application of internet of things introduced to control home appliances remotely over the cloud.

### 1.3. Advantages of Home Automation:

Wireless System like Wi-Fi has become more and more natural in home networking, also in house and building towers automation systems, the working of wireless technologies gives us several pros that is not achieved using wired network only.

- 1) Comfort: Home products like Wi-Fi thermostat helps us to monitor the temperature in the house. We can adjust the

temperature in the house from anywhere using the mobile phone. Through this, we could make the atmosphere in the house comfortable for our family.

- 2) Security: Move your finger on the screen to turn on the lights when you come home so you are tense about what is hidden in the shadows, or in your pathways. Door locks are another automated home product that can pop up your home security.
- 3) Energy Efficiency: Increase your house energy efficiency by remotely turning off systems and devices when they aren't in use. The home automation products give you super control, some products actively control systems and acknowledge the house owner with intelligence, insight and guidance to achieve full control and energy efficiency.
- 4) Savings: Home automation literally pays. When you are able to utilize home products and appliances only when required, the savings will be apparent in the first using bill. Wasting money on lights left on when you are not at home is no more, or spending money on gas to drive home because you forgot to close the door.
- 5) Peace of mind: One of the largest hidden profits that comes with home automation is peace of mind. No more tensed if you turned on the bulbs, door locked, off the television. For people who have a lot on their plates, being able to thoroughly check these products off the to-do list and halt the obsessive worrying, home automation is re-assuring and obviously worth the investment.
- 6) Convenience: Don't you hate depending on neighbors to see your house when you are gone somewhere? With the home automation, safe control of your home is in your hands. You don't have to trust others with your most valued possessions.

## 2. Implementation Setup

### 2.1. Components Required

- Node-MCU
- DC propellers
- MQ-3 Sensors
- Relays
- Bulbs
- PIR Sensor
- ESP8266 Wi-Fi Module
- Mobile phone to receive alerts

### 2.2. Node-MCU with ESP8266 Wi-Fi module

- Node MCU is a single board microcontroller developed by ESP8266 open source community. It uses XTOS operating system with the storage of 4MB and memory of 128 KB. It has the following features.
- The board is powered through USB for NodeMCU.
- Standalone development platform provides features such as sensors, LED's and push buttons.
- It has programmable Wi-Fi module and can be programmed with simple Arduino IDE programming Language.
- Event driven API for network application.
- NodeMCU has got integrated low cost Wi-Fi module.



Fig 1: NODEMCU ESP8266

## 2.3. Sensors Used

1. MQ-3 sensors.
2. PIR sensors.

### 2.3.1. MQ-3:



Fig 2:MQ3 sensor

- MQ-3 sensor is useful for gas leak detection in home and industry.
- It is suitable for identifying Alcohol, Benzene, CH<sub>4</sub>, Hexane, LPG, CO.
- Due to its slightest detection and quick response time, measurement can be taken as quick as possible.
- The sensitivity of the sensor can be adjusted using potentiometer.

### 2.3.2. PIR :( Passive Infrared Sensor)

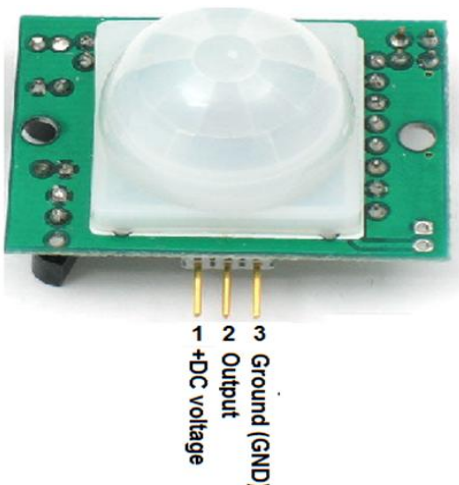


Fig 3: Passive Infrared Sensor (PIR)

- A PIR based motion detector is used to detect the motion of people, animals, or other objects.
- These are mostly used in the theft detection.
- This system is designed such that if no motion is detected the relay contact is closed (normally closed relay).
- If motion is detected the relay opens and triggers the alarm.
- It is recommended to place carefully to prevent false alarm.

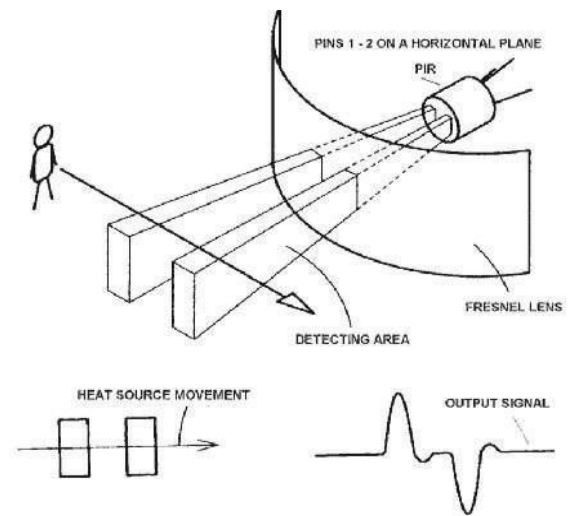


Fig. 4: PIR Motion Sensor working principle

## 2.4. Relays

- Relays are switches that open and close circuits electro- mechanically.
- Relays controls one electrical circuit by opening and closing contacts in another circuit.
- When relay contacts normally closed, there is a closed contact when relay is not energized.
- When relay contacts is normally open, there is an open contact when relay is not energized.

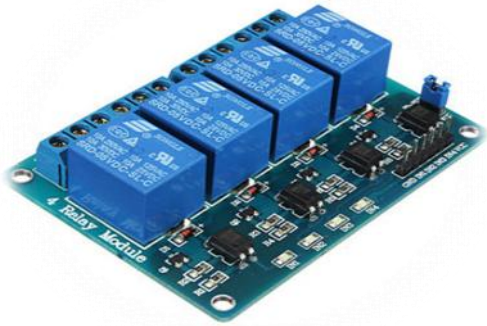


Fig 5:Relays

**Advantages:**

- High quality
- Low cost
- No extra power supply
- Create timers or pulses with our software

**3. Working Of Prototype**

The prototype can be used in following two ways:

- a. As a smart security system
- b. As a smart home automation system

**3.1. As A Smart Security System**

PIR motion sensors are usually installed at the entrance of the house, these sensors detects the motion of human beings. The detection of their presence becomes the input trigger for micro-controller. The person whose mobile number is predefined in the program i.e., the owner receives an alert on his mobile phone stating that “there is an intruder in the house”. To turn on the lights and alarm the house to warn the intruder, the owner can press ‘1’ on his mobile phone. If the owner that his house is not safe he can report the concerned authority in the police department explaining his situation. After a fixed time delay the alarm and the lights are automatically turned off. The alert will be triggered again as soon as the module detects any unexpected motion and owner will receive again and the process continues.

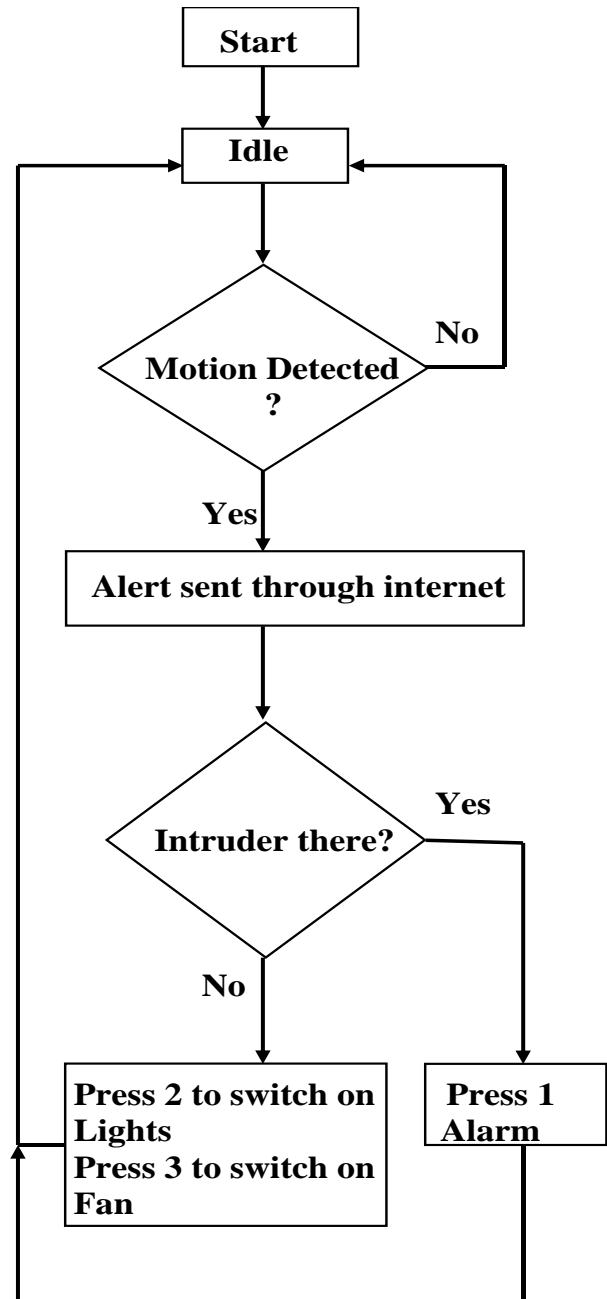


Fig 6: Flow Chart

**3.2. As A Smart Home Automation**

This application can be explained with examples. For example If we forget to switch off the lights or fans when leaving the house then we get alerts to our mobile phone and the user can press digits (such as 2 for lights and 3 for fan and so on) and also can enable the security system. For example if there is any gas leakage detected and we are not at our house then automatically we will get alert indicating the gas leakage so that we could able to take precautionary measures

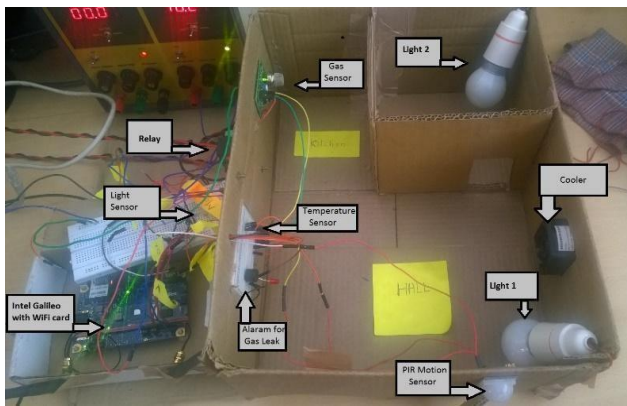


Fig 7: Experimental setup for HAS

#### 4. Conclusion

The home automation using Internet Of Things has proved to work efficiently by joining simple home devices to it and those appliances was fully controlled by internet using remote .The designed system also provides a process according to the needs, for example switching on light when it is dark. It also involves the sensor parameters in a timely manner this also provides user to think the condition of different parameters in the home any time anywhere.

#### 5. Future Work

The system involves home security feature like taking a photo of person moving around the house and storing it on to the cloud server. This also decreases the storing of data using the CCTV camera which records and stores the data .It can also be extended for monitoring energy, or weather stations. The system with respective modifications can be introduced in the hospitals for disabled people or in industries where presence of human is dangerous and also it can be introduced for environmental monitoring.

#### 6. References

[1] M. N. N. A. Asghar, M.H., “Principle application and vision in internet of things (iot),” in Communication Technologies (GCCT), 2015 Global Conference on, may 2015.  
 [2] A. R. . C. Y. . O. K. Withanage, C., “A comparison of the popular homeautomation technologies,” pp. 1 – 11, may 2014.  
 [3] B. R. Pavithra, D., “Iot based monitoring and control system for homeautomation,” pp. 169 – 173, April 2015.  
 [4] M. J. H. B. T. A. M. K. T. Baig, M.Q., “Artificial intelligence, modelling and simulation (aims), 2014 2nd international conference on,” pp. 109–114, November 2014.  
 [5] B. S. S. Tharaniyasoundhari, M., “Intelligent interface based speechrecognition for home automation using android application,” pp. 1 –11, march 2015.

[6] F. M. G. K. D. Sukmana, HusniTeja, “Wireless and mobile (apwimob), 2015 ieeeasia pacific conference on,” pp. 183 – 187, august 2015.  
 [7] S. E. T. B. C. A. Urfaliglu, O., “Signal processing, communication and applications conference, 2008. siu 2008. ieee 16th,” pp. 1–4, april 2008.  
 [8] E. A. Elkamouchi, H., “Design and prototype implementation of smsbased home automation system,” pp. 162 – 167, november 2012.  
 [9] O. N. C. S. A. P. B. Sahani, M, “Circuit, power and computing technologies (iccpct), 2015 international conference on,” pp. 1–6, March 2015.  
 [10] T. Ming Zhao, Chua, “Automatic face and gesture recognition, 2008. fg '08. 8th ieee international conference on,” pp. 1–6, September 2008.  
 [11] Wikipedia. (2012, 12th December). Home automation. Available: [http://en.wikipedia.org/wiki/Home\\_automation](http://en.wikipedia.org/wiki/Home_automation).  
 [12] Das, S.R., Chita, S., Peterson, N., Shirazi, B.A., Bhadkamkar, M., “Home automation and security for mobile devices,” IEEE PERCOM Workshops, pp. 141- 146, 2011  
 [13] S.D.T. Kelly, N.K. Suryadevara, S.C. Mukhopadhyay, “Towards the Implementation of IoT for Environmental Condition Monitoring in Homes”, IEEE, Vol. 13, pp. 3846-3853, 2013  
 [14] Rajeev Piyare “Internet of Things: Ubiquitous Home Control and Monitoring System using Android based Smart Phone” International Journal of Internet of Things 2013, 2(1): 5-11 DOI: 10.5923/j.ijit.20130201.02.  
 [15] HitendraRawat, Ashish Kushwah, Khyati Asthana, AkankshaShivhare, “LPG Gas Leakage Detection & Control System”, National Conference on Synergetic Trends in engineering and technology (STET-2014) International Journal of Engineering and Technical Research ISSN: 2321-0869, Special Issue.  
 [16] Nicholas D., Darrell B., Somsak S., “Home Automation using Cloud Network and Mobile Devices”, IEEE Southeastcon 2012, Proceedings of IEEE.  
 [17] Kumar, M. Kiran, And P. Krishna Reddy. "Analysis Of Security And Privacy Features In Mapreduce On Clouds." *Analysis* 5.9 (2016).

#### Authors:

1. K. Rithu Hebbar pursuing B.Tech in Computer Science Engineering, Sree Venkateswara College of Engineering.
2. M. Kiran Kumar working as Asso.Professor at Sree Venkateswara College of Engineering.
3. K. Surekha pursuing B.Tech in Computer Science Engineering, Sree Venkateswara College of Engineering.
4. K. Mallika Sobha Devi pursuing B.Tech in Computer Science Engineering, Sree Venkateswara College of Engineering.
5. K. Sai Akshaya Priya pursuing B.Tech in Computer Science Engineering, Sree Venkateswara College of Engineering.