Home Automation With Blynk And Nodemcu

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Abstract: The need for conservation of energy is very high in demand due to rise in population and consumption of energy.The main reason of energy loss is due to no access and control over the appliances remotely. AnApp or web application is employed by user to offer instruction to those systems. This system can make use of a number of communication method like Bluetooth, Wi-Fi, Zigbee, GSM.Different configurations and controlling devices are often discovered in the existing system. These systems are there in many place for a good sort of reasons and application. In this paper,there is a studyof related systems.

1.   Introduction

In the busy schedule and never-ending time constraints, we often tend to forget to switch off the home appliances such as lights, fans etc., It causes wastage of enormous amount of electricity, considering that this happens so often in most of the houses. It is indeed the duty of all humans to try and conserve electricity for the future generation. Home automation deals with controlling the home appliances automatically so as to save electricity and prevent damage of the electrical appliances due to over-charging, over-heating etc., In this project, the main objective is to control the home appliances using smartphone application or Google Assistant from anywhere in the world. For this, we use IoT technology, NodeMCU-ESP8266 Development board and Arduino IDE. We use the Blynk app to communicate with the project.

Electrical and Electronic environment in this perspective is the environment thatincludesmachines such as heater,fans, motors, air conditioners, lighting systems,television sets, etc.,.Using App or Web application remote access is established between every appliances in a remote access environment. This remote access environment is already available in market with variety and drawbacks too. The paper gives the survey of all such system and compare present features.

Figure 1.1   NodeMCU-ESP8266 Figure 1.2Blynk Application

2. Objectives

The main aim of ths paperincludes to control the appliances used for household purposes using a smartphone application from anywhere in the world. for this, we use IoT Technology, NodeMCU-ESP8266 Development Board and Arduino IDE software. We can either use IFTTT to interface this system with the Google Assistant by creating Applets, so as to be able to control the home appliances using voice commands given to the Google Assistant or we can control the appliances in Wi-Fi range directly through Blynk app.

2.1 Problem Formulation:

85% of the world has access to electricity. It is increasing enormously in the last decade due to urbanization and rural developments, 30% of electricity gets wasted every year. This is a serious problem to be considerd.

This problem can be partially solved by installing home automation systems which can save enormous amount of electricity.

2.2 Scope of Design:

The main purpose of this paper is ability to control home appliances from anywhere in the world using a Smartphone Application . This enables us to conserve electricity by decreasing the electricity bills, the hardware requirements are, NODEMCU-ESP8266 Development board, four relay module and other software reqirements.

2.3 Motivation:

Traditional automation of home systems like Wi-Fi controlled or Bluetooth controlled home automation systems can control the home appliances from within the range of the connection, which does not exactly serve the purpose of the automation.

3. Description of the project

3.1 Existing System

3.1.1 Bluetooth Controlled Home Automation using Cell Phones: In Bluetooth controlled automation of home system, home appliances can be controlled only from within the Bluetooth connectivity range. The main motto of the home automation is to regulator the home appliances even from far places, so as to save electricity. The Bluetooth controlled Home Automation system fails to do so.

3.1.2 Zigbee Controlled Home Automation using Cell Phones:

In Zigbee controlled home automation system, home appliances can be controlled from within the range of the Zigbee connectivity. The main motto of the home automation is to control the home appliances even from far places, so as to save electricity. The Zigbee controlled Home Automation system fails to do so.

3.1.3 Wi-Fi Controlled Home Automation using Cell Phones:

In Wi-Fi controlled home automation system, home appliances can be controlled from within the range of the Wi-Fi connectivity. The range of Wi-Fi connectivity is better than that of Bluetooth and Zigbee, making it better than those systems. The main motto of home automation is to control the home appliances even from far places, so as to save electricity. The Wi-Fi controlled Home Automation system fails to do so.

3.2 Proposed System IoT based Home Automation System using NodeMCU :

It enables us to control the home appliances from anywhere in the world. It uses IoT Technology to connect to the devices from the Blynk server, NodeMCU-ESP8266 Development board as the Micro-controller and Arduino IDE for Software Development. It uses Blynk app to communicate with the given devices or appliances to turn it on or off.

3.3 System Modules
3.3.1 NodeMCU-ESP8266 Development Board:

The Best IoT platform available in market is NodeMCU. Node MCU runs ESP8266 based firmware which supports WiFi and ESP-12 module.The Device makes use of Lua scripting and Arduino language. It is built on SDK based on Non-OS for esp8266 and supported by eLua project. The firmware is represented by the name Node MCU than development kit. Node MCU has been used in many projects like SPIFFS and lua-cison.

3.3.2 Relay Board:

A relay is an electrically operated switch. Relays can be used according to necessity to control circuit by separate signal of low-power, or thatmany circuits must be regulated by single signal. A n-channel relay board consists of n such relays. Hence, four channel relay board can be connected to four appliances at once.

3.3.3 IoT Technology, the Internet of things (IoT) :

It is new concept of connecting Internet to physical devices and any everyday objects. Embedded with electronics, Internet connectivity, and other sorts of hardware (such as sensors), these devices can communicate and interact with others over the web and that they are often remotely monitored and controlled.

3.3.4 Blynk:

Blynkissoftware designed for IOT with custom device management analytics, mobile apps, private cloud, rules engine dashboard. This App has feature of access to hardware remotely and display sensor data, store data in cloud and visualize and do endless things.
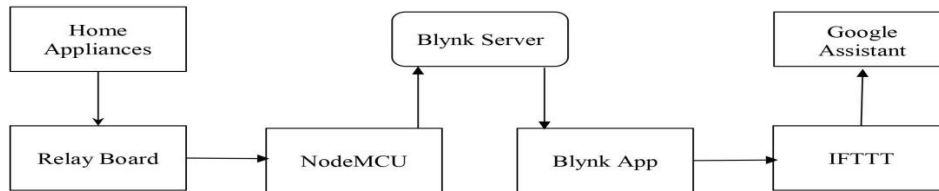
Block Diagram:

Figure 4.0 Block Diagram

This project can be divided into three modules: The NodeMCU end, the user end and the cloud/server end. The NodeMCU end includes the connections made to the NodeMCU that are mentioned in the connection diagram. In the block diagram above, the NodeMCU, Relay Board and the Home Appliances constitute the NodeMCU end. The user end consists of what the user can access or see. In the above block diagram, Blynk App and Google Assistant constitute the user end. The server/cloud end includes the server that is accessed and the information that is transferred through the server. Blynk server accesses the information sent by the Blynk app and sends it to the NodeMCU for further processing. The Google server accesses the information sent through the Google Assistant, processes it and sends it to the Blynk app for further processing.
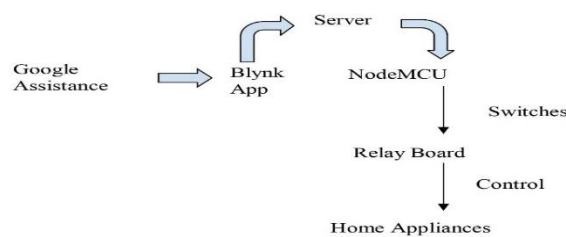
4.1 Flow project:

Figure 4.1Flow project

When command is given to the Blynk App, it connects to the NodeMCU using the server and sends the required information regarding the action to be taken. The NodeMCU switches the relay board depending on the information. The relay board in turn controls the devices. When command is given to the Google Assistant, it processes the command according to the Applets created and if the command is present, the information about what is to be done is sent to the Blynk App. Further the same steps are carried out.
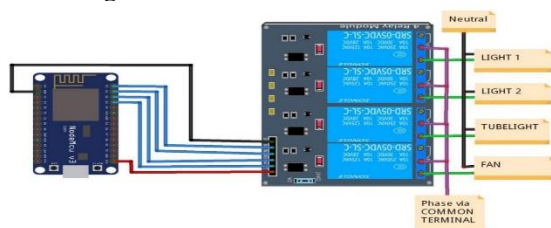
Connection diagram

Figure 5.0 Connection diagram

Methodology
● A project must be created on the Blynk app and Auth token must be obtained.
● The application should be made as required with the switches.
● NodeMCU should be connected to the laptop and powered up. Code should be dumped on to the NodeMCU.
● Relay board and the home appliances should be connected to the NodeMCU.

6. Software environment

6.1 Arduino IDE:

The Arduino programming can be done by using java programming language and IDE provided by Arduino. The IDE is used for writing and uploading programs in Arduino boards like Arduino Mega, Uno, Node MCU etc., The Arduino programming includes both C and C++ which is supported by Arduino IDE with small code rule changes.

6.2 IFTTT: If This Then That, also referred to as IFTTT may be a free web-based service to make chains ofsimple or straightforward conditional statements, called applets. An applet is triggered by changes that occur within other web services.

6.3 Blynk App:

Blynk app is a desktop or a smartphone application which enables us to create interfaces for project using the widgets provided.

7. System specifications

7.1 Hardware Requirements

7.1.1 NodeMCU	**7.1.2 Relay Board**
Type: 32-bit Microcontroller	Power supply: 5volts current: 10A(250VAC, 28VDC)
CPU: @80MHz or 16MHz	PCB Colour:BLUE
Memory: 32 KiB instruction, 80 KiB user data,	**7.2 Software Requirement**
Input: 16 GPIO pins ,**7.2.1 Arduino IDE**	
Power Supply: 5V	OS: Windows, Mac OS, Linux
Type: IDE	
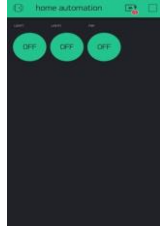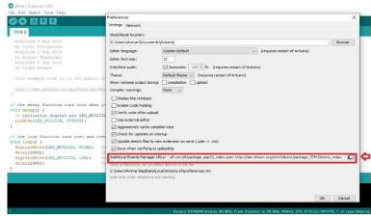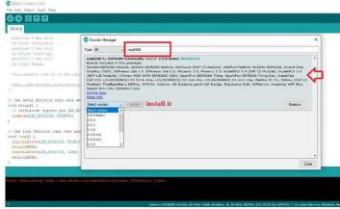
8. Implementation

8.1   Setting up ofBlynkApp

8.1.1 Blynk App Step 1	Download the Blynk app. A screen will appear when you open the Blynk app, Asking for login
8.1.2 Blynk App Step 2	 **Figure 8.1.2 Blynk App Step 2.** Login using an account if available, else create a new account and sign in, A page will appear as shown above**.**
8.1.3 Blynk App Step 3	 **Figure 8.1.3 Blynk App Step 3** Go to new project.The screen above will appear.

8.1.4 Blynk App Step 4	 **Figure 8.1.4 Blynk App Step4** Enter the project name and choose device as NodeMCU and choose connection type as WiFi A blank screen will appear as shown.
8.1.5 Blynk App Step 5	 **Figure 8.1.5Blynk App Step5** click on top right corner and select widgets.

8.2   Setting up of ArduinoIDE

8.2.1 Arduino Step1	 **FIGURE8.2.1 ARDUINO STEP 1** Download and install the Arduino IDE
8.2.2 Arduino Step2	 **FIGURE 8.2.2 ARDUINO STEP 2** Go To Tools -> Board->Boards manager and search for esp8266 and install the library.
8.2.3 Arduino Step3	 **FIGURE 8.2.3 ARDUINO STEP 3** Download the Blynk Library and unzip.Add the file to Arduino IDE. Go to Tool-> boards-> and select a NodeMCU 1.0

9. Result analysis

9.1 Turn ON Light1

WhenLight1buttonisturnedONintheBlynkapporwhenthecommand"TurnONLight 1" is given to the GoogleAssistant.

9.2Turn ON Light 2

WhenLight2buttonisturnedONintheBlynkapporwhenthecommand"TurnONLight 2" is given to the GoogleAssistant.

9.3Turn OFF Light1

When Light 1 button is turned OFF in the Blynk app or when the command "Turn OFF Light 1" is given to the Google Assistant.

9.4 Turn OFF Light2

When Light 2 button is turned OFF in the Blynk app or when the command "Turn OFF Light 2" is given to the Google Assistant.

Conclusion & future scope

The project has proposed the idea of smart homes that can support a lot of homes in automation systems. A smart home builds a interconnection between sensors, wireless communication, monitoring and tracking. Smart homes are huge system that involves multiple technologies and application that can be used to provide security and control of the homes easily. The final product of this project helps in controlling home appliances using a Smartphone application from any part of the world. This helps in minimizing human effort and cost of living by decreasing the power consumption and thus the electricity bill and maintenance. This project can be made to automatically control the home application by the use of sensors. Hence the home appliances can be controlled without human intervention, further minimizing human effort. It can also be connected to more devices such as an electric gas stove, AC, Geyser etc., which can help in home security as well, by further decreasing the hazards caused.

References

1. BarisYuksekkaya, A. AlperKayalar, M. BilgehanTosun, M. KaanOzcan, and Ali ZiyaAlkar "A GSM, Internet and Speech Controlled Wireless Interactive Home Automation System", 2006, IEEE Transactions on Consumer Electronics, Vol. 52(3) , pp. 837 - 843.
2. RozitaTeymourzadeh,Salah Addin Ahmed,Kok Wai Chan and MokVeeHoong , "Smart GSM Based Home Automation System", 2013, IEEE Conference on Systems, Process & Control, Kuala Lumpur, Malaysia. International Journal of Computer Applications (0975 – 8887) Volume 116 – No. 11, April 2015.
3. EMPLOYEE BENEFITSAS A COMPETATIVE STRATEGY FORBUILDING EMPLOYER BRAND IN COVID-19 ERA, Poonam Pratap Dev International Journal Of Advance Research In Science And Engineering http://www.ijarse.com IJARSE, Volume No. 09, Issue No. 10, October 2020 ISSN-2319-8354(E).
4. A. Alheraish, "Design and Implementation of Home Automation System", 2004, IEEE Transactions on Consumer Electronics ,Vol. 50(4) , pp. 1087-1092.
5. M.Van Der Werff, X. Gui and W.L. Xu, "A Mobile based Home Automation System, Applications and Systems", 2005, 2nd International Conference on Mobile Technology, Guangzhou, pp.5.
6. Mahesh.N.Jivani, "GSM Based Home Automation System Using App-Inventor for Android Mobile Phone", 2014, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 3(9), pp. 12121-12128.