

# IOT Based Intelligent Home Automation System Using NodeMCU ESP8266.

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## ABSTRACT

Availability of high speed mobile networks like 3G and long term evolution(LTE) coupled with cheaper and accessible smart phones, mobile industry has seen a tremendous growth in terms of providing various services and applications at the fingertips of the citizens. Internet of Things (IOT) is one of the promising technologies which can be used for connecting, controlling and managing intelligent objects which are connected to internet through an IP address. Applications ranging from smart governance, smart education, smart agriculture, smart healthcare, smart homes etc can use IOT for effective manner. This project discusses about IOT and how it can be used for realizing smart home automation using a microcontroller based NodeMCU board and Android mobile app. In this system there are two prototypes namely home automation using Bluetooth in an indoor environment and home automation using Ethernet in an outdoor environment are presented.

**Keyword:** - NodeMCU board, Android application, Bluetooth, smart home automation.

## 1. INTRODUCTION

It is easy to forget something as simple as turning off our stove if you are not careful something terrible can happen like blast of gas cylinder, catch fire short circuit and etc. and this may also can happen with other home appliances as it is common problem and this happened with lots of people in day to day life. The solution for this problem statement is instead of using gas cylinder we have used induction. Cooktop this induction is integrated with Wi-Fi module Node MCU through relay switch board for communication purpose similarly like shown in our problem statement in this case we get alert on dashboard accordingly which we can control our system through dashboard on and off or increase the temperature of induction. We can set timer to off our induction to particular temperature range as per the requirement this will help us to reduce power wastages. Using this dashboard and Google assistance we can control our electrical bulb and other home appliances to on and off.

## 1.1 LITERATURE REVIEW

In literature survey we have come across various types of concepts related to our idea. In an IoT-based Home Automation System Using Wi-Fi Wireless Sensor Networks they focus on new human computer interaction has evolved from the Graphical User Interface (GUI) to the Conversational User Interface (CUI) and is able to be built on a mobile device and integrated with the social apps. It allows users to chat with Chatbot through the chat interface provided by the Line App, regardless of where users are. They can control the smart home system, security system, and alarm system at home to achieve integration of different systems as well as ameliorate the shortcomings of mobile apps of departed smart home. In another paper we have seen constant monitoring of people's behavior, activities are required for the purpose of protection and management of confidential data. In surveillance, installing and setup of CCTV camera systems becomes costly for normal residents and also system cannot inform the owner's automatically when the robbery happens.

## 1.2 PROBLEM STATEMENT

Kitchen is center of our home it was so much of life happened. Spending time with love ones, papering food and sharing meals, with so much happening. It is easy to forget something as simple as turning off our stove if you are not careful something terrible can happen like blast of gas cylinder, catch fire short circuit and etc. And this may also can happened with other home appliances as it is common problem and this happened with lots of people in day to day life.

## 1.3 PROPOSED SYSTEM

The solution for this problem statement is instead of using gas cylinder we have used induction Cooktop this induction is integrated with Wi-Fi module Node MCU through relay switch board for communication purpose similarly like shown in our problem statement in this case we get alert on dashboard accordingly which we can control our system through dashboard on and off or increase the temperature of induction. We can set timer to off our induction to particular temperature range as per the requirement this will help us to reduce power wastages. Using this dashboard and Google assistance we can control our electrical bulb and other home appliances to on and off. In our project we have used NodeMCU which is main control unit of the project. We have connected NodeMCU with Relay Board. Relay Board is connected with induction cooktop and LED bulb. We have used breadboard for serial and parallel connection. WI-FI router is also connected with NodeMCU ESP 8266 for transmission and receiving of data. In our project Intelligent Home Automation System we have designed a smart induction cooktop which can be operated remotely with the help of mobile application. by installing appliances in your house, such as a smart oven, you can now use apps on your mobile device to enjoy complete control of your home's functions from anywhere in the world . If you have friends or family members who are elderly or disabled, you know how difficult even the most basic everyday task can be for them. Smart home technology can greatly increase their quality of life, and utilizing voice commands can make the learning curve much easier for someone unfamiliar with computers. In our project we have used NodeMCU which is main control unit of the project. We have connected NodeMCU with Relay Board. Relay Board is connected with induction cooktop and LED bulb. We have used breadboard for serial and parallel connection. WI-FI router is also connected with NodeMCU ESP 8266 for transmission and receiving of data

## 2. SYSTEM ARCHITECTURE

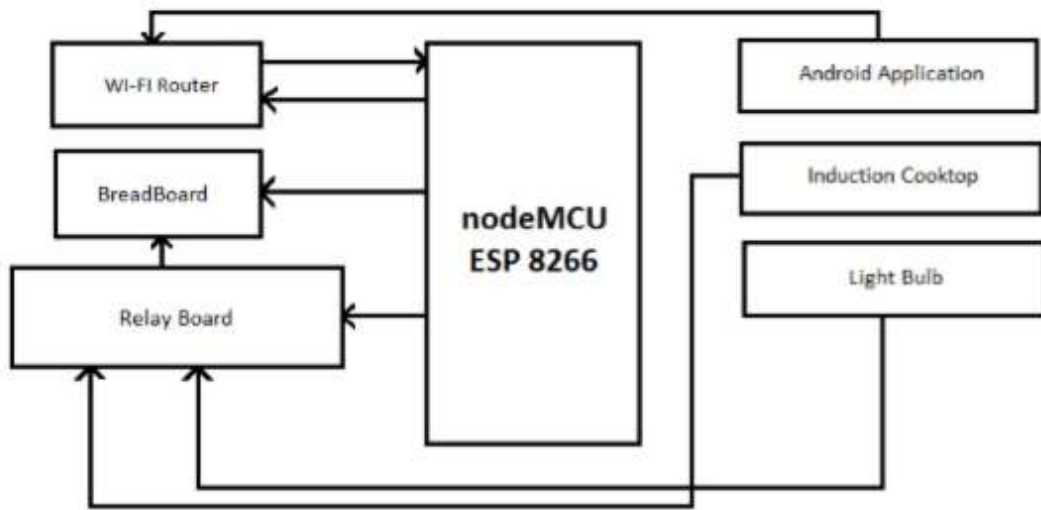


Fig -1: System Overview

### 2.1 Algorithm

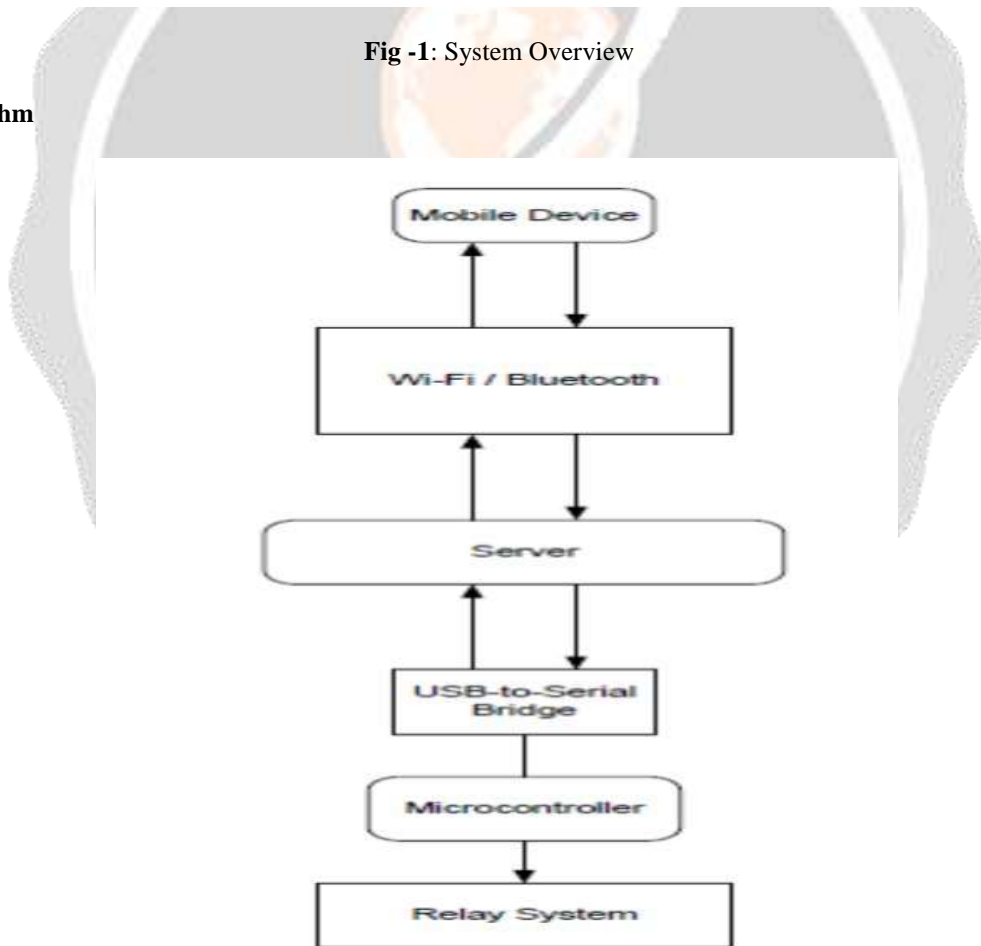
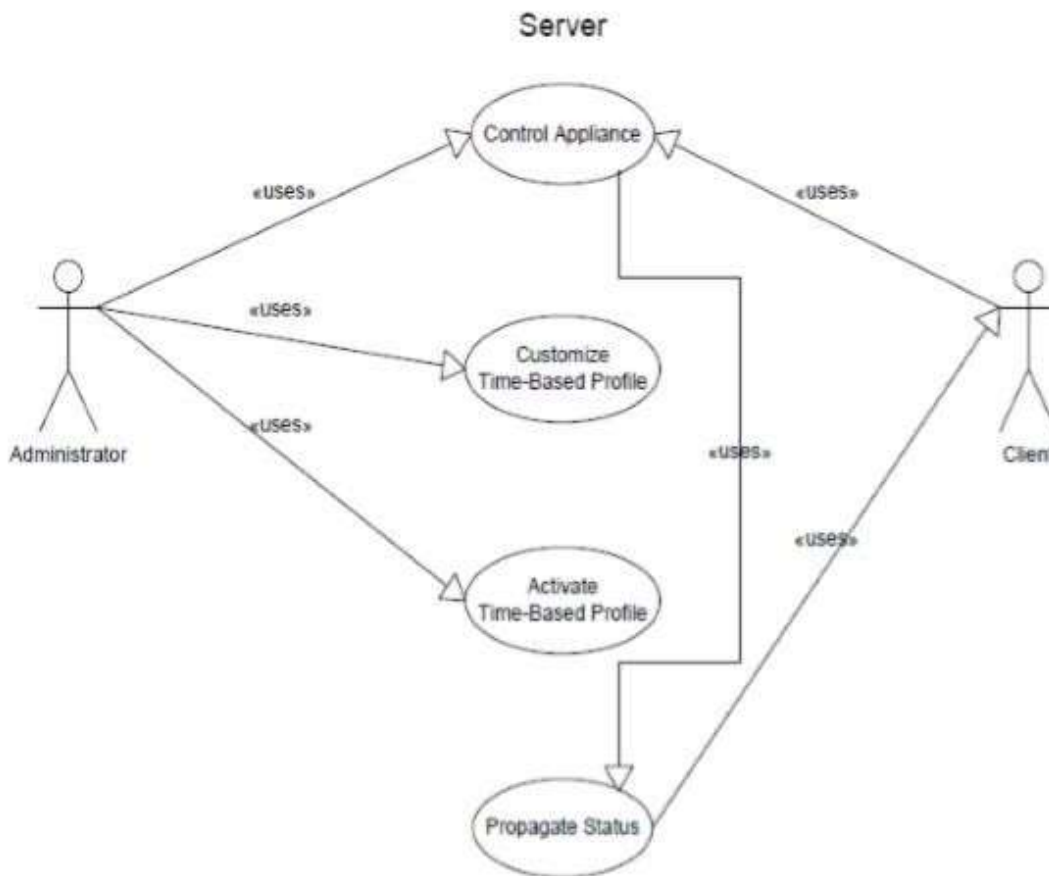


Fig -2: Data flow of proposed system

The mobile device connects to the server PC through Bluetooth or Wi-Fi or through the internet. The user sends commands to the server from the mobile device. The microcontroller is connected to the server via USB. On receiving commands from the mobile device, the server sends commands to the microcontroller over the USB connection. The microcontroller is directly connected to the relays and it can enable or disable them. The relays are connected to the electrical system of the building so that they can control the plug points.

## 2.2 Use Case Diagram



**Fig -3:** Server Module

The server module receives control commands either from clients or directly from its own interface. The time-based profiles are configured on the server interface. It internally checks whether it's time to activate a time-based profile. It propagates the status of the appliances to all connected clients. The client interface allows the user to control the appliances. It receives status updates from the server. Each of the modules was tested using both black box and white box testing techniques. Black box testing ensures the correctness of the system's output, given various possible inputs. White box testing involves providing calculated inputs so that the internal structure of the system can be verified to be error free. For example, white box testing of a software module involves providing different inputs that test all possible code paths within the program. The modules were designed keeping in mind all possible inputs and any erroneous inputs as well. Any exceptions that occur are handled appropriately without compromising the stability of the system. Different issues, both foreseen and unforeseen, were encountered during the design process.

### 2.3 Advantages

- Home automation systems are easy to use and simple to connect to your electronic device (i.e. smartphone or tablet).
- Just a light touch can dim lighting, change the temperature, close the garage, and lock all doors.
- Elderly or disabled persons may gain a sense of independence by being able to control their settings without the assistance of a caregiver.
- Caregivers for the elderly can function in their own lives while simultaneously looking after their loved ones (via remote cameras)
- Property owners can save on utility charges by being able to turn things on/off while away.
- Saving money on house sitters, gardeners and pet-sitters is possible because tasks like watering houseplants or landscapes and feeding pets can be done with home automation.
- Advanced systems can even sense an individual's preference through reading the temperature, light and noise level.
- Managing all of your home devices from one place.
- It is platform independent.

### 2.4 Future Scope

Home automation is all about safety, security and convenience at your finger-tips. Home Automation will save time in daily recursive activities like turning of lights, geysers and other home appliances. Home automation devices help to sort out the common problems which we usually face to manage the functioning our home such as home security energy management. For instance, we usually forget to switch off our home appliances. A home automation device allows us to control all the electronics of home through mobile application from anywhere around the world. It is possible that our project can replace today's device for particular purpose. Also, in further research on this project can improve its efficiency also get better work from our project.

### 3. CONCLUSIONS

The main overview for the project is to be able to communicate with different electrical devices within the home wirelessly. IOT or internet of things is an upcoming technology that allows us to control hardware devices through the internet. Here we propose to use IOT in order to control home appliances, thus automating modern homes through the internet. This system uses two loads to demonstrate as house lighting. Our user-friendly interface allows a user to easily control these home appliances through the internet. For this system we use an NodeMCU. This NodeMCU is interfaced with a 4-channel relay module to get user commands over the internet. Relays are used to switch loads. After receiving user commands over the internet, microcontroller processes these instructions to operate these loads accordingly. Thus, this system allows for efficient home automation over the internet.

#### 4. REFERENCES

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