



**IJIRCCCE**

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

**Volume 10, Issue 4, April 2022**

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

**Impact Factor: 8.165**



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# IOT Based Home Automation

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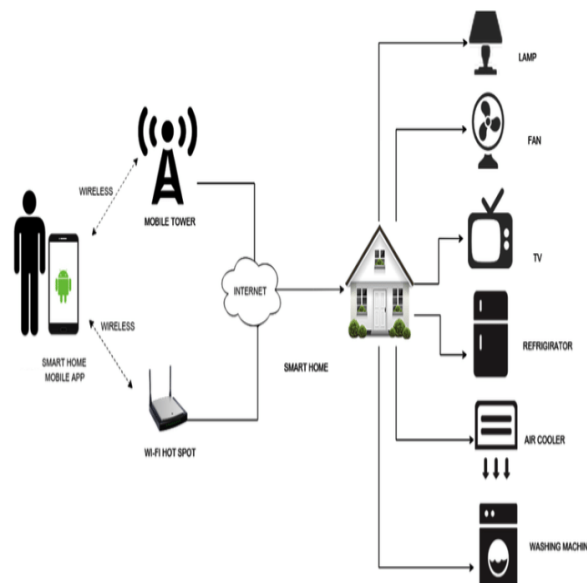
**ABSTRACT:** IOT – Internet of Things it is a network of internet connected things. Nowadays it is trending technology. All devices in IOT are connected to internet. Internet of Things (IOT) refers to physical and virtual objects that have unique identities and are connected to the internet to facilitate intelligent applications that make energy, logistics, industrial control, retail, agriculture and many other domains "smarter". When it comes to our home, this concept can make it smarter, safer and automated. In smart home automation systems user can control his home appliances remotely using devices like Smartphone, Smart watch, Tablets etc. Using Android or Web applications.

## I. INTRODUCTION

A growing portion of IOT devices are created for consumer use, including connected vehicles, home automation, wearable technology connected health, and appliances with remote monitoring capabilities. In this research paper we are covering widely used application of IOT called Home Automation System. Home automation is the automatic control of electronic devices in your home. These devices are connected to the Internet, which allows them to be controlled remotely. With home automation, devices can trigger one another so you don't have to control them manually via an app or voice assistant. Many of these IOT devices have sensors that monitor changes in motion, temperature, and light so the user can gain information about the device's surroundings. To make physical changes to the device.

Home automation works on three levels:

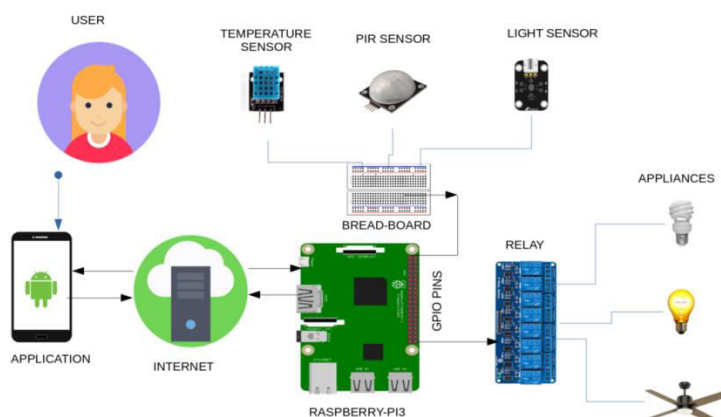
- **Monitoring:** Monitoring means that users can check in on their devices remotely through an app. For example, someone could view their live feed from a smart security camera.
- **Controlling:** Control means that the user can control these devices remotely, like panning a security camera to see more of a living space.
- **Automation:** Finally, automation means setting up devices to trigger one another, like having a smart siren go off whenever an armed security camera detects motion. **Example:** Alexa.



## II. LITERATURE REVIEW

System	Interface	Controller	UI	Merits
Wi-Fi-based using Adriano microcontroller through Iota	Wi-Fi	Adriano	Android App	Low cost, Secure, Remotely controlled
Smart Task Scheduling Based using Arduino and Android	Wired X10 and Wireless Zig bee	Zig bee Arduino	Android Application	Energy-efficient and Highly scalable
Web service and android app Based using Raspberry pi	Web server and interface card	Raspberry pi	Android Application	Autonomous, and Quite scalable
Cloud-Based Using Hadoop System	Cloud-based data server uses	Home gateway and router	Smart device	Reduce the computational burden of smart devices
Cloud-Based Using Zig Bee Microcontroller	Zig bee	Smart Socket	PC or Android Phone	Convenience, safety, and Powersaving
Wireless Sensors Based on mobile technology	cloud-based data server	PCB circuits	Mobile Application	Low power consumption And system cost efficiency.
Bluetooth Based using Arduino	Bluetooth	Arduino	Python supported mobile	Secured and Low cost
GSM Based Using Arduino	SMS	Arduino	Smartphone App	Simplicity

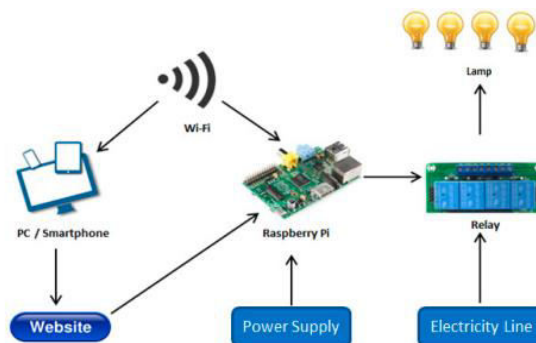
## III. SYSTEM DESIGN



1. Android Application : - An android application or web application is used to control the home automation system remotely. User can operate the home system remotely using Smartphone.
2. Cloud and Internet:- Internet is a medium and Cloud is storage. It is like Real-time Database which establishes communication between User and Automation System. And passes message between user and system.
3. Raspberry PI: - It is a special purpose embedded system. It's like a mini computer. All the sensors, actuators and Internet are connected to it. It Processes the information and produce efficient output.
4. Sensors: - Sensor is a device which measures the physical quantity and converts it into analog to digital signal which then read by controller device.

5. A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. It acts as a switch it has Boolean value true or false in the binary form 0 or 1.
6. Appliances:- Are the devices that are controlled by the controller, which operates on the relays outputs. Examples: - Light bulb, Fan, TV, AC, Refrigerator, Washing Machine etc.

#### IV. WORKING PROTOTYPES



Working of Home Automation System: -

When user wants to perform some action he will give the command through his android application and then the command will be sent to cloud through internet and received by controller connected. Then the controller will take surrounding information from sensors and then process the received information. This processed information will be sent to the actuators and actuators will produce expected output. Which is then passed to relays and relays will Take decision based upon it. And relay will control the actual home appliances.

Example: -

1. Turning on light from android app remotely.

User will click the ON button on his application and then the status will be stored into the cloud (e.g. Google Firebase) then it will be received by controller (i.e. Raspberry pi) which will process the data and send it to actuators which will produce output and send to the relays. Relays are connected to the electric board in house and when the status in cloud is updated then light will turn on.

Note: - For this process android app is connected to the firebase using programming.

#### Advantages and Disadvantages

##### ADVANTAGES

1. Reduce human efforts: As this system works by automatically human do not require applying more efforts.
2. Multitasking: Multiple functions are doing at the same time without efforts of the human.
3. Reduce time: As this system is multitasking so the time require will be less.
4. Customize as Per Your Convenience:It is very convenient with smart home automation systems to customize the appliances and smart devices in your home as per your needs

##### DISADVANTAGES

1. Security Issues:As with all computing devices, security will become a greater issue as more people use smart home devices. Certainly there will be a range of security concerns that arise and a subsequent mushrooming of smart home security software and devices
2. Cost:Extremely expensive:Although a lot of smart home devices are now affordable for many, but still it is extremely expensive to fully equip a home with smart devices. However, most computing technology becomes progressively more powerful & less expensive and this will be undoubtedly applicable for smart home devices as well.
3. Dependency on Internet:The basic requirement for the smart home system is the internet. Without a good and strong internet connection, you will not be able to take control of this. If there is no internet connection for some reason, there is no other way through which you can access and control your system.
- 4.Dependency on Professionals:In case there is a problem with the smart home system, you cannot simply call a handyman or someone similar to repair or manage the bug. You will have to depend on the professionals.

## V. FUTURE ENHANCEMENT

**Increased efficiency, control, and customization:** Artificial intelligence is set to make you lazy in the near future. Technology will become much more efficient and one will be able to control everything from volume to security from one central place. The devices will work automatically and you don't need to waste your energy it will act upon user's preferences. AI would revolutionize home by automatic threat detection and proactive alertness.

**Integration of Smart home devices:** One can command it to control small things of home through voice and Smartphones. All the tech giants are working in the field of IOT to bring advancements in the home automation devices. In near future, homes will be equipped with such IOT devices which will make your daily lives work faster smoother and more accurate.

**Smart spaces outside homes:** Smart parking through sensors will help to recognize whether the parking is available or not. Camera monitoring can be done and with the help of artificial intelligence and computer vision, both parking facilities and security can be provided. It would be a faster and smoother process and act as a reference for other smart systems to be built accordingly. Streetlights can also be automated through sensors and build for effective use for the people nearby.

**Development of smart appliances:** The devices which we use to use like television, refrigerator and even the mirror is getting smarter today with evolution of technology. The smart mirror should not only act as a face video but also help to other tasks like listening to music and stuff. Televisions have become part of a centralized entertainment and can also be used for social media. The refrigerator has been upgraded to sense the temperature outside and operate accordingly. The washing machine will wash the clothes according to the clothes material and switch off after drying. They will keep on advancing as the technology evolves.

## VI. CONCLUSION

Based on the design and results of the tests that have been carried out, the proposed home automation system prototype is able to remotely control the electronic device and minimize excessive use of electrical energy. Raspberry pi which functions as a server, and a relay module that functions as a magnetic switch. The user interface in this system can be accessed using a PC or smartphone. Prototype of web-based home automation system using raspberry pi allows users to be able to control electronic devices without being limited by distance using the internet network. For future works, it is expected to be developed and improved by adding various sensors in the system, using scheduling to turn on/off electronic devices, measuring the use of electrical energy, etc.

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INNO  SPACE  
SJIF Scientific Journal Impact Factor

Impact Factor: 8.165

 **doi**<sup>®</sup>  
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**ISSN** INTERNATIONAL  
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