

# SMART HOME AUTOMATION SYSTEM

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## Abstract

The Smart AI home assistant model is developed. It has the potential to revolutionize the way we live and work with its ability to process vast amounts of data. In the upcoming year, we anticipate that artificial intelligence (AI) will significantly impact fields like education, entertainment, and finance in addition to continuously improving healthcare, transportation, and manufacturing. Our Smart AI home assistant is powered by cutting-edge technology that combines seamless connectivity, potent AI algorithms, and voice recognition. Modern voice recognition technology is used by the system to comprehend and respond to your commands. Over time, the system can learn from your tastes and adjust itself thanks to AI algorithms. Our Smart AI home assistant seamlessly integrates with other smart gadgets in your house to provide a genuinely intelligent and connected living. The project automates tasks and provides real-time monitoring and control using a smartphone application in an effort to improve convenience, energy efficiency, and security within homes. By incorporating AI algorithms, the system can become aware of user preferences and modify the automated process to deliver a customized experience. The Smart AI Home Automation System provides a complete solution for upgrading and optimizing residential surroundings for enhanced comfort, efficiency, and security by merging sensor technologies, smart devices, and AI capabilities.

## KEY WORD: -

AI -Artificial intelligence.

PIR -Passive Infrared sensor.

PWM-Pulse width module

PLM -Pulse length module

Node MCU-Node microcontroller unit

## 1.Introduction

With an emphasis on local management and privacy, Home Assistant is free and open-source home automation software that serves as a central control system for smart home appliances. It is a full local substitute for products such as HomeBridge and SmartThings. Compared to many cloud-connected devices, home assistants offer better security, higher dependability, and greater flexibility. They also made it possible to handle smart home appliances locally. Smart

houses can identify and react to their homeowners' needs and preferences thanks to AI technology. AI can recognize which rooms are in use and make proactive adjustments to the lighting, temperature, and other environmental preferences based on that information using smart sensors. AI will enable our homes to comprehend our habits and preferences and make the necessary adjustments to make our lives more convenient. Though it still has a long way to go, convenient artificial intelligence (AI) is not without its challenges. Apart from practicality, an Energy conservation is greatly aided by smart home assistants. It cleverly controls thermostats, lighting, and other appliances to make sure they are used effectively, resulting in lower energy expenses and a greener way of life. An AI home assistant can be a lifesaver for people with mobility limitations, such as the elderly or people with disabilities. Improving tool, providing individuals with simple control over their surroundings. Using AI in your house is a big step toward a better, automated, and more productive way of living. One of the main aspects of the suggested system is the ability to monitor and manage lighting and household appliances in real time through a smartphone application. Energy optimization through automated reactions to environmental changes identified by temperature and motion sensors. Using AI techniques to optimize automation processes and learn user preferences. Increased security by means of automatic notifications and alerts in the event of emergencies or suspicious activity.

## 2. Objective

- Time is saved
- Easy to use at home for those with disabilities
- Improve the comfort of living
- More secure
- It is energy efficient.

## 3. Block Diagram

According to the block diagram, the first three blocks represent the system's inputs. The first is an electromagnetic motion sensor, which is used in motion detectors like automatically triggered lighting devices. It measures infrared light in the area within its field of view, detects motion, and sends an input. The second is a temperature sensor, which

measures the air's humidity and sends an input related to the temperature that is detected. All of these inputs are connected to the ESP8266 Node MCU, a development board that is widely used in Internet of Things applications. It offers a flexible and economical way to connect devices to the internet. It processes the input that is provided and further processes input from a smartphone as text or voice commands, providing the relay with an appropriate output. The relays are connected for safety reasons; they provide the right supply to the right load, which is then executed and produces an appropriate output

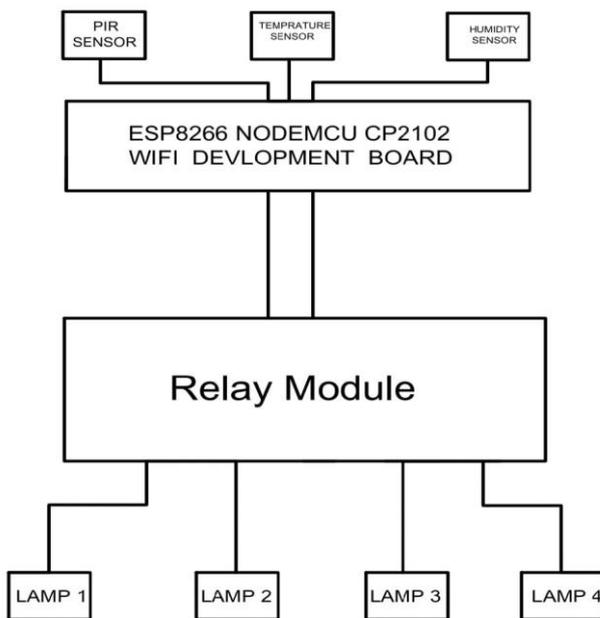


Fig .1 block diagram

#### 4.Methodology

Creating a smart AI home automation project involves several steps: For the Capstone Project, a group was formed. conducted some research via the internet For the Capstone Project, a group was We talked with our respective coordinators and shared some ideas with us guides. Make the decision to create the Smart AI Home Assistance model. We used our own guides to help us build our models and determine which instruments and components we would need. Gathered all necessary component ratings and costs. Distributed the work to create a project summary for our capstone. After making the necessary corrections to adjustments that each respective guide had pointed out, we finished the summary report.

#### 5. Problem statement

- 1.An somebody with a disability can effortlessly turn on and off the appliances.
2. Using a mobile device, we can cut the circuit in the event of a short circuit.

3. We can use voice commands to turn the building's lights on or off at any moment.

#### 6.Literature review

- Control of smart homes by July 2022 IJSSET.2022.45451 (DOI: 10.22214). Adithi Aperia from M.V.J. College of University wrote this.
- An automation system for smart homes, June 2022 doi.org/10.3390/s23135784 Author Chandra Irugalbandare from Sri Lanka's University of Moratuwa
- Rasberry Assistant for smart home automation DOI: 10.32628/ijscseit as of June 2020 Author: Ganga G., Mysura Krnataka VidyaVikas Institute

#### 7.Component

- Arduino: The ideal board for learning electronics and coding is the Arduino UNO. The UNO is the most durable board you can begin experimenting with if this is your first time modifying the platform.



Fig 2.Arduino

- Motion sensor with PIR sensors perceive motion and are virtually always used to determine if a person has entered or exited the sensor's detection range. They don't wear out and are compact, affordable, low-power, and easy to operate.



Fig 3 Motion sensor

- Module for Bluetooth. A PCB board with integrated Bluetooth functionality is called a Bluetooth module. Depending on its intended purpose, Bluetooth modules—which are separated into Bluetooth voice modules and Bluetooth modules—can be utilized for short-range wireless communication.

- Node MCU

A popular development board for Internet of Things applications, the Node MCU ESP8266 offers a flexible and affordable way to link objects to the internet. Its programming and Wi-Fi capabilities enable quick IoT solution deployment and development. An inexpensive, open-source IoT platform is Node MCU. Initially, it came with hardware based on the ESP-12 module and firmware that uses Espressif Systems' ESP8266 Wi-Fi SoC. Subsequently, the ESP32 32-bit MCU was given support. Node MCU is a compact, inexpensive microcontroller with WiFi capability that can be directly connected to sensors via SPI, I2C, ADC, GPIO, and other interfaces. Support for the Arduino Integrated Development Environment (IDE) facilitates module programming. 3.3V to 5V is normally the operating voltage range for the Node MCU board. Making sure the voltage applied to the board is within this range is crucial.

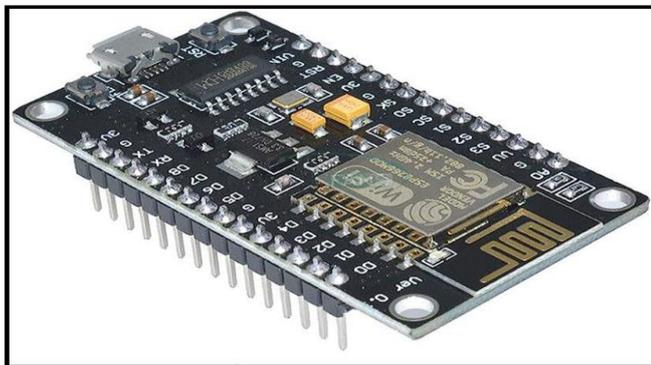


Fig 4 Node MCU.

- Relay module

An electromagnet powers an electrical switch used in a power relay module. A separate low-power signal from a micro controller activates the magnets. The electromagnet pulls to open or close an electrical circuit when it is turned on. Relay modules are mostly used to turn on and off electrical systems or equipment. In order to guarantee that low-power devices, like microcontrollers, can safely regulate greater voltages and currents, it also serves to isolate control circuits. Relays are electrical or mechanical switches that open and close circuits. By opening and closing contacts in another electrical circuit, relays regulate one circuit. Relay diagrams demonstrate that when a relay contact is marked as normally open (NO), the contact remains open even when the relay is not powered on. Both DC and AC relays operate

on the same electromagnetic principles; however, DC relays require a DC power source, whereas AC relays require an AC power source



Fig 5 Relay module

## 8. Working

### Hardware Setup:

Establish a wireless connection between the Node MCU and your smartphone by configuring it to do so. Link the Node MCU to a relay module. The Node MCU can turn on and off the lights and other electrical devices thanks to the relay module. Attach a motion sensor to the Node MCU, such as a PIR sensor. Motion is detected by this sensor within its viewing angle. Attach a humidity and temperature sensor (such as DHT11 or DHT22) to the Node MCU in order to monitor the surrounding environment.

### Programming:

The Node MCU's proper firmware can be developed with an Arduino UNO or any appropriate development environment. There should be code in the firmware to: Establish a Wi-Fi connection. Use a web interface or mobile app to send commands to operate the electrical equipment and lamps. To identify motion occurrences, read data from the motion sensor. Analyze the

temperature and humidity sensor's data. Notify recipients or initiate actions (such turning on or off lights) in response to environmental factors or motion sensing. Put in place any extra features you might desire, like data logging, scheduling, and automation.

### Mobile App or Web Interface:

Create a web interface or mobile application that uses Wi-Fi to connect to the Node MCU. Users should be able to control the lamps and electrical equipment (e.g., turn them on or off) using the app or interface. See the temperature and humidity sensor's real-time data. Get alerts or notifications in response to environmental factors or motion detection. You can choose to alter automation rules, schedules, or configurations.

### Integration:

Connect the mobile application or web interface to the Node MCU's firmware. Make sure the Node MCU and the app or interface communicate flawlessly so users can access and control devices from a distance. These instructions will help you build a smart home system that you can use to control lights and other electrical appliances, sense movements, and use Node MCU and other sensors to monitor temperature and humidity—all from the comfort of your smartphone.

### 9. Future scope

- Medical Facilities, Hospitals and other medical facilities could benefit greatly from the deployment of smart AI home assistance, which would simplify and improve patient care beyond anything that has been done previously.
- Workplaces and Offices Smart AI Home Assistance is ideal for offices and workplaces of all kinds due to its automation and integration features, which increase productivity and efficiency.

- Outdoor Applications and Gardening You may elevate your outdoor and gardening activities with the support of Smart AI

Home Assistance thanks to its cutting-edge features and interoperability with other smart devices.

### 10. Actual Image



**Fig 6 actual image**

### 11. Conclusion

The Smart AI Home Automation project has been a thorough investigation of the feasibility and possibilities of incorporating artificial intelligence into contemporary homes. We have looked at the essential elements and technologies—such as voice assistants, sensors, and smart devices—that go into building a smart AI home automation system in this paper. The project's successful completion confirms the bright future of smart AI home automation and serves as a timely reminder that more research and development are needed to keep these systems secure, dependable, and easy to use. It will be fascinating to see how AI continues to change as the area develops our houses, generating them more intelligent, effective, and networked than before.

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