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## Home Air Quality and Light Quality Control

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### Abstract

Home air quality and light quality control is a topic which gaining popularity day by day, because of large advantages. One can achieve home automation by simply connecting home appliance electrical devices to the internet or cloud storage. the reason for this surge demand of network enabled home automation is reaching the zenith in recent days for its simplicity and comparable affordability. Platforms based on cloud computing help to connect to the things surroundings everyone so that one can find it easy to access anything and everything at any time and place in a user friendly manner using custom defined portals. Hence, cloud act as a front end to access IOT. Here we are assuming a system which can control devices through wireless based network or cloud based approach. In project we use IOT based home automation system which goal is to develop a home automation system that gives the user complete control over all remotely controllable aspects of his or her home. The automation system will have ability to be controlled from a central host PC, the internet, and also remotely accessed via a packet PC with a windows mobile based application.

**Keywords:** Internet of Things, WIFI Module, Relay, Home Automation, Cayenne Application.

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## 1. Introduction

The home automation is control of home device form a central control point automation is today s facts where more things are being completed every day automatically. Usually the basic tasks of turning on or off certain device and beyond, either remotely or in close proximity. The concept of the RF-based system is to use the underlying wireless data network such as IEEE 802.11 (Wi-Fi). The popularity of wireless networks at home has increased in recent years, and the advanced computer technology has made the personal digital device to commonly have the capability to communicate through the wireless network. Hence, it is suitable to use RF-based location determination system to estimate location of the personal digital device in a home environment with high data rate transmission, supporting multimedia application may be feasible in WLAN.

One if the possible application is wireless network for home automation. Imagine a private home equipped with motion light temperature and other sensor actuators for opening the door dimming lights with a remote control as complex as setting up a network of items in your home (such as thermostat, security system lighting and appliances) that can be programmed using a main controller. The basic idea of home automation is to employ sensor and control system to monitor dwelling and accordingly adjust the various mechanism that provide heat ventilation lighting and In an intelligent home automation system there are many possible solution for how and form where to control the automation system and single device a user interface can be a computer-based system a mechanical switch a single light a loudspeaker with a microphone or a some kind of personal remote controller using normal PC, laptop or table PC by standalone software or web-based user interface. In the near future all electronic appliances in a home will be networked.

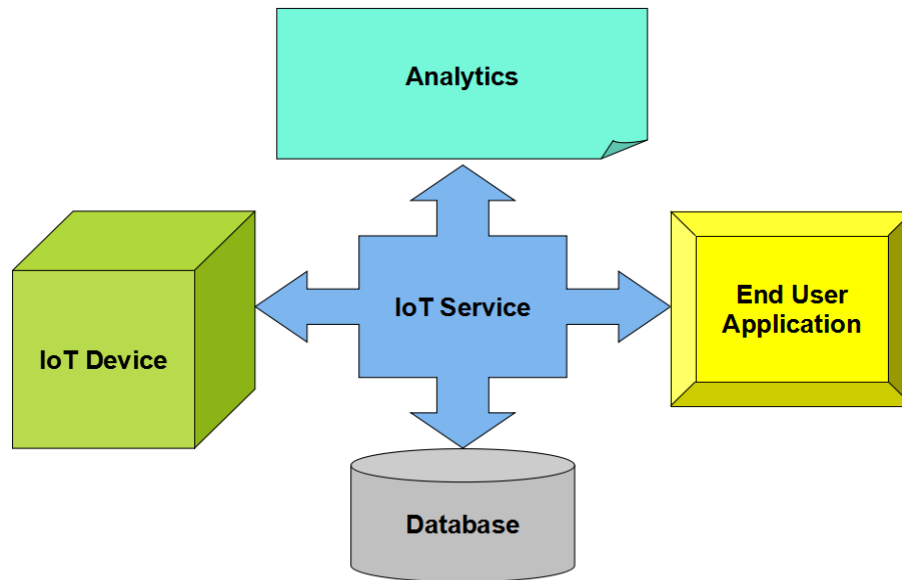
## 2. Materials and Methods

### 2.1. Materials

#### 2.1.1 Internet of Things

The Internet of Things (IoT) is a system of ‘connected things’. The things generally comprise of an embedded operating system and an ability to communicate with the internet or with the neighboring things. One of the key elements of a generic IoT system that bridges the various ‘things’ is an IoT service. An interesting implication from the ‘things’ comprising the IoT systems is that the things by themselves cannot do anything. At a bare minimum, they should have an ability to connect to other ‘things’. But the real power of IoT is harnessed when the things connect to a ‘service’ either directly or via other ‘things’. In such systems, the service

plays the role of an invisible manager by providing capabilities ranging from simple data collection and monitoring to complex data analytics. The below diagram illustrates where an IoT service fits in an IoT eco-system: One such IoT application platform that offers a wide variety of analysis, monitoring and counter-action capabilities is ‘ThingSpeak’.

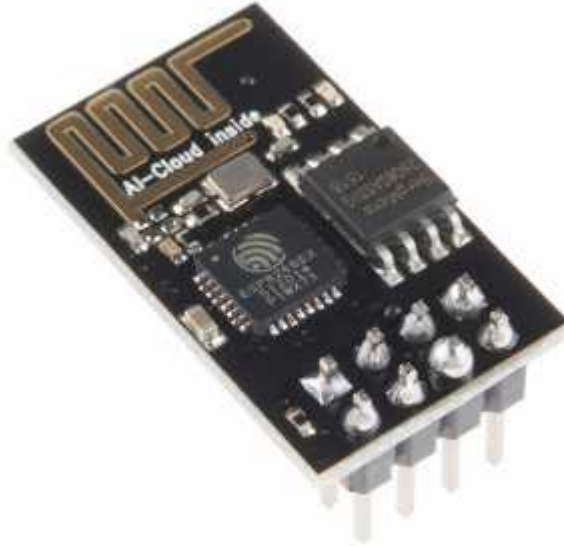


**Figure.1. Block Diagram of IoT**

### 2.1.2 WIFI Module

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts. There is an almost limitless fountain of information available for the

ESP8266, all of which has been provided by amazing community support. In the Documents section below you will find many resources to aid you in using the ESP8266, even instructions on how to transforming this module into an IoT (Internet of Things) solution.



**Figure.2. Wifi Module**

### 2.1.3 Relay

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. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations there of Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations. The traditional form of a relay uses an electromagnet to close or open the contacts, but other operating principles have been invented, such as in solid-state relays which use semiconductor properties for control without relying on moving parts. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called protective relays. Latching relays require only a single pulse of control power to operate the switch persistently. Another pulse applied to a second set of control terminals, or a pulse with opposite polarity, resets the switch, while repeated pulses of the same kind have no effects. Magnetic latching relays are useful in applications when interrupted power should not affect the circuits that the relay is controlling.



**Figure.3. Relay Module**

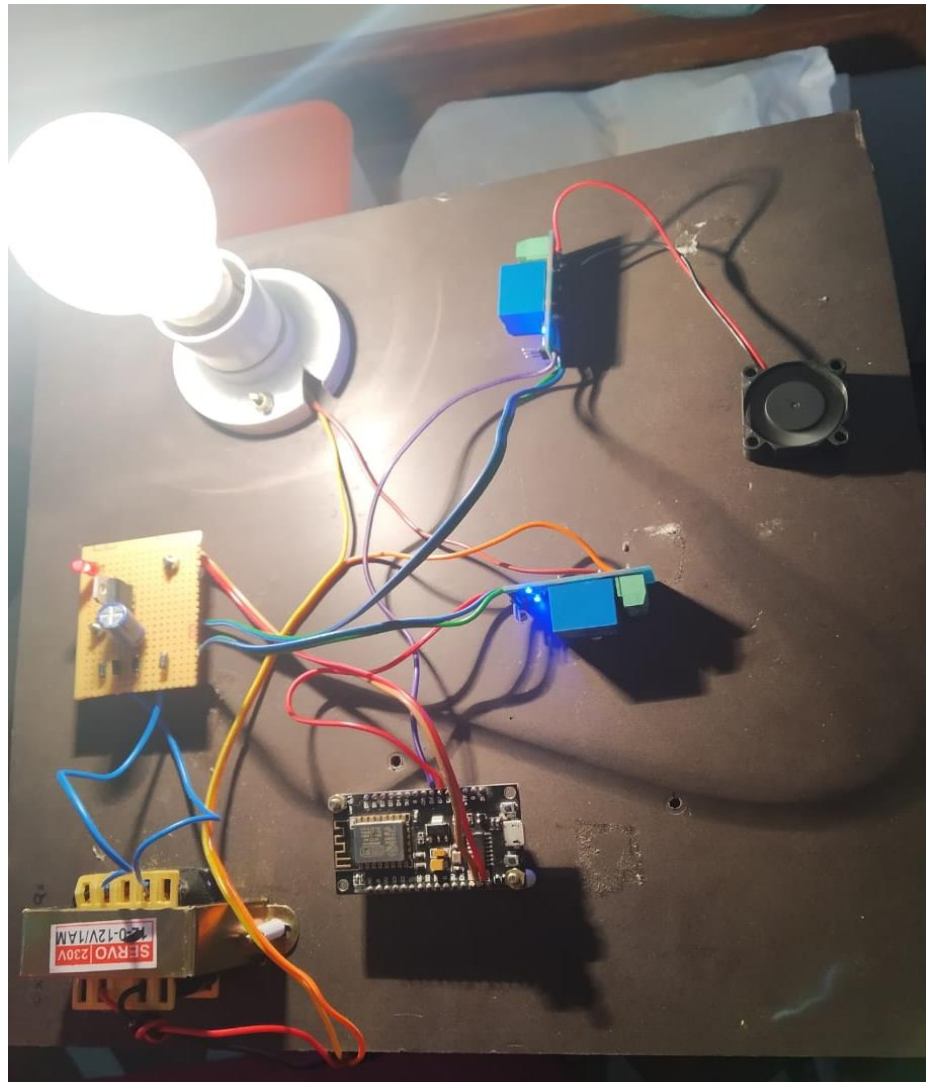
## 2.1 Methods

The proposed model of the home automation system is as shown in the figure. The model consist of number of relays to connect various devices. Initially all the devices are connected to the internet through Wi-Fi. When the connection is established in on web page we provide virtual switches to operate the connected devices. Also it will start reading the parameters of devices to shows the graph of current verses time for each device. If particular device exceeds the threshold set point then server will give notification to the user on web page and that device will automatically turned off. If problem found it report to cloud server.

Here user can modify some settings and see the devices functionality and working. In our system we provides notifications to the user but in future we can add also some voice alerts, SMS or alarm system. This system can be expanded to include various other options which could include home security feature such as open-door and motion detection, energy monitoring for kitchen garden etc. Using such system we can control any device from anywhere.

## 3. Result And Discussion

Home automation connected with Internet of Things ( IoT ) to access the appliances using Cayenne application, below figure to operate (ON/OFF) the home appliances through the application are shown as.



**Figure.4. Real Time Setup**

### 3.1. Cayenne

Cayenne is the world's first drag and drop IoT project builder that empowers developers, designers and engineers to quickly prototype and share their connected device projects. Cayenne was designed to help users create Internet of Things prototypes and then bring them to production. Cayenne was designed to work from iOS and Android smart phones and popular browsers. There are several major components in the platform: Cayenne Mobile Apps – Remotely monitor and control your IoT projects from the Android or iOS Apps. Cayenne Online Dashboard – Use customizable widgets to visualize data, set up rules, schedule events and more.

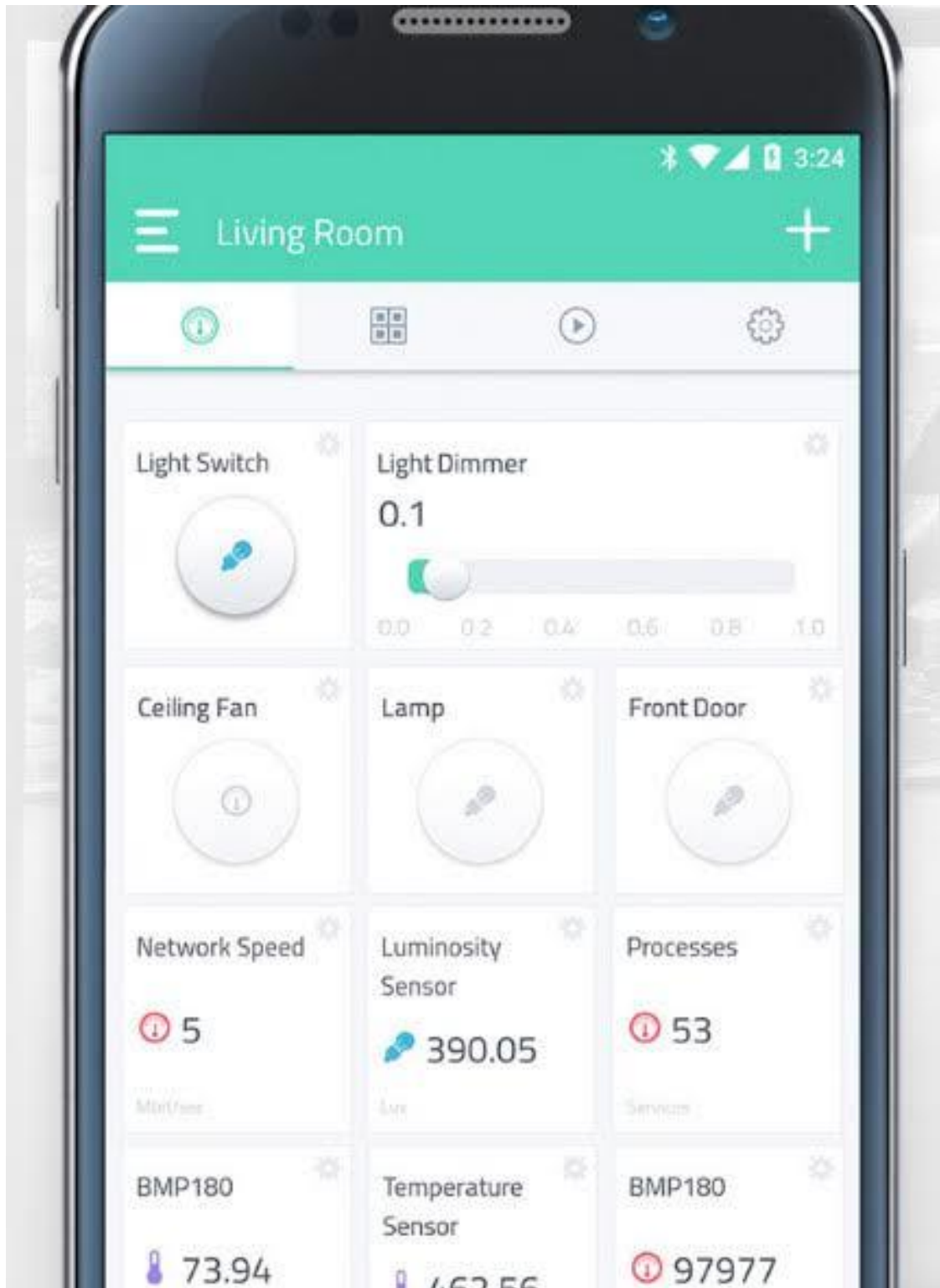


Figure.5. Mobile APP Display



### 3.2. Schematic of the System:

The schematic of the system is shown below.

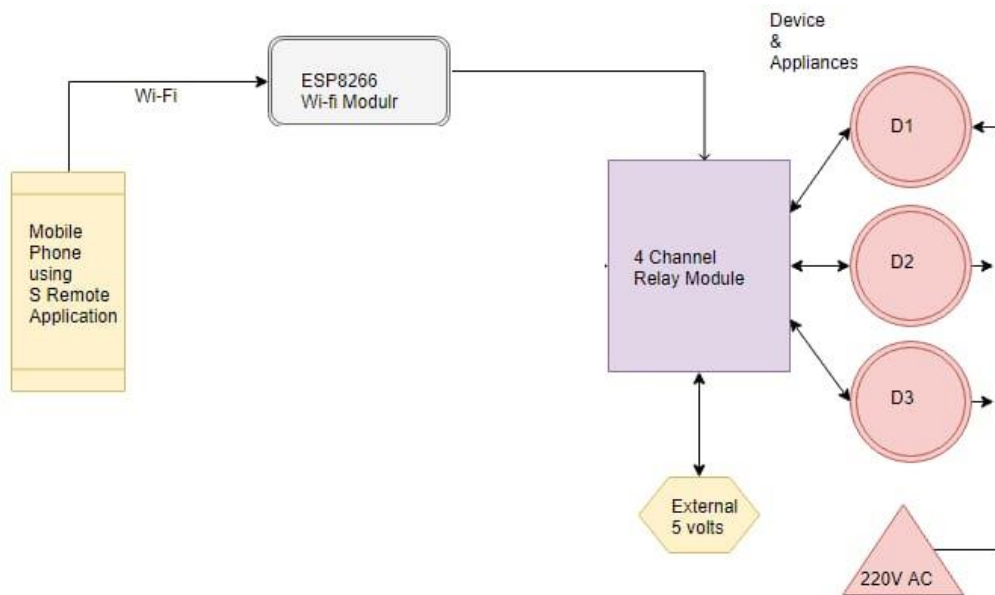


Figure.6. Schematic Diagram of Setup

### 3.3. Circuit Connection

The below circuit shows the connection among the IoT, WIFI Module and Relay.

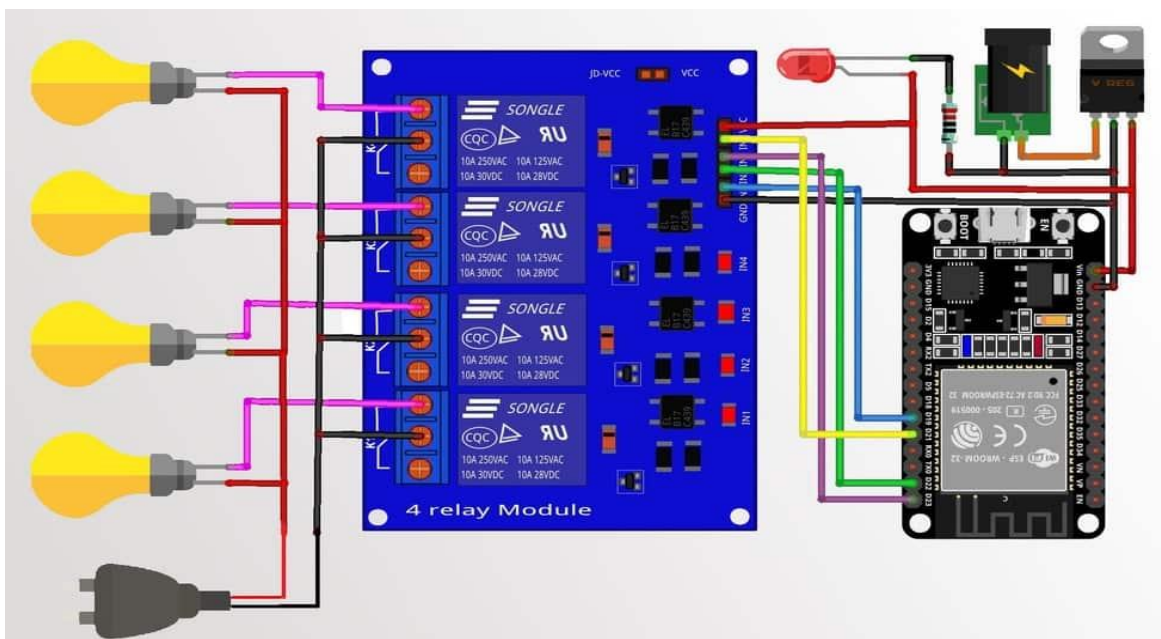
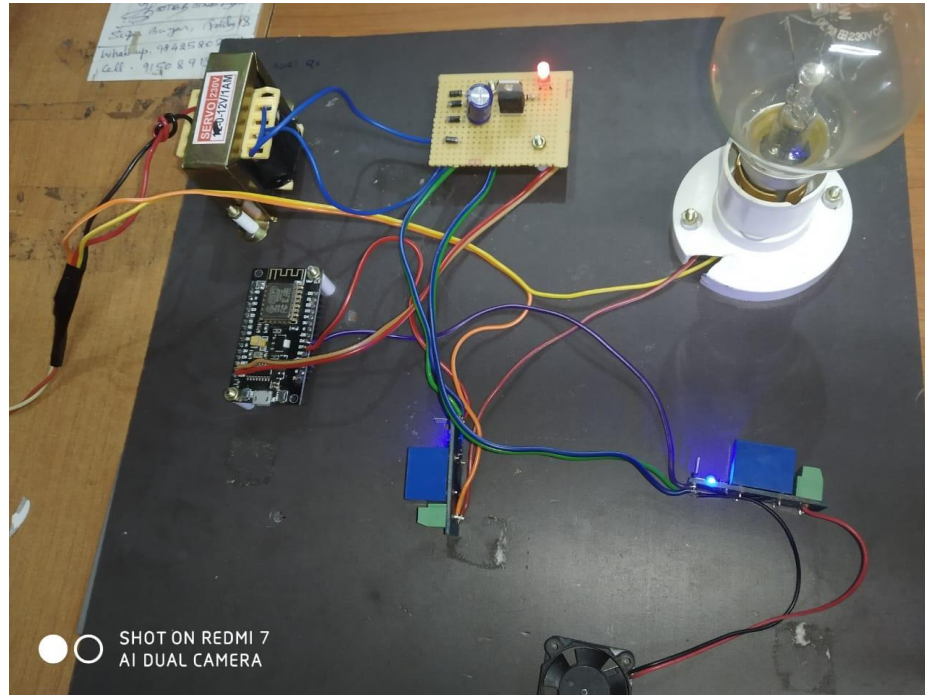


Figure.7. Circuit Connection with IoT, WIFI Module and Relay



### 3.4. Experimental Setup/Hardware Prototype

The below figure depicts the hardware prototype that has been developed to realize the proposed methodology. The tests were conducted using the below experimental setup.



**Figure.8. Hardware Prototype**

### 4. Conclusion

A IoT system integrates electrical devices in a house with each other. The techniques which are going to use in home automation include those in building automation as well as the control of domestic activities, such as TV, fan, electric tubes, refrigerator etc.

After studying and understanding literature survey and other existing works, we proposed a technique that will gives us better understanding of the Environmental conditions in home. We also provide notification to the user about any error occurs in the devices. In this paper we are planning to eliminate most of the human interaction by providing intelligent system.

Development of such system by using Internet of Things technology. By using these system we can actually manage to make low cost, flexible smart homes to adjust its environmental conditions and resolve its errors with energy saving.

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