

# Smart Lab Using IOT

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**Abstract**— To help and maintain comfortable living conditions within a house, home monitoring and automation are used. The levels of human's comfort in homes can be differentiated into different types. Among these categories, the most important ones are the thermal comfort, which is related to temperature, followed by the visual comfort, related to light, and hygienic comfort, associated with air. A system can monitor these parameters and help maintain them between an acceptable range. Additionally, making the house smart is to permit for intelligent automatic executing of various commands after analyzing the data. Automation can be achieved by using the Internet of Things (IoT). This gives the people accesses to certain data in the house and the power to control some parameters from anywhere. This paper presents the complete design of an IoT based sensing and system for smart home automation.

**Keywords**—Home Automation System, IoT (Internet of Things), Sensors Nodes.

## I. INTRODUCTION

The Internet is a global network connecting computers. To keep up to the increasing growth of the internet and the vast number of users, something which can bring them all under one common point was needed. IoT a digital change where everybody is connected virtually, where the workplace is anywhere.. IoT technology is a big network of connected "things" which also includes people. The relationship will be between people-people, people-things.. In future machine-to-machine (M2M) communication will provide ease and comfort to our life. IoT involves many technologies including architecture, sensor/identification, discovery, etc. Millions of 'smart' devices are expected to connect to each other and use data and information over the internet.

The basic idea of IoT is to allow autonomous and secure connections and exchanges of data between real world devices. The objects that are not only physical entities, but also digital ones and do some tasks for humans. This is why, IoT is not only hardware and software paradigm, but also include interaction. Computing which was thought as a difficult task has now become reality due to advances in the field of Automatic Identification, Distributed Computation process and high speed of the internet. Individuals will be able to keep track of their belongings from anywhere from any network . Internet of Things (IoT) becoming important to integrate it with cloud computing because of the amount of data IoT's are generating and their requirement to have the right of utilization and storage.

## II. WORKING OF IOT

### 2.1 Sensors

Sensors collect data from their environment. This could be a temperature reading. We use "sensors" because multiple sensors can be used or sensors can be part of a device that does more. Your phone is a device that has sensors (camera, accelerometer, GPS, etc), However, whether it's a standalone sensor , in this first step data is being collected from the environment.

### 2.2 Connectivity

The data is sent to the cloud. The devices can be connected to the cloud through cellular, satellite, WiFi or connecting directly to the internet via Ethernet. Every option has challenges between power consumption,bandwidth. Choosing which connectivity option is needed but they all get data to the cloud.

### 2.3 Data Processing

The data gets to the cloud, software performs processing on it.This could be checking that the temperature reading is within an range. It could also be using computer vision on video to identify objects. What happens when the temperature is very high or if there is an intruder in your home? That's where the user comes in.

## 2.4 User Interface

The information is made useful to the last-user in some way. This could be through an alert to the user . A text alert when the temperature is too high in the cold storage. A user might have an interface that allows them to check on the system. A user might want to check the video feeds in his home via a web browser. The user may be able to perform an action . The user might adjust the temperature in the cold storage via an app. Some actions are performed automatically. In place of waiting for you to adjust the temperature, the system could do it via set rules. Rather than just call you to alert you , the IoT system could also notify relevant people.

## III. BLOCK DIAGRAM

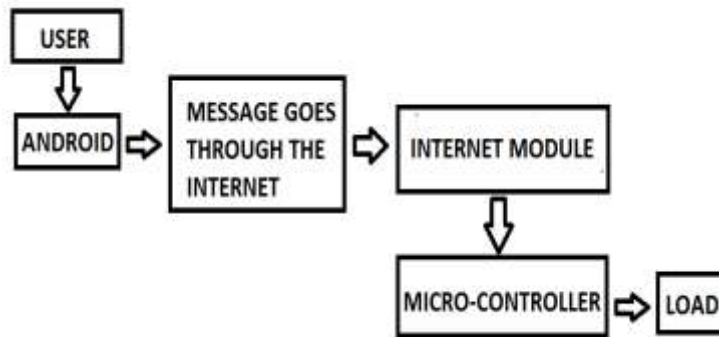


Fig. 1 Block Diagram

USER: Any Person (Faculty in our case)

SMARTPHONE: Android or IOS

INTERNET MEDIUM: College Wi-fi in our case

INTERNET MODULE: ESP 8266

MICRO-CONTROLLER: Node MCU

LOAD: Light/ Fan

## IV. COMPONENTS

### 4.1 Node MCU

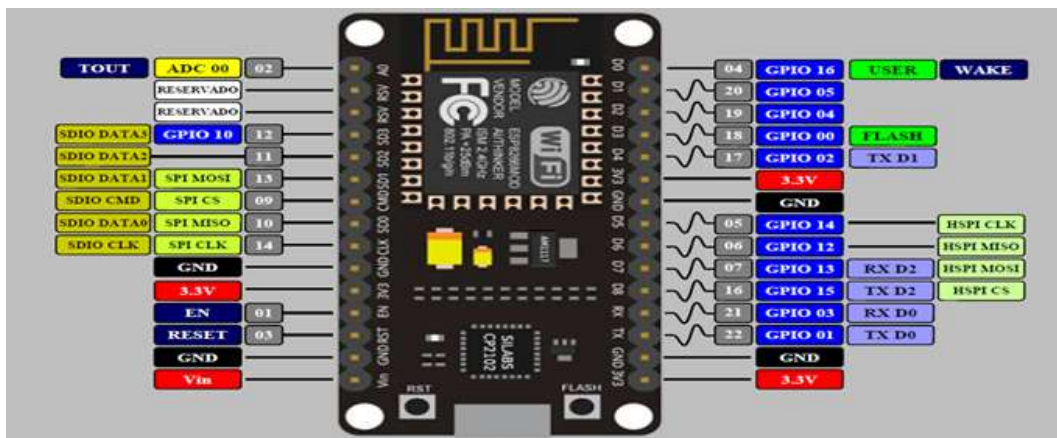
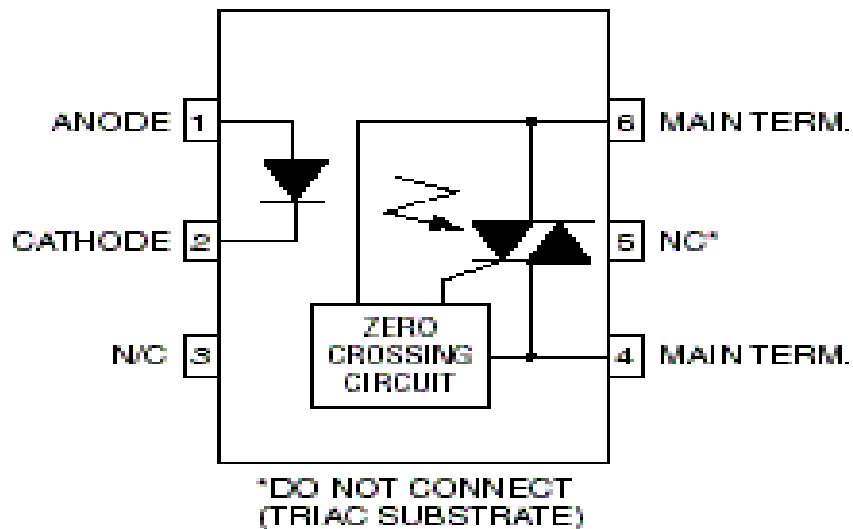


Fig.2 Node MCU

**Table 4.1**

Sr. No.	Parameter	Type
1.	Microcontroller	ATmega328P
2.	Architecture	AVR
3.	Operating Voltage	5 V
4.	Flash Memory	32 KB of which 2 KB used by Bootloader
5.	SRAM	2KB

**4.2 MOC 3063**



**Fig. 3 Optocoupler IC MOC 3063**

**PIN DESCRIPTION:**

1= Anode

2= Cathode

3= Not Connected

4= Main Terminal

5= Not Connected

6= Main Terminal

**WORKING:**

The optocoupler is used to optically isolate the high voltage circuitry from the low voltage circuitry. There is a trigger LED which gets turned ON when the high input from the microcontroller is given to it. The output has a photodiode which starts conducting as soon as it gets an input signal from the input LED.

#### 4.3 BT 136

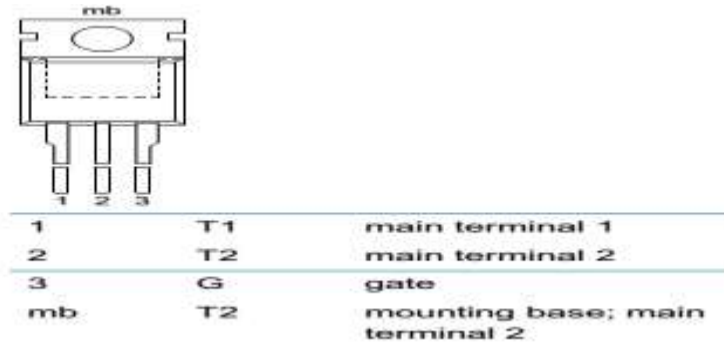


Fig. 4: TRIAC BT 136

TRIAC PINOUT:

T1: Main Terminal 1

T2: Main Terminal 2

G : Gate

WORKING:

The triac is a bidirectional electronic switch. It acts as an open circuit when there is no input at the gate terminal. The triac starts conducting when the input is high. The triac used in this project has a maximum current rating of 4 amp.

## V. CONCLUSION

Smart Lab using Internet of Things (IoT) has been successfully designed. The project is highly efficient as it uses arduino board having microcontroller(Arduino nano) which having low power consumption. It is possible to control the switch from the mobile application. This system is a bit time consuming. It is user friendly. Maintenance of this project is not costly.

### 5.1 Advantages:

- Low Cost of maintenance and operation.
- User Friendly.
- Can be controlled from anywhere in the world.
- Compact circuit.

### 5.2 Disadvantages:

- Internet connection is compulsory.

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## VII. LITERATURE REVIEW

### 7.1 Majid Al-Kuwari,

The data collected in a home automation system is usually processed and managed by a microcontroller such as Arduino, Raspberry Pi, and NodeMCU. Raspberry Pi is a small single microcontroller computer. With a higher RAM of 256MB or 512Mb, depending on the model, it can handle more complex tasks than other controllers and used mostly as a central processing unit for multiple devices. Most new models of Raspberry Pi have USB and Ethernet ports, making it easy to upload data to the internet.

### 7.2 Vishwajeet Hari Bhide

Home Automation is nothing but automation of the home that is automation of household activity or housework. It can also include centralized lighting control, appliances, ventilation, heating and air conditioning (HV AC), security of doors and gates. It helps to improved comfort, convenience, security and energy efficiency. Home automation is useful for elderly and disabled peoples to increase quality of life so they becomes less dependent on caregivers.

### 7.3 Zeinab Kamal Aldein Mohammeda

By the 2020 around 50 to 100 billion things will be connected electronically by internet. Figure 2 shows the growth of the things connected to the internet from 1988 to forecast 2020. The Internet of Things (IoT) will provide a technology to creating the means of smart action for machines to communicate with one another and with many different types of information. The success of IoT depends on standardization, which provides interoperability, compatibility, reliability, and effective operations on a global scale. Today more than 60 companies for leading technology, in communications and energy, working with standards, such as IETF, IEEE and ITU to specify new IP based technologies for the Internet of Things.

### 7.4 Wentao Shang

The current subnet model of IPv4 and IPv6 considers two types of Layer-2 networks: multi-access link, where multiple nodes share the same access medium, and point-to-point link, where there are exactly two nodes on the same link. Both of them assume that the nodes in the same subnet can reach each other within one hop. An IoT mesh network, on the other hand, contains a collection of Layer-2 links joined together without any Layer-3 device (i.e., IP routers) in between.

### 7.5 Chandra Sukanya Nandyala

Healthcare in the past, decision making was merely based on doctor's personal experience, domain knowledge, patient's physical signs and symptoms and diagnostic laboratory reports. In contrast, devices or things and technologies came into existence playing significant role and helps doctors or physicians to add wisdom to their decision in healthcare monitoring. Cloud paradigm stands as the backbone for on-demand network use of a shared pool of configurable computing resources.

## REFERENCES

- [1] "Meeting Cloud Challenges ", by Chris Miyachi, chair, IEEE Cloud Computing, systems engineer/software architect, Xerox Corporation
- [2] "Carbon Footprints ", by Cicek Cavdar, IEEE Green ICT Initiative, Swedish cluster coordinator of SooGREEN: Service Oriented Optimization of Mobile Networks, coordinator of 5GrEEen: Towards Green 5G Mobile Networks, researcher in the Communications Systems Department, School of ICT
- [3] " Standardizing 3D Body Processing", by Luciano Oviedo, chair, IEEE Standards Association, Industry Connections, 3D Body Processing Activity, and Strategy and Product Development, Intel

- [4] "IOT special gift to big Data " by Jeff M. Voas, Past IEEE Reliability Society President, IEEE Reliability Society representative to IEEE IoT Initiative, host of IEEE Big Data Initiative's first standards workshop Christian K. Hansen, President, IEEE Reliability Society
- [5] "An Internet-of-Things Enabled Smart Sensing System for Nitrate Monitoring ",by Md. Eshrat E.E Alahi , Najid Pereira-Ishak , Subhas Chandra Mukhopadhyay ,Lucy Burkitt
- [6] " Internet of Things for Smart Manufacturing System ", by Seohyeon Jeong , Woongsoo Na , Joongheon Kim , Sungrae Cho
- [7] " Heterogeneous Online Learning for Thing-Adaptive Fog Computing in IoT ", by Tianyi Chen , Qing Ling , Yanning Shen , Georgios B. Giannakis
- [8] " SAFE: Secure Appliance Scheduling for Flexible and Efficient Energy Consumption for Smart Home IoT ", by Sai Mounika Errapotu , Jingyi Wang , Yanmin Gong , Jin-Hee Cho , Miao Pan , Zhu Han
- [9] " Guest Editorial: Special Issue on (Industrial) Internet-of-Things for Smart and Sensing Systems: Issues, Trends, and Applications ", by Herve Panetto , Paulo Cezar Stadzisz , Wenchao Li , Qing-Shan Jia
- [10] " Device-Free People Counting in IoT Environments: New Insights, Results, and Open Challenges ", by Iker Sobron , Javier Del Ser , Iñaki Eizmendi , Manuel Velez , Md. Eshrat E.E Alahi , Najid Pereira-Ishak , Subhas Chandra Mukhopadhyay , Lucy Burkitt.