HOME AUTOMATION USING IOT AND BYLNK APP

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Abstract: As the technology is advancing towards automation, the need of efficient controlling of the appliances is required as it saves the wastage of unnecessary power. Light and fan which are basic home appliance consume lot of power. Unnecessary wastage of power is due to turning on the lights during daytime and running the fan during winter season. A system is proposed to control home appliances using blynk app. The basic home appliances and sensors are connected to internet using nodemcu as a microcontroller. The various sensors read the data from the environment and send the data to blynk app. Based on the sensor values the nodemcu will control the appliance through relay switch board.

Keywords: Blynk app, Home appliances, Nodemcu, IOT, Blynk server.

INTRODUCTION

As of today, internet has become a part humans' life, affecting the daily activities of almost every human being. Apparently every second a Smartphone with advanced feature are released out in the market. It concludes that internet users with advanced Smartphone features are increasing day by day. Thus connecting the appliances possessed by humans to the internet and eventually controlling and monitoring those appliances via smartphone is goal of this project.

IOT [1] allows variety of objects or things such as Radio Frequency identification (RFID) tags, mobile phones, sensors which interact with each other to reach common goal. The high-speed internet due to 4g LTE cellular technology has become a boon for present generation which allows the evolution of IOT based home automation system. IOT allows the sharing of information from sensors through wireless network, achieving identification and information exchange in open computing network. Things that we use in our daily life activities are becoming smart with current technologies but it still not enough until we link them in changing environment [2]. Different algorithms and technologies has been explained in wireless sensor network survey [3][4] and smart city using IOT application has been proposed .A system has been designed to connect sensor data with the user daily life activities. There are many Smartphone-oriented controller products, but these products have platform compatibility and graphical user interface in such system is complex. The proposed system is simplified for controlling and monitoring experience. The various sensors in home allow the monitoring of the environment and controlling remotely based on sensor data. The microcontroller is used to process the sensor data and the sensor data is sent to mobile application through web server. With the advancement of technology electronic appliance can be controlled and monitored with help of the internet connection has become possible. It gives us an opportunity to have full control over a place even if we are far away from it. IOT allows the controlling of many devices simultaneously and it also reduces human efforts. The user interface is simple which allows the user to easily control the appliance through internet. Through the mobile application we use to send the commands to the microcontroller which in turn controls the appliance through relay switch board. In the meanwhile, the microcontroller also read the data from the sensor and displays these sensor values in mobile application. Besides controlling and monitoring household appliance, the proposed system also provide notification of whether the appliance is turned on or off and preventing wastage of power by automatic turning off of an appliance. Thus the system allows efficient control of home appliances through internet.

LITERATURE REVIEW

Kumar Mandula et.al [5] proposed Arduino based home automation system using Bluetooth and Ethernet. For indoor environment Bluetooth based home automation is proposed where Bluetooth mainly useful for short range wireless communication and it is used for connection establishment between Arduino and smart phone. The drawback of the

Bluetooth based home automation system is overcome by Ethernet technology where ethernet module is used for connecting to Arduino board from any part of the world.

Smart home design using Nodemcu and blynk framework where various appliances are controlled and monitored via smartphone using wifi as a communication protocol and raspberry Pi as private server [6].

A smart home control system where smart central controller is used to set up a radio frequency of 433 Mhz wireless sensor and actuator network. Various control modules such as switch modules and radio frequency control modules has been developed using wireless sensor and actuator which is used to control all kinds of appliances [7].

Home automation using android application [8] is proposed where android application is used to send commands to Arduino to control appliances. The system is designed to control voltages levels of home devices like fan light based on temperature and light intensity. The users also get the status of the home appliance in their smart phone.

A home automation system that is interfaced with android mobile device is proposed [9]. Wifi is used for communication between system and mobile device. Command such as on/off is used to control electrical equipment such as light, fan and air conditioner. They have designed simple GUI application for setting the timer at home.

A web based application to control various electrical devices which are connected Arduino microcontroller via relay switch board is designed by Somnath singh[10].

City Pulse[11] project has been focused on developing, building, and testing large scale real time IOT and relevant social data stream for knowledge extraction in city environment.

The Smart Santander [12] project describes how the high level architecture of IOT experimentation facility being deployed in Santander city.

SYSTEM DESIGN

The design of the system is divided into two major parts hardware and software design.

Hardware design involves connecting various sensors, devices and microcontroller where as the software portion involves coding using Arduino ide and uploading the code to microcontroller.

The specification of the various components used in the system are discussed below

Fig 1: Nodemcu

ESP8266 Nodemcu: Nodemcu [13] is low cost wifi module chip which can configured to connect to internet for internet of things. It is mainly used for controlling the various home appliances and monitoring of the various sensors. It has built in wifi connectivity for sending and receiving data from mobile application through internet server. It will read the sensor values and send those values to mobile application and receive the commands from mobile application to control appliance via relay switch board.

Fig 2: pir sensor

Pir sensor: It is an electronic sensor for measuring infrared light radiating from objects. It is mainly useful for motion detection and automatic lighting application.

Fig 3: dht11

DHT11 Sensor: This sensor [14] is mainly useful for measuring the temperature and humidity of the environment.

These sensors receive information from the environment and send them to the nodemcu.

Mobile application- Blynk[15] an android application which provides various widgets to display sensor values received from the nodemcu and it provides various buttons which provide commands to nodemcu to control various appliances through clicks.

Blynk server- Communication between blynk application and nodemcu happens through blynk server. Mobile application and blynk app transfer the data through this server.

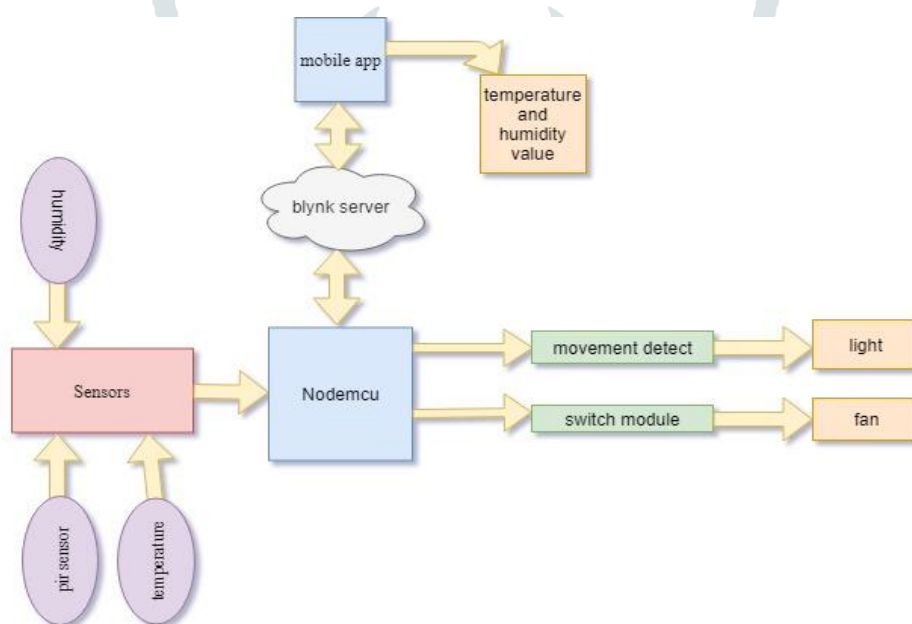## SYSTEM ARCHITECTURE AND IMPLEMENTATION

Fig 4: system architecture

The proposed system allows the user to control the appliance in his home remotely from smartphone. The user can control his control his household appliance using internet via mobile application and monitor the parameters of environment by the reading the sensor data in the mobile application. We supply 5v power supply to nodemcu and other sensors modules and relay module will power up. The pir sensor will send motion detection values and DHT11 sensor will send temperature and humidity values to the nodemcu. The user gets these data in the mobile application via blynk server. If any movement is detected the nodemcu will provide an output signal to relay module which turns on the light which is automatic way of controlling the appliance. The user can also control the appliance through clicks in mobile app. On pressing the suitable clicks the nodemcu gets instruction via blynk server which provides the output signal to actuator circuits. When the relay is turned on the appliance gets power of 230v AC power which turn on the appliance like fan.
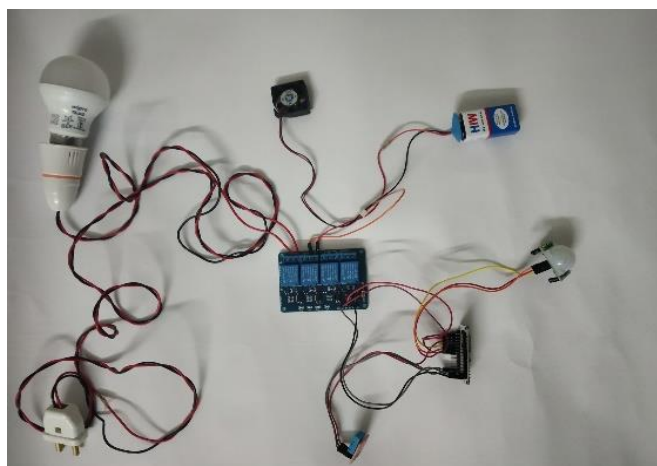
IMPLEMENTATION

Fig 5: the entire setup of proposed system

The implemented system performs three functions automatic turning on/off of light based on the movement, turning on/off of fan through clicks in mobile app and monitoring of temperature and humidity.

The system mainly consists of 3 sub system where first sub system consist of pir sensor which is used motion detection, second subsystem consist DHT11 sensor for temperature and humidity and third sub system consist of nodemcu microcontroller which acts a central coordinator that communicates with the other sub system using wifi. Nodemcu microcontroller controls various appliances through relay switch module.

The nodemcu is powered up by 5v which searches SSID (service set identifier) and connects automatically to the internet. If nodemcu does not find SSID it remains offline and performs automatic controlling of light.

The nodemcu will send all the sensor values to the mobile application through blynk server where various widgets in application will display sensor values.

The system usually operates in two modes automated mode and manual mode. In automated mode pir sensor will continuously monitor the movement, if any movement is detected the nodemcu will turn on the light via relay switch module. In manual mode the user will manually control the appliance via mobile application through clicks.

RESULTS

The Blynk app provides the feature for controlling the various appliances and reading the sensor module data. In the blynk app various widgets are provided for various sensor modules.

The widget labeled motion will show the reading the pir sensor value. If any movement is detected the value is fluctuated between 0 and 1. Further, it will send the instruction to turn on the lights to nodemcu through blynk server where nodemcu will provide an output signal to relay switch module which turn on the lights.

There in another button in the mobile app named trigger. When this button is clicked we get the notification when the light is turned on.

The fan button in mobile app is used for turning on/off with just clicks. When this button is clicked the nodemcu will provide output signal to relay module turning on the fan.

Lastly the temperature and humidity widget will show the temperature and humidity values. These values were delivered by the dht11 sensor.

Fig 6: Screenshot of the output image

CONCLUSION AND FUTURE SCOPE

The proposed home automation system provides simple user interface for monitoring and controlling various appliances remotely within wifi range. The system can be further upgraded and enhanced by using various other sensors and home appliances. As the smartphone users are increasing in mass numbers, this system can be benefitted to many people which provides a smarter and efficient way of controlling various home appliances. The feature of emergency notification is very useful in gas leakage detection. In this case the user gets the notification through blynk app. Thus, IOT based home automation is much better than all existing home automation system

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