



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 Issue: V Month of publication: May 2019

DOI: <https://doi.org/10.22214/ijraset.2019.5469>

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IOT based Home Automation and Energy Awareness System

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Abstract: We are developing a home automation system that allows multiple users to handle the device located at home or in any infrastructure through android application and from remote position. The system has main three part those are mobile application to send communication to hardware, second is server which stores data related to user that can be user id, password, username, mail address of user, which also maintains the update of messages those are sent to hardware, third one is Arduino MEGA kit positioned at home or any infrastructure which actually controls appliances. Generally, when we go out of the house or any infrastructure we switch off the light or the electrical devices to avoid such as short circuit, firing etc. but sometimes we forgot to switch off, so to do this we have to come back. So to prevent such situation the recent new technology growing worldwide is the smart home system which manage residence appliances. In smart home system all electrical appliances in home automated with the help of highly developed technology. Smart home expertise provides ease in accessing appliances and also provides safety measures and safety.

Index Terms: Energy Efficiency, Remote Access, Smart home, Smart Phone, Android Application.

I. INTRODUCTION

Android based home mechanization system that allows one or other user to control the appliance by an Android application or through a website is accessible. The system mainly consist three hardware components:

1. Local device to transport signals to home appliance.
2. A web server to stock up consumer report.
3. Support services to the other mechanism, and a mobile smart device managing Android application.

Distributed cloud platform and services of Google are used to communication between the apparatus. In this System the user will communicate with the remote appliances using Smartphone over long distance. Home automation aim to offer users to organize the remote area appliances through smart phone.

II. LITERATURE SURVEY

In paper "1", developed system to allow client to access remote appliances and their power utilization. It Uses low power zigbee expertise[1]. In this user was able to control appliances, light through mobile upto 10 to 1000 metres. It uses CoZNET zigbee based technology. It present the user details about energy consumption in terms of watts to user to make user attentive about energy consumption of each appliances. In this method user not able to control the appliance and luminosity through remote region which is located beyond 100metre. It shows pointless details to user such as the electricity consumption in watt as its going to be difficult for user to understand it[1].

In paper "2" The main intention of this system was to save redundant wastage of energy for that this system uses PIR sensors to check human occurrence and accordingly set the light and fan ON/OFF[2]. Mobility and remote effecting of user commands is done using android mobile app which is used to transmit the command to microcontroller through bluetooth. The Main idea of this system to allow user automatic and manual control to electrical appliances.

The main disadvantages of this system is scope, as PIR sensors are used in classroom, adn range of PIR sensors is less so sometimes it gives mistaken output. This system fails if more than two people enter in th class at the same time.

In paper "3" The built system main goals to provide the user real time energy consumption of each and every electrical appliance[3]. For this it uses the smart meter which is connected to the appliances. This smart meter measure the energy consumption of each appliances and accordingly upload data to database using PHP. The main of system was to make user aware about the energy consumption by appliances so that user will take major actions to prevent unnecessary electricity consumption. User can access this all data through the mobile android application. The main disadvantage of this system is it provide unwanted information to user like energy consumption in units and watts, instead of showing the consumption in easy format. So due to this the database size increase.

In paper "4" Operation Intervals Based on Real Time Electricity Cost. The system uses data collected by actuators that of power consumption per hour of all devices and analyses them to determine time intervals of their operations[4].It uses various sensors and actuating subsystems. Even though the processing speed has increased there is no significant difference in energy consumption.

In paper "5" the system allow user to control the appliances through samrt phone using internet and android application. It provide the live video and audio streaming. The quality of video and audio provided by the system is good[5].Cost required to develop this system is minimum as compared to other system, but the more complex as compared to other system .To control the appliances it uses actuators.

III. PROPOSED SYSTEM

A. Hardware Module

In this proposed system NODE MCU is used to connect the home appliances to the user through WIFI. Data collected from sensors is analysed by NODE MCU ,and accordingly appliances are operated. Energy consumption of each appliances is transferred by WIFI module to the smartphone using MQTT server.

- 1) PIR sensor to detect the human presence
- 2) Temperature sensor to measure temperature
- 3) LDR sensor to detect intensity of external light Based on user command it operate.

At command are given to NODE MCU through android application. It also uses sensor data to manage the appliances automatically when it is set to auto mode

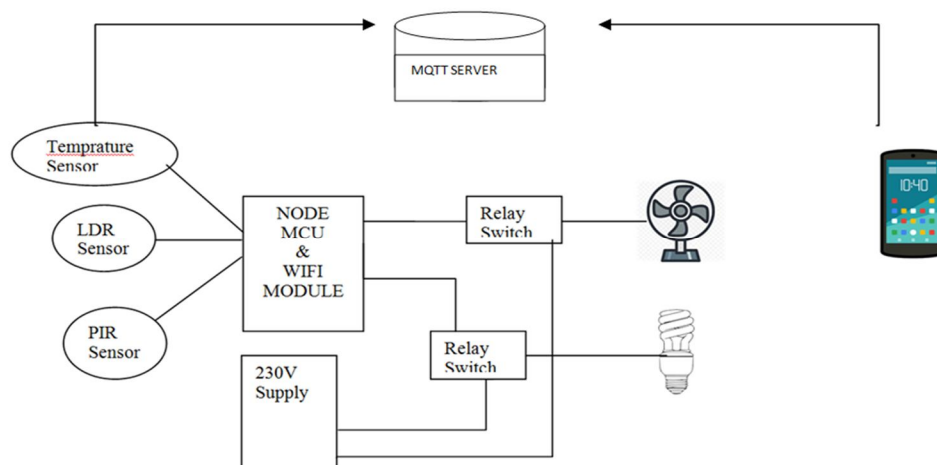
B. Server Module

The proposed system uses MQTT server as intermediate to control data from NODE MCU and user. Due to use of server the command send by user is implemented in less than.

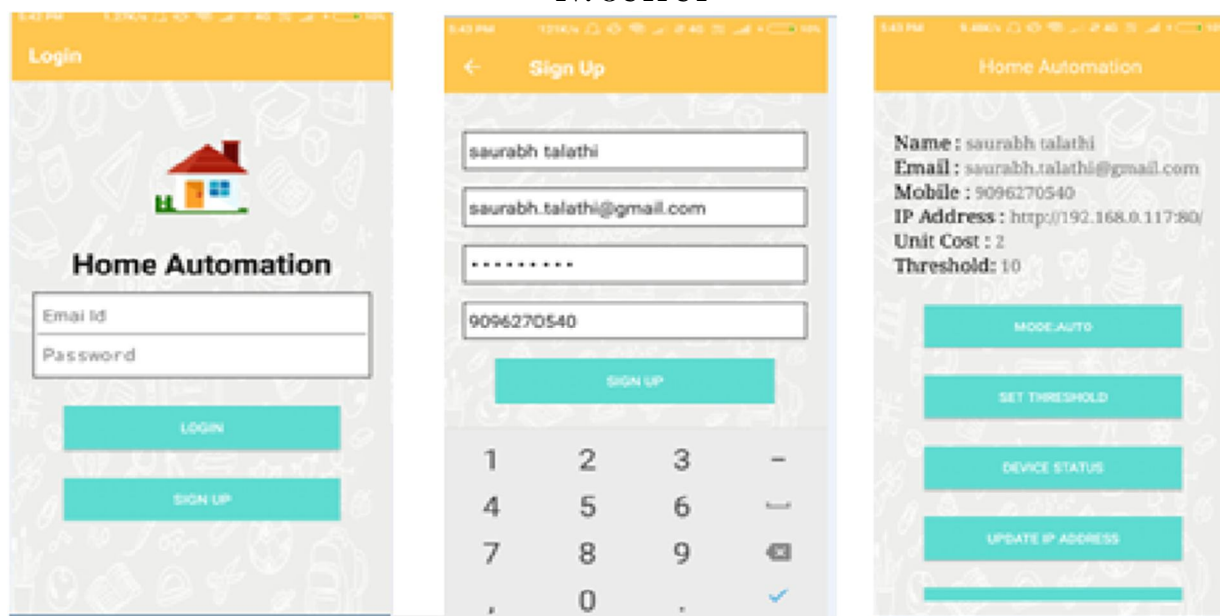
C. Android Application Module

Controlling Home Appliances via Application Switch To develop an application that includes the features of switches mode application. Switch Mode can be used to control the switches of home appliances. It allow user to control appliances through android application. It consist mainly three operating mode.

- 1) *User Mode:* in this user can control the appliances manually through android application.
- 2) *Auto Mode:* In this NODE MCU automatically control the home appliances based on data collected by sensor. This html script data is converted into xml so that it will be compatible to store data in MQTT server. When user send command to turn on light or fan through phone, it is transmitted to WIFI module in AT commands to server. This AT command is transfered to NODE MCU by WIFI module and accordingly NODE MCU Set the appliances.
- 3) *Protect Mode:* This mode can used only when there is no one in home. In this when user turn on this mode on the PIR sensor set on. This sensor is used to detect the human presence or motion in home ,if any motion or human presence found in home then the system will create alert ,that some malicious activity detected.

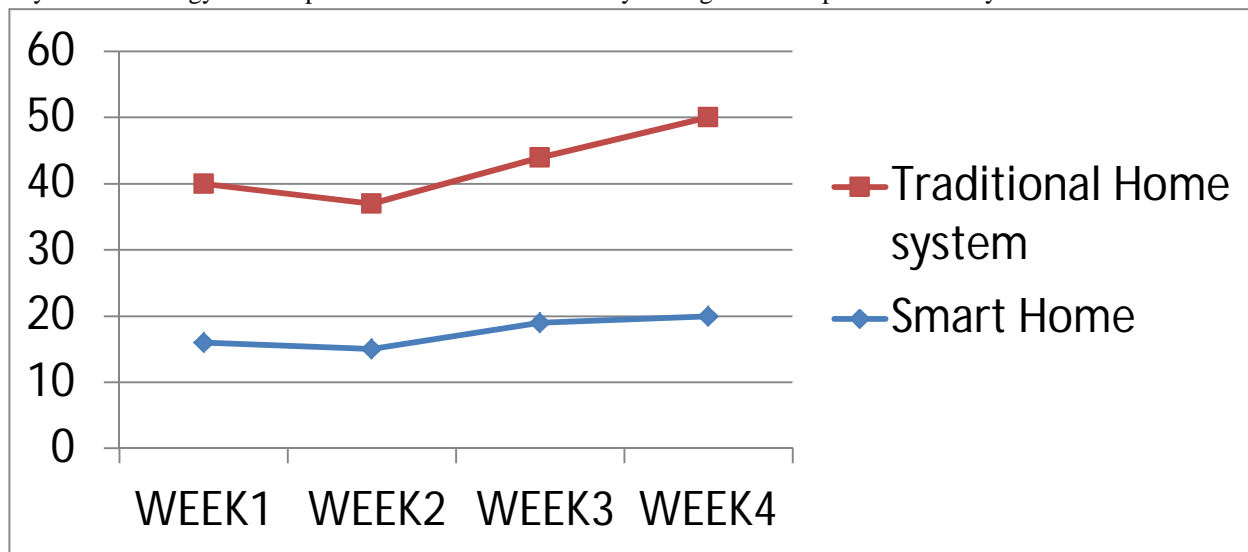


IV. OUTPUT



Application to Control home Automation System.

Due this system the energy consumption of the home is efficiently managed under specified limit by user.



V. CONCLUSION

In above mentioned system's allows either manual or automatic access of appliances. Sometimes consumer forget to switch o light and this may lead to unnecessary wastage of energy. So the system help user to reduce their consumption by automation in light and appliances.

- A. The system allow user to manage their remote area appliances using android phone through network. It automate lights and fan based on weather condition and external luminance. It provide electricity consumption of their appliances and other electrical equipment to user which help user to get aware about their electricity consumption and to manage them accordingly.
- B. The system consist of three hardware components: User local device like smart phone,pc to transfer signals to home appliances using internet, a web server store customer records like(password,username,other all data) and support services to the other components, and a mobile device running Android application.



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