IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# The Evolution of IoT Based Home Automation: Current Trends and Future Directions

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Abstract: Smart home technology has gained popularity in recent years. Data security, automated decision-making for IoT-based devices, identity theft, and device security are some of the major issues associated with smart homes. A reliable and safe smart home solution with automated decision-making and systematic features is still desperately needed, even though current home automation systems attempt to address these problems. The smart home system suggested in this study the use of smart technology to automate and regulate home systems and appliances in order to improve comfort, convenience, and energy efficiency is known as home automation. Using their smart phones or voice commands, homeowners can now remotely monitor and control equipment like lights, thermostats, security cameras, and even kitchen counters. Home automation systems provide a smooth integration of technology into daily life, from scheduling tasks to reacting to changes in the surroundings. In order to enable safe, decentralized, and reliable authentication and identification of IoT devices, we have used cutting-edge block chain technology.

**Keywords – Internet of Things (IoT), Smart home, IoT based Automated, Home Automation System.**

## I. INTRODUCTION

The automation business is developing quickly, which is making human existence better and more advanced in every way. Automated systems are preferred over non-automated systems in the current situation. IoT is the newest and most emergent internet technology, and with the Exponential increase in the number of people utilizing the internet over the past few years, the Internet has become an Integral part of life. Because they can offer information and do jobs while we are busy with other duties, the Internet of Things plays a significant role in both human life and education. This paper presents the implementation and prototype of Wi-Fi-enabled smart home automation. The Wi-Fi technology is ESP8266. A hardware interface and a software interface make up the suggested system. An application is offered for controlling numerous home users using laptops, tablets, and smart phones, and the hardware interface integrates ESP8266 Wi-Fi technology for controlling sensors and appliances. This system is among the greatest ideas for an energy management system and for easily managing household appliances with several users. Only specific users are granted access to the entire system by its administrator. As long as there is Wi-Fi network coverage, this system can potentially be expanded to operate different household appliances and use sensors for home security and safety

## II. HOME AUTOMATION

Home automation is revolutionizing our lifestyle by providing unmatched security, efficiency, and convenience. By incorporating smart gadgets and systems into our homes, we can use voice commands or a few smart phone taps to control everything from entertainment and security to lighting and temperature. Creating a more connected, responsive, and sustainable living space is the goal of home automation, not just making our lives easier. Home automation technologies enable centralized control of lighting, air conditioning, heating, and ventilation in addition to increasing comfort. Thus, they aid in lowering total expenses and are beneficial in conserving energy, which is undoubtedly the biggest issue of our time. These technologies have the potential to completely transform our daily lives, improve our comfort levels, and give us more peace of mind as they develop further.

## III. OVERVIEW

Home automation, often known as smart home or sensible home, is the process of building automation for a residential space. The IoT home automation ecosystem allows you to control your TV, fans, lights, and other gadgets. Appliances, lighting, climate control, entertainment systems, and other home features can all be monitored and/or controlled by a home automation system. Controlling the gadgets in your house is really useful. Additionally, home security features like alarm systems and access control will be included. When connected to the internet, household devices are a crucial component of the Internet of Things.


Fig.1 Smart Home Automation overview

Typically, a home automation system links a central hub or gateway to controlled devices. The system control program utilizes wall-mounted terminals, desktop or tablet computers, smart phone applications, or an online interface that can even be accessed remotely via the Internet.

Controlling and monitoring a variety of systems and devices from a single, central place, like a smart phone or tablet, is one of the main advantages of IoT-enabled home automation. This can be anything from alarm systems and security cameras to climate control and lighting. he ability to remotely monitor and manage equipment, even when away from home, is another benefit of IoT-enabled home automation. This can be helpful in regulating energy use and guaranteeing the home's safety and security.

Smart gadgets, such light bulbs, security cameras, and thermostats, are commonly used in IoT-enabled home automation systems. These devices may be controlled and observed via a centralized hub or app. Wireless protocols like Bluetooth, Z-Wave, and Zigbee can be used by these smart devices to connect with the central hub and with one other.

Energy. By detecting people's movements and their surroundings and adjusting the lights appropriately, smart lighting systems for homes save energy.

## IV. COMPONENTS OF IoT HOME AUTOMATION SYSTEM

### 4.1 Smart Appliances

• Smart appliances with management capabilities are now available and may remotely update users on their status.
• The smart washer/dryer may be operated from a distance and will alert you when the washing and drying are finished.
• Smart refrigerators are able to monitor the inventory and notify users when an item is running low.

### 4.2 Intrusion Detection

- Security cameras and sensors are used by home intrusion detection systems to identify intrusions and sound an alarm.
- Can we notify the user when an email or SMS has been sent? More sophisticated systems can even deliver comprehensive alerts that include brief video clips or an image shoot.

### 4.3 Smoke/gas detectors

Gas detectors can identify the presence of dangerous gases like CO, LPG, etc. Smoke detectors are placed in homes and buildings to detect smoke, which is usually an early indication of a fire. They do this by using optical detection and ionization for air sampling techniques.

• It can sound an alert in a human voice that indicates the location of the issue.

## V. FUTURE OF IoT HOME AUTOMATION

The digital natives' home is the place of the future. Home automation is now a reality because to the development of numerous automation technologies that incorporates IOT and AI. A single command of spoken instructions can be used to carry out several tasks. With the help of these technologies, a completely functional home automation system can be constructed and smart appliances, connected thermostats, and lighting can all be controlled.

In the near future, a number of new technologies could be included into homes:

Greater control, efficiency, and personalization: In the near future, artificial intelligence will likely make you lazy. One will be able to control everything from security to volume from a single location as technology becomes much more efficient. Smart home device integration: Smartphone and voice commands can be used to control minor household items. To improve home automation devices, all of the major IT companies are working in In the near future, homes will be furnished with these Internet of Things gadgets that will speed up, simplify, and improve the accuracy of your everyday tasks. A humorous proof-of-concept video that depicts an idealized version of the actual operation of Mark Zuckerberg's Jarvis system was created. Google Home, the Google Assistant-enabled smart speaker, was upgraded during last year's Google I/O with a number of new capabilities, such as hands-free free calling, Spotify, Sound Cloud, and Deezer integrations, "proactive assistance," also known as push notifications, and more.

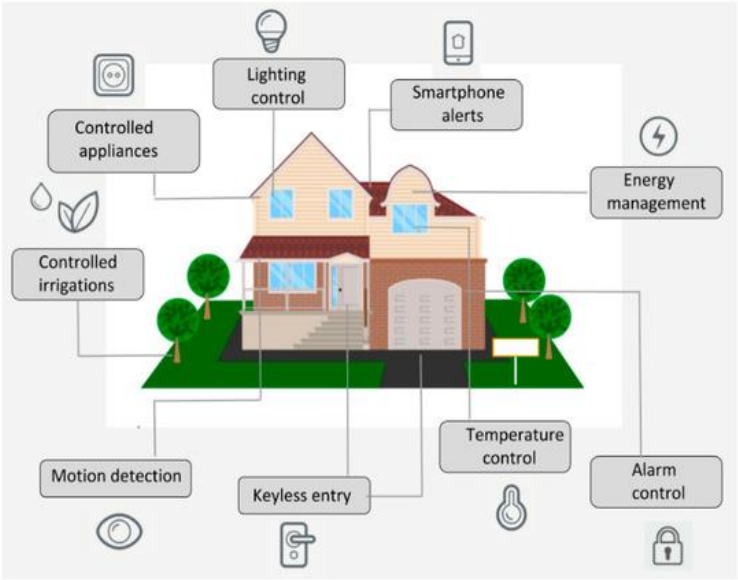


Fig.2 Future of Smart Home Automation system

Smart areas outside of houses: Sensor-based smart parking will assist in determining whether or not there is parking available. Camera surveillance is possible, and parking facilities and security can be offered with the use of computer vision and artificial intelligence. It would expedite and streamline the process and serve as a model for the development of other intelligent systems. Sensors can also be used to automate streetlights and design them for optimal use by those in the vicinity. Creation of smart appliances: As technology advances, everyday objects like televisions, refrigerators, and even mirrors are becoming the smart mirror should assist with other activities, such as music listening, in addition to acting as a face camera. Televisions can be utilized for social networking and are now a component of a centralized entertainment system. The refrigerator is now able to detect the outside temperature and adjust its operation accordingly. When the clothes are dry, the washing machine will turn off after washing them in accordance with the material. As technology advances, they will continue to progress.

Personal home delivery: Packages will be delivered on schedule by drones. They will take the place of the typical salesperson. They may also be utilized for a number of other purposes, such as keeping an eye on the outside weather, bringing something back to a nearby relative's house, and so forth. They can also be utilized to keep an eye on the traffic in our neighborhood. The principles of home automation can be used to create a number of incredible projects. Numerous projects have already been completed by developers and are accessible online. They could assist you in beginning your IoT project. To obtain a smart device, you can acquire new talents. Your smart home appliance can be configured to fit your lifestyle and routine. By exploring new facets of the internet of things, we can even construct numerous initiatives centered on it and improve the quality of life on Earth.

### 5.1 Advantages of Home Automation

Energy Savings: Over time, self-automated fans, light bulbs, and switchboards save electricity bills by conserving energy.
• Home Safety: The greatest technologies for home security are offered by home automation. These gadgets are bought by consumers who wish to increase the security and safety of their houses. • User Convenient: End consumers find home automation to be very convenient as it handles routine tasks automatically. For example, when you unlock the front entrance, you may use sensors inside to activate your smart lighting. Better Control: In order to have more control over household operations, consumers also select smart home appliances. You can easily keep an eye on what's going on inside your house at all times with home automation technology. Comfortable ambiance: Because connected devices offer sophisticated and dependable lighting, sound, and temperature controls, they can all contribute to a comfortable ambiance in our homes.

•Offer Peace of Mind: Customers may decide to invest in home automation as a result of this technology. • Remote Access: Having the ability to operate gadgets from a distance allows you to perform things like unlock the door for a plant sit

### 5.2 Disadvantages of Home Automation

Price: Compared to their counterparts without WiFi, these are more costly. Security Concerns: The doorbell may begin to ring automatically, among other security concerns. New Technology: Because IoT is a relatively new technology, you can encounter some issues, such as devices lagging or having problems connecting to the Internet, depending on the type and brand of the device. Surveillance: Since users can broadcast live video from the camera's app, smart security is probably not for you if privacy is a major concern. A local alarm system might be a better option.

## VI. CONCLUSION

Modern living is made much more convenient, secure, comfortable, and energy efficient with home automation. Smart technology makes daily chores easier and gives homeowners more control over their home settings by enabling them to automate and regulate a variety of household systems. Smart homes will become a more viable and beneficial alternative for enhancing quality of life as technology develops, opening the door to even more integrated and user-friendly home automation systems.

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