# IoT Based Home Automation System

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**Abstract**

**The main purposes of with advancement of Automation technology, life is getting simpler and easier in all aspects. In today's world Automatic systems are being preferred over manual system. With the rapid increase in the number of users of internet over the past decade has made Internet a part and parcel of life, and IoT is the latest and emerging internet technology. Internet of things is a growing network of everyday object-from industrial machine to consumer goods that can share information and complete tasks while you are busy with other activities. Wireless Home Automation system (WHAS) using IoT is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The home automation system differs from another system by allowing the user to operate the system from anywhere around the world through internet connection. In Home Automation system(HAS) using Intel Galileo that employs the integration of cloud networking, wireless communication, to provide the user with remote control of various slights, fans, and appliances within their home and storing the data in the cloud. The system will automatically change on the basis of sensors' data. This system is designed to be low cost and expandable allowing a variety of devices to be controlled.Key Words: Home automation System (HAS), Internet of Things (IoT), Cloud networking, Wi-Fi network, Iot based home automation using ESP-32**

**Keywords**: Home Automation System (HAS), Internet of Things (IoT), Wireless Home Automation System (WHAS), Cloud Networking, Wi-Fi Network, IoT-based Home Automation

## INTRODUCTION

The project aims at designing an advanced home automation system using normal web server and Wi-Fi technology. The devices can be switched ON/OFF and sensors can be read using a Personal Computer (PC) through Wi-Fi. Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. These had greater importance than any other technologies due to its user-friendly nature. These can be used as a replacement of the existing switches in home which produces sparks and also results in fire accidents in few situations. Considering the advantages of Wi-Fi an advanced automation system was developed to control the appliances in the house. Wi-Fi (Short for Wireless Fidelity) is a wireless technology that uses radiofrequency to transmit data through the air. Wi-Fi has initial speeds of 1mbpsto 2mbps. Wi-Fi transmits data in the frequency band of 2.4 GHz. It implements the concept of frequency division multiplexing technology. Range of Wi-Fi technology is 40-300 feet. The data sent from PC over Wi-Fi will be received by Wi-Fi module connected. In this project we have used the two nodes which were placed on the different location which are connected using wi-fi to the cloud, The two nodes are be controllable by the mobile application as well as by the personal computer. The both nodes are been connected to the blynk cloud over wi-fi. The all nodes are controllable by the different sensor reading, where we can collect all the data of the sensor on the mobile application in the graphical as well as the actual value

## LITERATURE SURVEY

1. "International conference on (iot Social, mobile, analytics and cloud) (SMA C 2017)",Vagdevip.divya nagaraj, The paper the system for automation using technology and via GPRS IN this system various features home like turning light, fan, air wireless fidelity Bluetooth the consist of an field communication card, which is across the reader entrance of the door for the locked or similarly, the NFC card is programmed to turn on off the air depending on the room.

2."International research journal engineering and technology (IRJET )", Manish Prakash gupta, The control comprises of microcontroller MCU and 4/8 relay ULN 2803 control. The relay blynk app android communication with microcontroller and the desired signal the internet

3. "A cheap and open source alternative to household appliance's", Bassamru waida ,Toni mink kinen, This project around creating automation prototype with the focus being the ability lock/unlock a door through the internet the consist of a device, a server android application

## METHODOLOGY

The proposed IoT-based Home Automation System (HAS) utilizes an ESP-32 microcontroller for wireless communication, integrating cloud networking to enable remote access and control of home appliances. The system employs Wi-Fi connectivity to establish communication between the user and the automation devices. Various sensors are deployed to monitor environmental conditions, such as temperature, humidity, and motion, allowing for automated decision-making based on real-time data. The user can control appliances like lights, fans, and other electrical devices through a web-based interface or mobile application. The system processes sensor data and updates it in the cloud, ensuring real-time monitoring and control from any location with an active internet connection. The Intel Galileo board is utilized for processing and data management, enabling seamless interaction between the hardware components and cloud-based services. The automation is achieved through pre-programmed logic, where appliances respond to sensor inputs without manual intervention, optimizing energy efficiency and enhancing user convenience. This system is designed to be cost-effective, scalable, and flexible, allowing additional devices to be integrated as needed.

## OBJECTIVE

1. To save energy proper management of electricity distribution.

2. To show the effective way for power utilization and conservation

3. To control and monitor any operating system.

4. To make power usage low and conservation more effective.

5. To make smart and intelligent usage of energy and its conservation in home appliances.

## PROBLEM DEFINATIONS

1. Electricity was discovered more than 200 years ago. But still now we are operating switches manually. Manual operation some times leads to danger of electrical shocks.

2. To avoid this problem, we developed a IR Based automation to control any 1- phase electrical equipment remotely.

3. Our developed automation system relates the Insurance of removal of good amount of human work, saving of time, security, decrement of monotony, reduction of power consumption and overall, economic improvement.

## CIRCUIT DIAGRAM
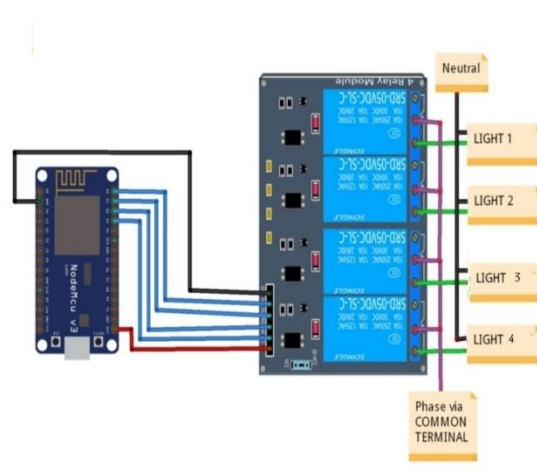


## FUCTIONAL REQUIREMENTS

1. User Authentication & Access Control : Users must log in via a secure authentication system to access the home automation features.

2. Remote Control of Home Appliances: Users can turn ON/OFF lights, fans, and other appliances using a web-based interface or mobile application.

3**.** Sensor-Based Automation: The system should automatically control appliances based on sensor inputs.

4. Cloud Integration & Data Storage: Sensor data should be stored in the cloud for real-time monitoring and future analysis.

5. Wi-Fi Connectivity: The system must communicate via Wi-Fi to ensure seamless operation and remote accessibility.

6. Real-time Monitoring & Status Updates: Users should receive real-time updates about the status of connected appliances.

7. Scheduling & Timers: The system should allow users to schedule appliance operations.

## LIMITATIONS

1. Internet dependency: Home automation systems rely on a stable and fast internet connection. If the internet connection is slow or there is an outage, some features may not work properly.

2. Security risks: Smart home devices can be hacked, and hackers can gain access to personal information or control of the devices. To mitigate these risks, homeowners should secure their networks and keep software up to date.

3. Difficulty linking systems: It can be difficult to link systems from different vendors.

4. Cost: Smart home systems can be expensive.

5. Lack of global standards: There is a lack of global standards for IoT-based smart home automation.

**APPLICATIONS**

Rebuilding consumer expectations, home automation has been projected to target wide array applications for the new digital consumer. Some of the areas where consumers can expect to see home automation led IoT-enabled connectivity are:

1. Lighting control

2. HVAC

3. Lawn/Gardening management

4. Smart Home Appliances

5. Improved Home safety and security

6. Home air quality and water quality monitoring

7. Natural Language-based voice assistants

8.  Better Infotainment delivery

9. AI-driven digital experiences

10. Smart Switches

11. Smart Energy Meters

**RESULT**

Increased convenience through the automation of various home devices and systems. Improved Energy efficiency and cost savings by leveraging smart lighting, thermostats, and other devices. Enhanced security and safety through IoT-based security cameras, locks, and sensors.
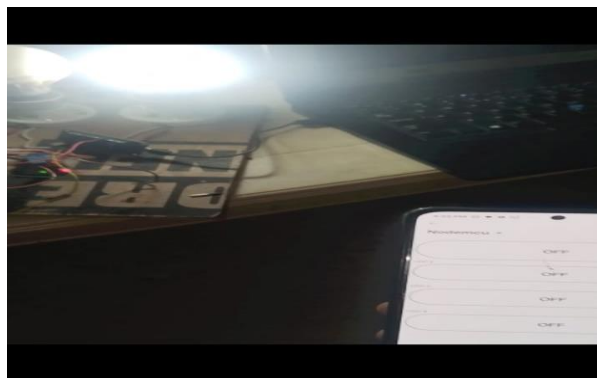
## CONCLUSION

The home automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through

internet. The designed system not only monitors the sensor data, like temperature, gas, light, motion sensors, but also actuates a process according to the requirement, for example switching on the light when it gets dark. It also stores the sensor parameters in the cloud (Gmail)in a timely manner. This will help the user to analyze the condition of various parameters in the home anytime anywhere.

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