Internet of Things (IoT) based Home Automation System (HAS) Implementation of Real-Time Experiment

Voore Subba Rao
Research Scholar
Dayalbagh Educational Institute(DEI)
Agra, India

Mahesh Kumar Thota
Asst. Professor
Kakatiya Institute of Technology & Science,
Warangal, India

N. Santhosh Ramchander
Asst. Professor
Sreyas Institute of Engineering. & Technology
Hyderabad, India

K. Ramya Laxmi
Asst. Professor
Sreyas Institute of Engineering. & Technology
Hyderabad, India

***Abstract* - Internet of Things(IoT) is a next generation of Internet. The IoT providing an easy way of life with comforts to human being by managing and interacting remotely control of home appliances. The Home Automation System is a new technology for control remotely by IoT technology infrastructure(sensors, communication devices, microcontroller, NodeMCU) without interacting of human being.**

Keywords–IoT, Home automation system, home appliances, Internet, Microcontroller, NodeMCU.

1. INTRODUCTION

Home automation refers to the automatic way to control of house hold appliances, there are various systems used for home automation that is based on different microcontrollers and take different parameters to monitor and control the home appliances. The system providing facility to control of home appliances by IoT sensor and other communication devices efficiently. We can control home appliances by mobile device or laptops or over web anywhere in the world. The system is used for controlling various tube lights, fans, home appliances, electrical motors, air conditioner, air heating systems etc are easily controlled by web or internet enabled devices, All these types of systems becoming more popular due to its less cost of implementation and provides flexible functionality that can be easily configurable by every one according to their need that's why all the IoT system are in great demand and have a lot of value because helping peoples like the people having disabilities, as they can't walk more much then this system is very useful to them and also for the patient or for the old aged person that remains mostly on the bed or also beneficial for the persons that live alone in their houses.[3,4].

In this system architecture consists of proposed system model which connect, communication and co-ordination of various communication devices through Internet for takes important of home automation system. This proposed system

2. EXISTING WORK

In[1] authors develop a remote control of lights, fans other home appliances. A pc based program develop for control the remote devices. It is a low cost system for control various devices.

In[2] proposed Andriod software for Arduino platform these both are open source software. This system is used to control various home appliances. The system available for less cost.

In[3] Authors developed smart home system to control and manage home appliances of daily life for comfortable life for human being.

3. PROPOSED MODEL

The proposed model of home automation system contains server, actuators, sensors and microcontrollers. The hind-end server will be setup to controlling, monitoring of the sensor devices. The proposed home automation system will be remotely control by wireless technological communication devices like smart phones, tabs and other wireless devices remotely through Internet. In this proposed home automation system can be control, managed remotely of room temperature, automatic on and off fans, automatic lights on and off, automatic gas leakage detected by sensors, air conditioning system etc. are automatically control and managed by home automation system. The proposed without interacting of human being the home automation system monitor as well as control leakage of gas, fans on & off system, lights on & off system, check and control room temperature and humidity level by IoT related communication devices.

The NodeMCU is a brain of this system and executing various processes for home appliances system. NodeMCU connect, communicate with various sensors are gathered real-time information for home automation system. These

contains two Node MCU. The NodeMCU (Node Micro Controller Unit) is a open source contains software and hardware that built-up very less expensive system designed on chip known as ESP8266.

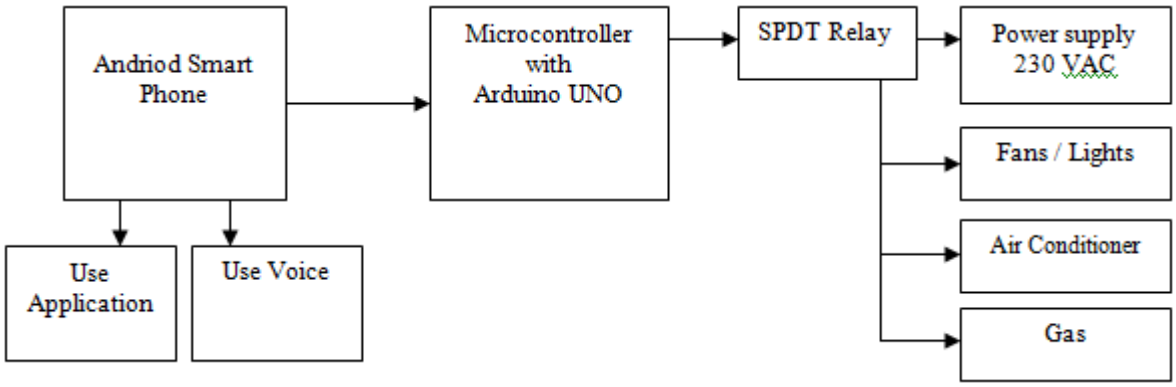


Fig1-Proposed System Model

The home automation system especially managing the house hold appliances remotely for convenient to human being. This system contains for notifying occur any violation for providing security and violating dangerous things will not be happened in the home. The system connected with Buzzer Alarm system can sound alarm for notify human in a home for signaling any problem happened. And also there is a alert SMS to user mobile or e-mail can be sent to the concerned user for alert for safety in home[5,6,7,8].

4. IMPLEMENTATION

In the proposed home automation system various sensors will be kept at various places that can gather real time continuous data to the central micro-processors. The home automation system contains various sensor devices are sensing, communicating and collect data from various appliances in the home. The sensors are continuously collect real-time data and send to micro-processors. The micro-processor having a code which execute the functions automatically control the home appliances like fans, tube lights, gas leakages, air conditioners etc monitor remotely and notifying time-to-time and record the information gathered to the cloud. In the cloud the actual data processing will be happened and results can be viewed by end user for taking decision. The relay tool is analyze the matching of power supply of the connect the home appliances to home automation system. As well as the sensor devices are also connect to various ports of NodeMCU[9,10]. We can also observe the data uploading in gauge on thinger.io (dashboard).

4.1.1.2 Light Dependent Resistor(LDR)

It is also known as photo resistor device that work on the resistivity function of the incident electromagnetic radiation. data and information received to the Internet and ultimately the results viewed by end user for visibility.

As the Above Described model is just proposed model not implemented from our side we are continuously working on it but the re is some work has be end one in this project like we have automated all the appliance of the room is controlled by the Node MCU as microcontroller, SMPS(Power Supply) as power supply forgiving to the relays and the controlling over internet is done bythethinger.io(third party cloud server)[7,8,9,10].

4.1 MODULES OF HOME AUTOMATION SYSTEM

4.1.1 Data Collection Unit(Module-1)

This Data collection unit module consists of sensor used for Home Automation system. The sensors connect, communicate and collect the different types of sensor data like environmental condition of a particular room in which system is implemented and shows this information to the third party server such as thinger.io(to monitor and visualize the data) and also send it to the microprocessors so the processors can take decisions based on the data now what is the next activity

4.1.1.1 Digital Humidity and Temperature sensor(DHT11)

The DHT11 is a low-cost digital humidity and temperature sensor. It uses resistive component to measure surround in DHT11 sensor made up of a capacitive humidity sensing element and a thermostat. That sense wetness and connected with a huge-performance level micro controller and gives out put understandable by us or means.

4.1.2 Central Processing Unit Module II

The above designed module contains the two NodeMCU will work on base of providing sensor in and out

Hence, they are light sensitive devices. The material used for constructing LDRs is semi conductor material When light loaded in resistor because of properties of photo-conductive of materials, then automatically the resistance will be gradually decreases.

4.1.1.3 Grove Gas Sensor(MQ-2)

It is a model of gas sensor having good option for detecting gas leakage in homes. Sensor is able to detect different types of gases like H2, LPG, CH4,CO and as per in-time fast response. The measurements will also be taken very fast for getting appropriate results. As per potentiometer the sensitivity vary.

connections. Node MCU is a well known open source platform for IoT application development. It is based on the ESP8266 Wi-Fi So C and hardware is based on the ESP-12 module. The Node MCU generally mean the firmware not the development kit. The Firmware is based on the Lua scripting language.

The ESP8266 is known Wi-Fi SoC that is widely used in applications of IoT. Arduino IDE having concerned programming language tool for using various libraries and various functions to perform various operation.

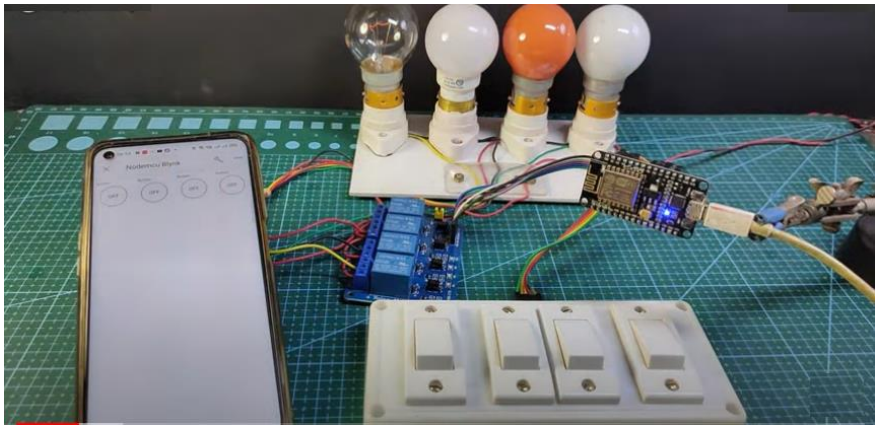


Fig2 –Real-Time Experiment for Home automation using NodeMCU ESP8266

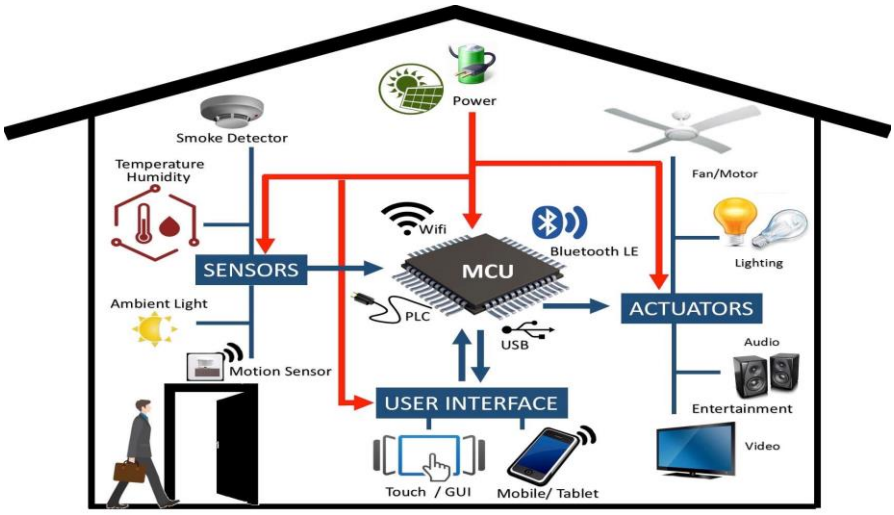


Fig-3 A an open platform for Home Automation System with various Sensor Devices, Microcontroller, NodeMCU and other technologies that can remotely control home appliances.

4.1.3 Interface Unit - Module III

This above module contains the third party IoT cloud server for the user so that it can take the utilization of the functionality of thinger.io(it is named asthinger.io). Thinger.io is a cloud platform that provides functionality like monitoring the data, collection of the data (provides free cloud storage for storing the data) and controlling of the devices.

The gas and smoke detect sensor will detect un-necessary leakage of gas around kitchen then automatically gas detect sensor alert the buzzer for signal alert sound to human and also a SMS to mobile shows either gas detected or gas not-detected message.

The Humidity sensor will detect humidity level of a room temperature and it will be set to threshold to by default 100. The home appliance system automatically detect and

5. RESULT & DISCRIPTION

The objective of this paper is to experimental setup of a home automation system by using IoT concept. The design can control home appliances like lights, fans, air conditioning remotely manage by mobile phone. Blynk android application should download from internet. It can control electronic appliances. The working model is for example any person in our home switch on/off light other person get information in the form of messages to mobile phone.

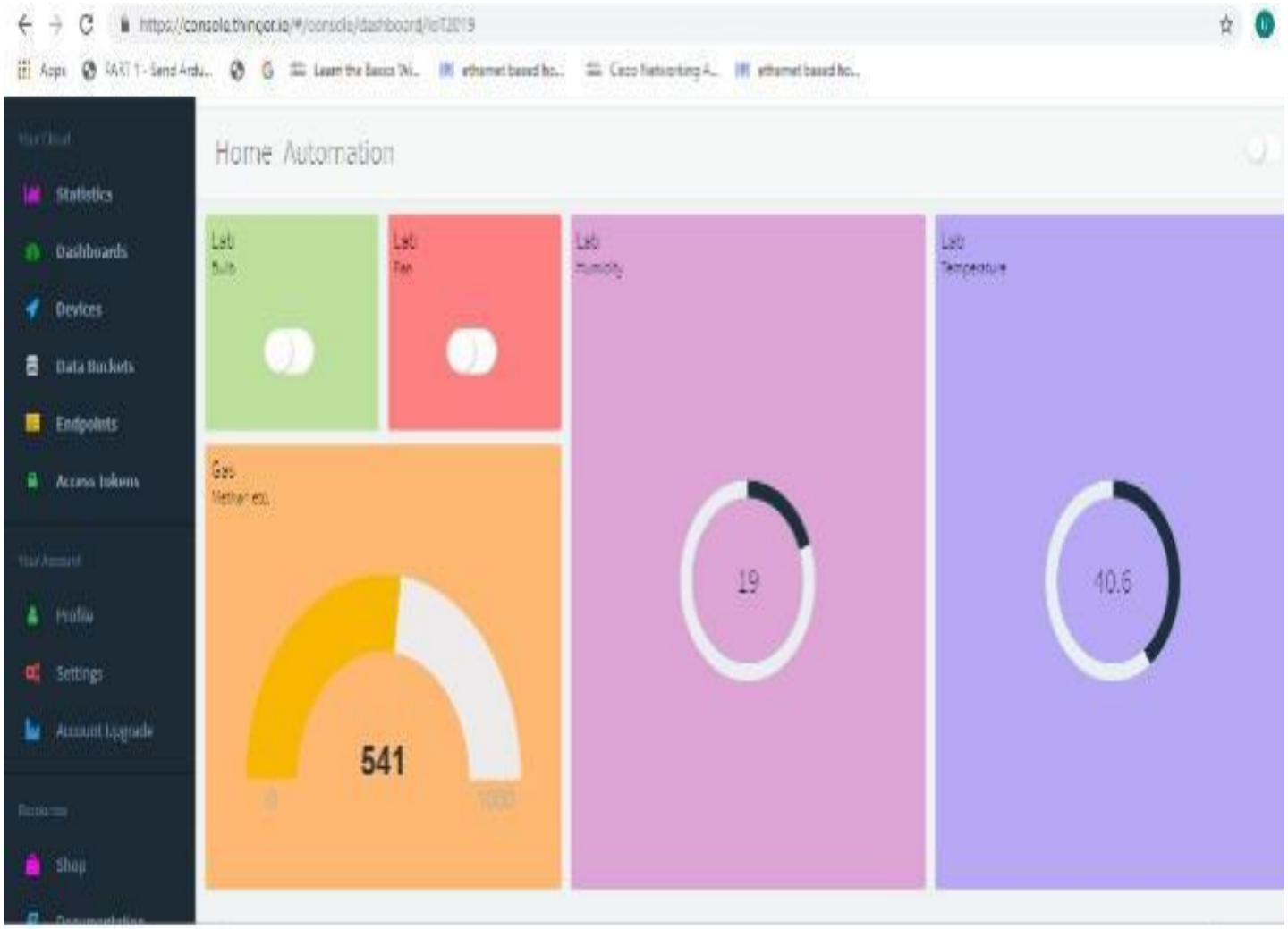
All sensors are connect and testing with each other and the system will get a output positively for known the results of various appliances connected to the home automation system.

The temperature sensor will sense the room temperature automatically if temperature beyond the 45 degree then automatically hear a alarm sound.

control various un-necessary one lights, fans, air conditioning systems. These systems when human is not using automatically off without human interaction for saving energy for minimizing electricity bill.

Every connections have been setup then automatically starts functioning. The system providing notification in the form messages in mobile phone when a person in a home will enter into the room then automatically on/off operations for home appliances (fans, lights, air-conditioners, motors). For example the humidity sensor can manage the room temperature approximately 65%. If exceeds this should the air becomes wet in the room and its harm the health of persons. If temperature less 25% also cause the problem of dehydration. So we wills set humidity sensor to control room temperature for 27^0c to 30^0c. In figure its shows temperature sensor control the room temperature.

In Fig4 shows the real-time experiment for Web Home Automation System for room temperature and humidity levels for Internet of Things(IoT) based experiment.



In Fig-4 shows the Web based Home Automation System in Real-Time experimental results.

CONCLUSION

This proposed home automation system can be scaled upto apartments but when it will be implemented on large scale then the security issues will be occurred, proper actions should be taken like weeping the bell for alert the human for avoiding problems will occur in home. All the appliances like light, fan and cooler, fridge, air conditioning system can be remotely controlled by Internet enabled device. The home doors will automatically controlled on remote by the portable internet enabled. Thinger.io provides the account creation means authentication and authorization on every account so that the authorized person can control, monitor and also can take actions according to what they need hence the home automation system can have more and more options for making, updating, modifying or making it smarter.

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