

ENERGY CONSERVATION IN HOME AUTOMATION USING IOT

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Abstract: Nowadays global development of generation inside the fields of automation is getting less complicated and better in all aspects. There's a speedy growth in range of internet users. Smartphones have performed a very essential position in supporting customers with a much better internet service and exclusive on-line applications. The idea of domestic automation is implemented using IoT (Internet of things). There has been a time whilst people used to carry out domestic automation using Bluetooth (without internet). Now technology has made an amazing exchange and Bluetooth is switched to WIFI. Iot based home automation is now becoming more popular application. This paper presents the design, idea and implementation of IoT (internet of things) based intelligent home automation system that transforms an ordinary residence into a smart home while increasing the energy conservation and providing higher standards of safety. This system has greater flexibility, reliability and accuracy with minimal human involvement. This system is easy and reliable because it uses Node MCU esp8266 with numerous sensors to make the system effective. The system can control many gadgets or home equipment at a time.

The concept of conserving energy is to use energy as per requirement and avoid its wastage. This includes simple things like turning off lights and other gadgets when not in use, etc. One of the most important motivation for the people to conserve energy in their homes is the accrued savings in their power bills. The main objective of this paper is to regulate the working of home appliances like Fans, Lights, etc. using Blynk software or Google Assistant through Node MCU esp8266. Now-a-days, maximum energy is wasted because people forget to turn off electrical appliances after using them. One of the major reasons for it to happen is the proximity of the switches from the user. With a view to handle this situation, we have proposed a low-cost system which uses Node MCU esp8266 which assist users to controls the operation of fans and lights from anywhere around the world using Internet. The proposed system also indicates an approximate power consumption of the entire house to the user by SMS/e-mail.

Keywords—Smart home; IoT; Home automation; Sensors; Energy Conservation.

I. INTRODUCTION

Electrical energy could be very vital form of power in normal use. With the fast improvements in the wi-fi communication technology, there are many enhancements in numerous industrial components which reduces human efforts. So, we will be implementing energy conservation technics with minimal human involvement. It is an era of modern technology; world is becoming faster and getting closer. Due to this reason, our homes should also become a part of it. Sitting in any part of the world, we can operate our home just by using a smart phone. Thanks to the 'smart home automation technology'. Home automation (HA) is becoming very much popular these days due to its various advantages. It has the ability to provide good quality of life. It can act as a remote interface for home appliances. Research community has been attracted towards the Smart home automation system. Some of these systems are limited to support basic operations, while some others satisfy a range of additional primitives.

Automation is a technique of running or controlling a process by way of digital devices with reducing human involvement. The need of constructing an automation system for a workplace or home is growing everyday which has several benefits. Research scholars are working to build environment friendly and cost-effective automatic structures to reveal and control one of a kind home appliance totally as per requirement. Automation is helpful in green and reasonably priced use of the power. People use special types of communication methods on top of these applications to govern home equipment, business appliances, and different types of automation. wired and wireless are two types of communication techniques.

In wired communication, generally copper wires are used while in wireless communication we transmit signal wirelessly. Here we are applying the IoT based domestic automation system for energy conservation. Internet of things (IoT) uses internetworking of many devices, cars, homes and different gadgets in combination with electronics, software program, sensors, actuators, and community connectivity that allow those items to gather and exchange data. In this paper we defined a power conservation mechanism together with far off home equipment control system that can control home appliances through the usage of a cellphone application or google assistant. Domestic automation controls most of the electrical devices in our home, irrespective of our physical presence. This automatic system has less manual operation which provides additional flexibility, reliability and accuracy. This controller is extremely reachable at places in which we can manage the ON and OFF states of gadgets but no wired connection to that region is available. The microcontroller could then control and device based totally on the statistics given to it. The proposed method should be clean to apply, simple, comfortable and strong enough to benefit most of the cell phones. Completely computerized mode controlling the home equipment relies upon on the output of the sensors interfaced with microcontrollers. Typically, while we exit of the house, we switch off lights or electric gadgets to avoid any injuries due to short-circuit firing and so on. But on occasions, we overlook to switch them off and we tend to come back home again. That is wastage of time and energy and creates chaos and anxiety. So, the Smart Home System is the answer to such a scenario. The speedy boom of wi-fi communication prompted us to use mobile cellphones to control home appliances.

The house automation is getting extra attention due to its ease of use and huge operational benefits. This system along with voice recognition makes it more consumer friendly. A few require domestic automation system to fulfill their needs and comfort at the same time as for physically challenged people because it could offer extraordinary help for the them. So, to elevate the overall living standards, this system can use android based utility.

II. PROPOSED SYSTEM

1. BLOCK DIAGRAM

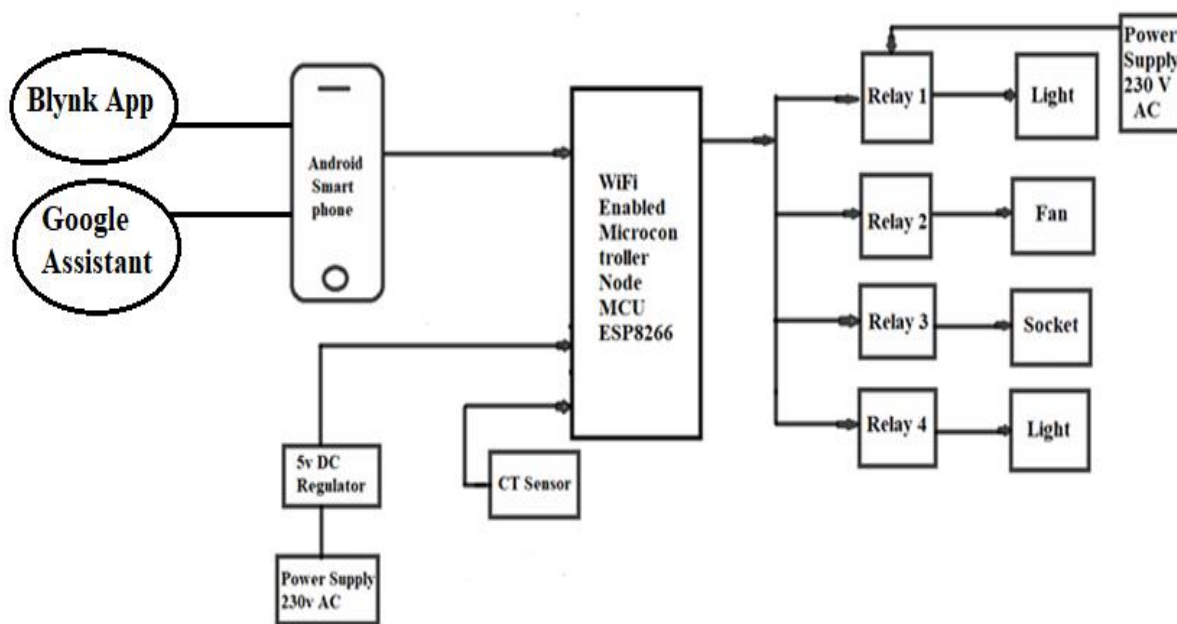


Figure No II.1. Block diagram of the proposed system.

Figure II.1. shows the basic block diagram of the operation of home automation system and various parts involved in it. The Node MCU ESP8266 is the controlling device through which application interacts with home appliances. Android application or Google Assistant is used to send the command to Node MCU which gives the input to the relay control unit for regulating the appliances. The relay unit will amplify the power to turn ON or OFF the particular device based on the input received from the Node MCU. CT Senor is connected to the Node MCU, it calculates how much energy is consumed for a given time period and that value is given as an input to the WiFi Enabled Microcontroller Node MCU ESP8266 that is sent to the energy consumption unit in the form of SMS/E-Mail. The main power supply is connected with the step-down transformer. The step-down transformer is connected to the bridge rectifier. The rectifier will convert the alternate current into direct current. In circuit capacitor used for to convert pulsating dc to pure dc using filter. From the rectifier the voltage is passed to the voltage regulator. Voltage regulator is used to control or regulate the circuit. From the voltage regulator the voltage is passed to the microcontroller (Node MCU ESP8266). From the microcontroller the voltage is passed to all other devices. The relay circuit will indicate the ON/OFF of the various appliances. The appliances are directly connected to the power supply.

2. Data flow diagram of the proposed system

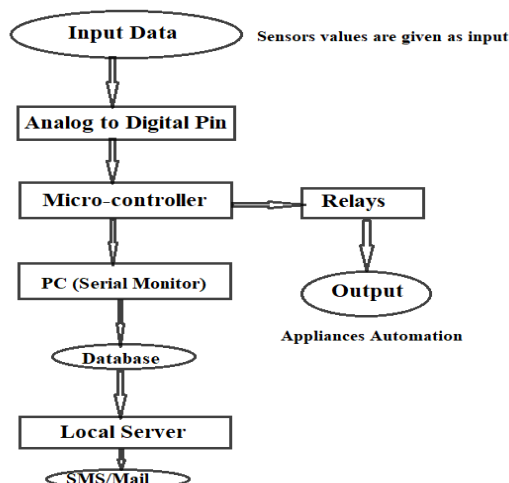


Figure no. II.2. Data flow diagram of the proposed system

III. HARDWARE DESCRIPTION

1. CT Sensor: -

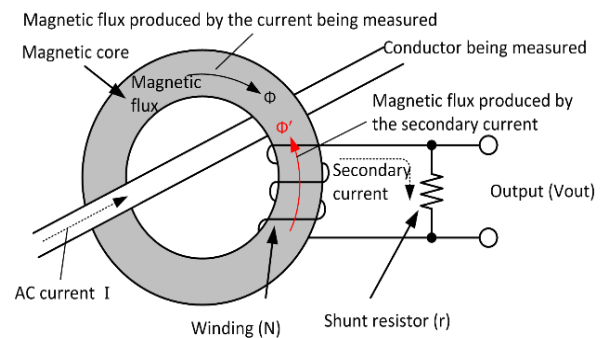


Figure no. III.1 CT sensor

CT sensor means current sensor. It is used to calculate current consumption of the system or particular wire. The principle of converting the current being measured to a secondary current that is proportional to the turn's ratio.

Measurement principle:

- An AC current that is proportional to the turn's ratio flows in the secondary-side winding so as to cancel out the magnetic flux Φ produced in the magnetic core by the AC current flowing in the conductor being measured (the primary side of the circuit).
- This secondary current flows to the shunt resistor, producing a voltage across its terminals. This voltage is the measurement circuit's output, which is proportional to the current flowing in the conductor being measured.

Node MCU ESP8266: -



Figure no. III.2. Node MCU ESP8266

IoT platform node MCU is open source. It uses 'Lua' scripting language for communication. It is based on the eLua project, and built on the ESP8266 SDK 0.9.5. It uses many open source projects, such as lua-cjson, and spiffs. It includes firmware which runs on the ESP8266 Wi-Fi SoC, and hardware which is based on the ESP-12 module. NodeMCU was created shortly after the ESP8266 came out. In December 2013, Espressif systems started producing ESP8266. The ESP8266 is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core, which is widely used in IoT applications. NodeMCU started in Oct 2014, when Hong committed the first file of NodeMCU - firmware to GitHub. Two months later, the project expanded to include an open-hardware platform when developer Huang R committed the gerber file of an ESP8266 board, named devkit 1.0. Later that month, Tuan PM ported MQTT client library from Contiki to the ESP8266 SoC platform, and committed to Node MCU project, then Node MCU was able to support the MQTT IoT protocol, using Lua to access the MQTT IoT protocol, using Lua to access the MQTT broker.

2. Blynk Application: -

Blynk application can be used on Platforms like iOS and Android to control Arduino, Raspberry Pi and likewise devices. It is a digital dashboard where we can build a graphic interface for a project by simply dragging and dropping widgets. It is really simple to set everything up to date. Blynk is not tied to some specific board or shield. Also you will start adjust or tamper with in less than minute. Instead, it's a supporting hardware of our choice. Whether your Arduino or Raspberry Pi is linked to the Internet over Wi-Fi, Ethernet or this new ESP8266 chip, Blynk will get you online and ready for the Internet of Things (IoT).

3. Blynk Server

Blynk Server is an Open-Source Netty based Java server, responsible for forwarding messages between Blynk mobile application and various microcontroller boards (i.e. Arduino, Raspberry Pi. Etc.) Blynk Cloud is a software written in Java using plain TCP/IP sockets and running on our server. Blynk iOS and Android apps connect to Blynk Cloud by default. Access is free for every Blynk user. To run Blynk Server, all we need is Java Runtime Environment.

4. Power Supply

A power supply is an electronic device which supplies electric energy to an electrical load or Applications. The main function of a power supply is to convert one form of electrical energy to another usable form and, as a result, power supplies are sometimes referred to as electric power converters. Some power supplies are discrete, stand-alone devices, whereas others are built into larger devices along with their loads. Examples of the latter include power supplies found in desktop computers and consumer electronics devices and many more.

5. Relay:

Relay is a switch which operate electrically Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid state relay. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

Pin description

Input:

- ✓ Vcc : positive voltage supply
- ✓ Ground : ground
- ✓ IN1-IN4 : relay control port

Output:

- ✓ Connect a load.
- ✓ DC 30V/10A.
- ✓ AC 250V/10A.



Figure no. III.3 Relay

IV. software design

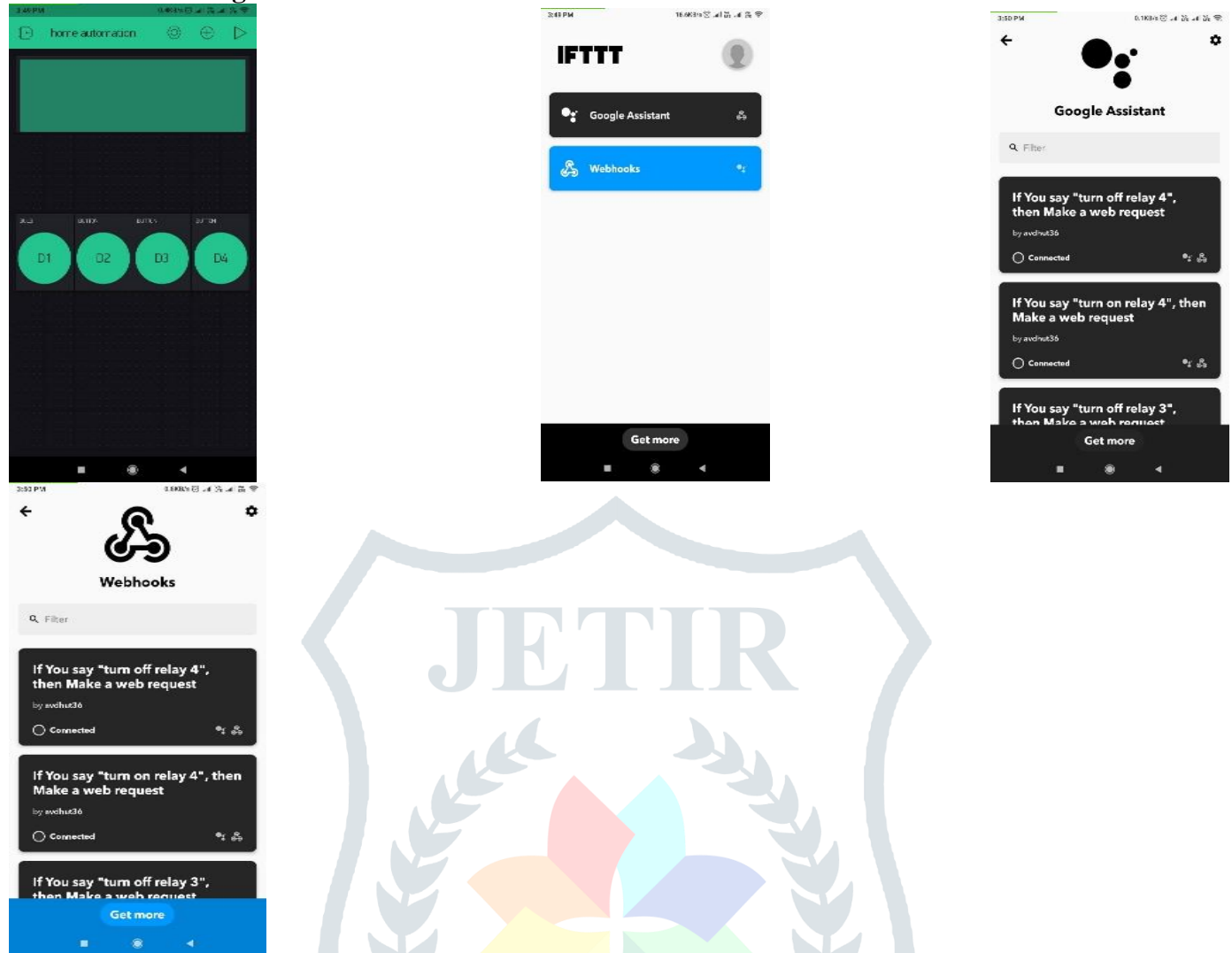


Figure no. IV.1. software design

RESULTS:

- ON/OFF the electric appliances using smartphone.
- Check the Status of electrical appliances whether is it ON or OFF at home from anywhere around the world.
- If user found electrical appliances is ON then user can operate or switch-off the appliance by using Android application or google assistance from outside the home like office or wherever the user is.
- Integration of voice recognition technology (Google Assistant) for home automation systems is very useful in modern lifestyle.
- Using this system, we can successfully save Electricity.

CONCLUSION:

An Android Smartphone can be effectively used to control home equipment's like fan/ bulb. The user can send commands to operate any electrical equipment. Android application provides user interface to communicate with system. We can save electricity and for handicapped, paralyzed and old aged people, we can make the system more user friendly and easy to operate and control.

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