

# IOT based complete Home Automation with Timer and Scheduling Feature and Fire detection Alert on IOT Application

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## ABSTRACT

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Internet of Things (IoT) is an important concept in today's world when we think about automation and smart home. It is related to the automation by computing things where all things and physical devices can be connected so that we can make those device intelligent, programmable which can interact with humans. IoT is a cloud computing network it can provide ability to user of accessing physical things or control devices from any distance irrespective of time and location through wireless network, the smart home automation is one of the examples of IoT technology.

Keywords—Internet of things (IoT), Home Automation, Voice Recognition, Mobile Application, Wi-Fi, Time & Scheduling.

## I. INTRODUCTION

“Home automation” refers to the automatic and electronic control of household features, activities and appliances. The utilities and features of our home can be easily controlled via Internet. There are three main elements of a home automation system: sensors, controllers, and actuators. Having day to day developing technology is a proud moment to the whole world. The foremost aim of the technology is to increase the efficiency and to decrease the effort. In this trending world, Internet of Things is being given extreme importance. In that, Automation, leads to have less effort and much efficiency. By using IoT, we are successful in controlling the appliances in various areas, in which one of them is to control the home automation by using Node Microcontroller. We can

also use other boards like raspberry pi, beagle bone etc., In the present- day technology, the whole work is done through communication so the effective way of communication can be done through voice Even though the technology is developing in our day to day life, there is no help coming into existence for the people who are physically not good on the basis of technology. As the speech enabled, home automation system deploys the use of voice to control the devices. It mainly targets the physically disabled and elderly persons. The home automation will not work if the speech recognition is poor. The speech given by the user will be given as input to the Microphone. . Microphone recognizes the speech given by the person and sends it to the recognizing module. It searches for the nearest word even if there are any disturbances in it. If the command (ON/OFF) is given, the action

is done. Similarly, the line following robot functions with respect to the speech commands given to it. The line following robot moves forward and backward with the help of sensors and a motor driver board.

Home is the place where one desires to be rest after a long tiring day. People come home exhausted after a long hard-working day. Some are way too tired that they find it hard to move once they land on their couch, sofa or bed. So, any small device/technology that would help them switch their lights on or off, or play their favorite music etc. on a go with their voice with the aid of their smart phones would make their home more comfortable. Moreover, it would be better if everything such as warming bath water and adjusting the room temperature were already done before they reach their home just by giving a voice command. So, when people would arrive home, they would find the room temperature, the bath water adjusted to their suitable preferences, and they could relax.

## II. INTERNET OF THINGS

The major concept using in the Google assistant-controlled Home automation is the Internet of Things. The Internet of Things (IoT) can be connecting various types of objects like smart phones, personal computer and tablets to the internet, which brings new-fangled type of communication between things and things, and things and people.

Any man-made objects that can be assigned an IP address and it has the ability to transfer data successfully over a network, the interaction through a network is called IoT. The internet helps us to bring immediate solutions for many problems and able to connect from any of the remote places. The Internet of Things technology is used to come in with innovative idea and large development space for smart homes to improve the living standards of life. The growth of the Internet of Things will reform a number of sectors, like healthcare, automation energy, transportation, etc.

The cloud computing can be used in such case to implement the IoT infrastructure that augmented with sensors and actuators to monitor and control “things” from anywhere.

## III. PROPOSED HOME AUTOMATION SYSTEM LAYOUT

The proposed home control system consists of two main modules: the hardware interface module and the software module (Smart phone app & Voice recognition). To demonstrate the effectiveness of this system, devices such as light switches, temperature sensor and motion sensor have been integrated with the proposed home control system.

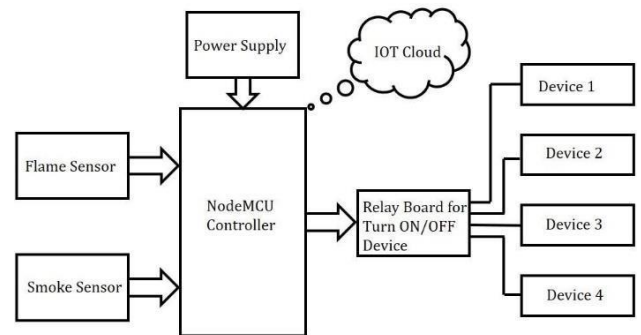


Figure 1 : System Architecture of Automation using ESP8266

## IV. SOFTWARE DEVELOPMENT FOR HOME NETWORK

Software of the proposed home automation system is divided into two parts: application software and microcontroller firmware. The server application software is a library implementation of a server running on NodeMCU ESP8266 using the Wi-Fi shield. This shield has the capability to be used both, as a client or a server. To successfully communicate between remote user and the Home Network, configuration stage and sensor/actuator control stage layers have been implemented on the NodeMCU ESP8266. The Home Network is connected to Internet over TCP/IP.

## V HARDWARE

### A. NodeMCU (ESP8266)

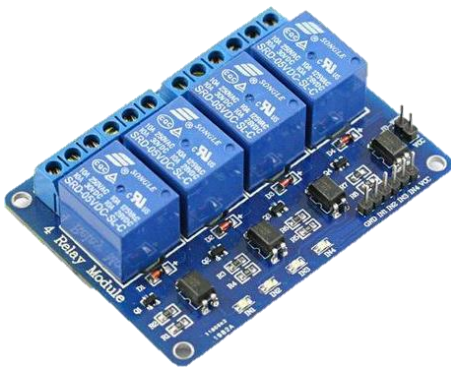
NodeMCU is a micro-controller uni. It refers to an open source firmware which uses the Lua scripting language. Its firmware is dependent on ESP8266 Wi-Fi SoC which enables the availability of web to appliances surrounding it. ESP8266 bridges the gap between the user and the appliances.



NodeMCU (ESP8266)

### B. Relay Board

Any relay acts as a switch for any appliance connected to it. The power is supplied to them in the form of electrical signals. The opening and closing of the circuit is driven by the current passed through coil which either release or pulls the bar used for opening or closing the circuit. In this project, on or off signal is provided by the micro-controller. A four-channel relay is used in the proposed system which can allow four devices to run together.

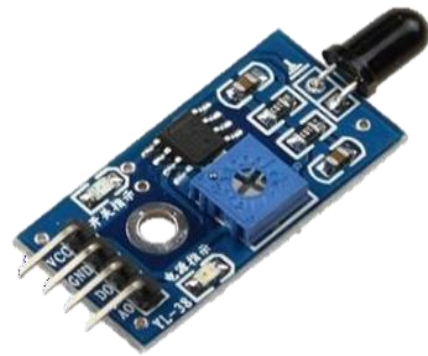


Relay Board

### C. Flame Sensor

A flame-sensor is one kind of detector which is mainly designed for detecting as well as responding to the occurrence of a fire or flame. The flame detection response can depend on its fitting. It includes an alarm system, a natural gas line, propane & a fire suppression system.

This sensor is used in industrial boilers. The main function of this is to give authentication whether the boiler is properly working or not. The response of these sensors is faster as well as more accurate compare with a heat/smoke detector because of its mechanism while detecting the flame. This sensor/detector can be built with an electronic circuit using a receiver like electromagnetic radiation. This sensor uses the infrared flame flash method, which allows the sensor to work through a coating of oil, dust, water vapor, otherwise ice.



Flame Sensor

### D. Smoke Sensor (MQ2)

When it comes to measuring or detecting a particular Gas the MQ series Gas sensors are the most commonly used ones. These sensors can either be purchased as a module or as just the sensor alone. If you are trying to only detect (not measuring ppm) the presence of a gas then you can buy it as a module since it comes with an op-amp comparator and a digital out pin. But if you planning to measure the ppm of a gas it is

recommended to buy the sensor alone (without module).

The MQ-2 Gas sensor can detect or measure gasses like LPG, Alcohol, Propane, Hydrogen, CO and even methane. The module version of this sensor comes with a DigitalPin which makes this sensor to operate even without a microcontroller and that comes in handy when you are only trying to detect one particular gas. When it comes to measuring the gas in ppm the analog pin has to be used, the analog pin also TTL driven and works on 5V and hence can be used with most common microcontrollers.



Smoke Sensor (MQ2)

## V. SOFTWARE

### A. Arduino IDE

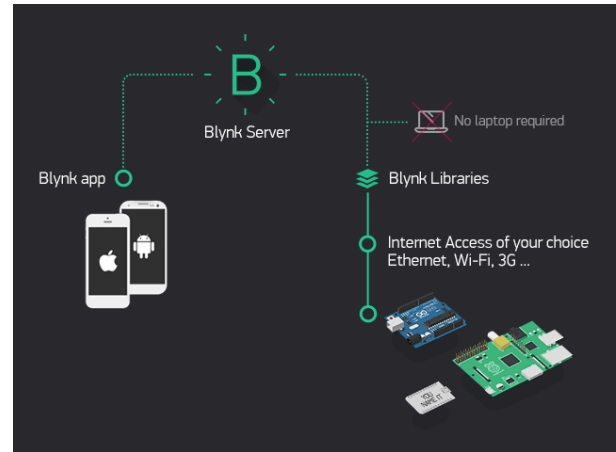
The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards.



Arduino IDE

### B. Blynk

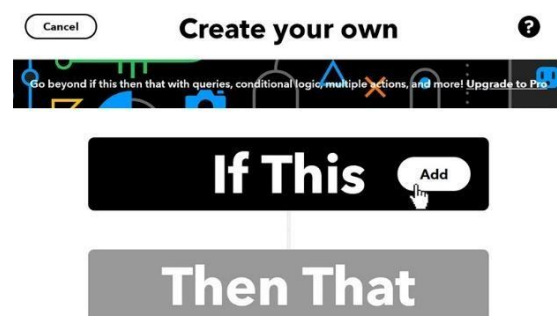
Blynk is a Platform with IOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets.



Blynk App Interface

### C. IFTTT

If This Then That, also known as IFTTT, is a free web-based service to create chains of simple conditional statements, called applets. An applet is triggered by changes that occur within other web services such as Gmail, Facebook, Telegram, Instagram, or Pinterest. For example, an applet may send an e-mail message if the user tweets using a hashtag, or copy a photo on Facebook to a user's archive if someone tags a user in a photo. IFTTT is an initialism for "If This Then That. In addition to the web-based application, the service runs on iOS and Android. IFTTT users created about 20 million recipes each day.



IFTTT Protocol

#### D. Google Assistance

Google Assistant is an AI enabled software agent provided by Google. It is used to accomplish tasks for a user, based on the commands provided by him. Here, we use it to provide voice commands to operate home appliances.



#### VI. BASIC APPLICATION OF HOME AUTOMATION

Remote home monitoring allows users to manage and control various aspects of home. These include motion detection, water leak detection, monitoring temperature against burglary and fire, and controls for lights, locks, fans and more from Laptop or Tablet or Smartphone. The household activities are automated by the development of special appliances such as water heaters to reduce the time taken to boil water for bathing and automatic washing machines to reduce manual labor of washing clothes. In developed countries, homes are wired for electrical power, doorbell, TV outlets, and telephones. The different application includes when a person enters the room, the light turns on. In advanced technology, the room can sense the presence of the person and who the person is. Taking into account the day of the week, time of the day and other such factors it can also set apt lighting, temperature levels, television channels or music levels. In the case of a smoke detector when fire or smoke is detected, the lights in the entire house begin to blink to alert the resident to the probable fire.

In case of a home theatre, the home automation system can avoid distraction and lock the audio and video components and can also make an announcement. The home automation system can also dial up the houseowner on their mobile phone to alert them or call any alarm monitoring company. It is essential that the different controllable appliances be interconnected and communicate with each other. The basic aim of Home automation is to control or monitor signals from different appliances, or basic services. A smart phone or web browser can be used to control or monitor the home automation system. The household activities such as food preservation and preparation are automated with the movement of pre-packaged food or pre-made food. Automation of handling the food in the home is possible to only standardized products. The use of electricity facilitated the automation in heating which trim down the manual toil to gas stoves and fuel heaters. The growth of thermostats enables automated control of heating and cooling at a later stage. Other automated activity includes the air conditioner set to an energy saving setting when the house is vacant and get back to the normal setting when the resident is about to return home. The classy system preserves a list of products, records the usage through bar codes or an RFID tag and replaces the order automatically.

Many people today prefer smart devices which can be controlled remotely by the Internet rather than the manual control to improve the standard of living. The home appliances are expected to fully automatic and Internet of Things (IoT) is projected to provide dramatic improvements in smart home appliances. The internet technology is growing day by day and the internet connection is accessible everywhere conditioning unit. The human motion detection is achieved by the PIR sensor for security purpose in the world. The IoT is going to rule the world within a few years. It presents an Internet of Things based real-time home automation and security system using Node MCU and ESP8266 Wi-Fi module which makes the



system cost-effective and portable. It is used for controlling and monitoring home appliances (Fans, Lights, etc.) from anywhere in the globe over the Internet. The home automation system includes an integrated temperature and humidity sensor module to control over the air. A voice recognition-based home automation system was proposed and implemented.

## VII. RESULTS AND DISCUSSION

We were able to operate the electrical appliances like electric bulb, light and fans by giving simple voice commands. We were able to switch ON and OFF the appliances. A similar setup can also be used for heavy loads such as an air conditioner, washing machines, etc. Also we found that the cost of the system dropped in comparison to the already existing systems making the system cost efficient. This system is also found to be very useful for the people who are disabled or who remain mostly out of their homes due to work. The image below shows the implemented model of the system.

The Device Control Test is done by pressing the ON / OFF button widget on the Blynk application on the respective Android smart phone and voice command using Google Assistance for lights and fans. This is done after the system is turned on and connected to a Wi-Fi internet connection. If at any time the internet connection is lost or bad signal, then it also affects system performance.

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