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SMART SOCKET USING ESP 8266

Mr. Purushothaman B. [1], Mr. Prem S N. [2] Ms. Aarthi T. [3],
Ms.Gayathri R . [4] ,Mrs.Pushpalatha. N. [5]
[1 to 4] UG students,[5] Assistant Professor
Department of Electrical and Electronics Engineering, Sri Eshwar College of Engineering, Coimbatore – 641202.
E-mail: purushothaman1307@gmail.com , prem.sn.eee@gmail.com , aarthitamilalagan99@gmail.com , gayathribabu84813@gmail.com
pushpalatha.n@sece.ac.in

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ABSTRACT:

A common home consists of some electrical loads such as lighting, kitchen appliances, climate control equipment, entertainment devices etc… All devices consume a lot of electric power in spite of being on their standby mode. In this chapter, programmable smart sockets with ESP8266 are introduced without the need for replacing the present appliances. The implemented software allows programming, controlling and real time monitoring over Blynk platform. Furthermore, an energy management system with smart sockets is also proposed in the system framework to efficiently utilize the energy consumption. This project implements the potential of "Full Home Control",which is the aim of home automation in near future. This project is based on the ESP8266 module, Relay 230V AC to 5V DC Converter, AC Socket and DC plug. Then the Blynk Automatic is used to connect and pair ESP8266 in order to control home appliances. Using this Blynk Automation, the Home Owners Will be able to receive feedback status of any home appliances under control whether switched on or off remotely from their mobile phones. We can access either by using Local Network(Wi-Fi) or by using Internet.

KEY WORD: *Smart Plug, ESP8266, Home Automation, Smart Socket.*

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I. INTRODUCTION

A smart socket is a small adapter that can be plugged into a regular electrical wall outlet. It saves electricity consumption. It is connected to a Wi-Fi network. Without Wi-Fi connection you won't be able to control your smart plug. The main goals for the device to consume very less power at all time. Some high end energy saving sockets not only save electricity but also protect electrical appliances. The smart plug is very economical and user friendly to home and industries. We can access the device from anywhere. Once connected to the smart plug it is controlled through an application installed in the smartphone. The smartphone is used to turn on and off the device. Smart plug is very easy to control all our home appliances. They can be connected to handheld devices through Wifi, Bluetooth, etc. The main functions are remote switches and voice control.

II. PROBLEM STATEMENT

Smart socket Home automation allows you to add smart lighting to your system so that you can be able to monitor and control your home's lighting from an app on your smartphone. Some smart lighting systems can even detect when you're away and automatically switch off the lights. Problem statement Smart socket Home automation refers to control the home appliances by using computer technology. Home automation provides security, energy efficiency and ease of use hence, it is adopted more. It also provides a remote interface to home appliances to provide control and monitoring on a web browser. The main disadvantage of smart socket home appliances are Installation, Depending on the complexity of the system, installing a home automation device can be a significant burden on the homeowner. The benefits of Smart socket home automation typically fall into a few categories, including savings, safety, convenience, and control.

III. SURVEY

Smart homes based on IoT technology are becoming more and more popular. Main motto of IoT is to connect the hardware to the Internet from a remote location. So, we made a survey related to Smart Socket. We have gone thoroughly through a number of journals, research and conference papers and project reports to thoroughly understand the real world scenario of Home Automation and it's importance. Similarly, we have researched various projects that have ESP8266 and Blynk App. Some of the points that we noticed are as follows.

The Smart Socket aims at reducing the complexity of a common man in his home due to lack of time. This project is intended to generate and provide different models which have been working using the internet nothing but IoT etc.

And similarly we had done analysis of our project in detail. By the analysis we came to know that Home Automation is under developing technology for now. But in future it will be tremendous in nature. People in spite of their busy schedule Home Automation will be helpful for their daily tasks.

At this end of survey we conclude that Home Automation is necessary but at low cost and high efficiency in order to successfully implement in our day to day life.

IV. HARDWARE COMPONENTS

In our project, Smart Socket using ESP 8266, we have developed a hardware setup for continuous and efficient process. The following are the hardware components used,

1) ESP 8266
2) Relay
3) LED
4) 220V AC to 5V DC converter
5) Connecting wires
6) AC socket and plug

1) ESP 8266- NODE MCU:

ESP 8266 is Low cost, compact and powerful Wi-Fi Module. It gives Power Supply to +3.3V.The Current Consumption is 100mA.It gives input Voltage as 3.6V maximum. The input source current is 12mA max. The low power is 32-bit MCU at 80MH.Flash memory stores 512KB.It can be used as Station or Access Point or both combined. It supports serial communication hence compatible with many development platforms like Arduino. It can be programmed using Arduino. The Arduino connects with ESP8266 to control the home appliances. It is used as a low cost device to provide internet connectivity to your projects. The module can work both as an Access point (can create hot-spot) and as a station (can connect to Wi-Fi), hence it can easily fetch data and upload it. It can also fetch data from the internet using API's hence your project could access any information that is available in the internet, thus making it smarter. The applications are used such as IOT Projects, Access Point Portals, Wireless Data logging, Smart Home Automation, Learn basics of networking, Portable Electronics and Smart bulbs and Sockets.

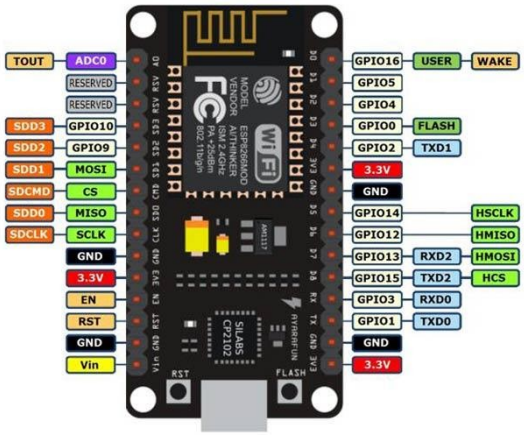

Fig 1: ESP 8266 Node MCU model

2) 220V AC to 5V DC CONVERTER:

Every electrical and electronic device that we use in our day-to-day life will require a power supply. In general, we use an AC supply of 230V 50Hz, but this power has to be changed into the required form with required values or voltage range for providing power supply to different types of devices. There are various types of power electronic converters such as step-down converter, step-up converter, voltage stabilizer, AC to DC converter, DC to DC converter, DC to AC converter, and so on. For example, consider the microcontrollers that are used frequently for developing many embedded system based project and kits used in real-time applications. These microcontrollers require a 5V DC supply, so the AC 230V needs to be converted into 5V DC using the step-down converter in their power supply circuit. Power supply circuit, itself indicates that this circuit is used to supply the power to other electrical and electronic circuits or devices. There are different types of power electric circuits based on the power they are used to provide for devices. For example, the microcontroller based circuits, usually the 5V DC regulated power supply circuits, are used, which can be designed using different techniques for converting the available 230V AC power to 5V DC power. Generally the converters with output voltage less than the input voltage.

Fig 2: 220V AC to 5V DC Converter

3) RELAY:

Relay Module is a relay interface board, it can be controlled directly by a wide range of micro-controllers such as Arduino, AVR, PIC, ARM. It uses a low level triggered control signal 3.3 to 5VDC to control the relay. Triggering the relay operates the normally open or normally closed contacts. It is frequently used in an automatic control circuit. Relay is an automatic switch to control a high-current circuit with a low-current signal. The 5V relay signal input voltage range from 0 to 5V.The trigger Current is70mA.The maximum AC load current is 10A to 250/125V AC. The maximum DC load current is 10A to 30/28V DC. The Operating time is 10msec and release time is 5msec. The maximum switching is 300 operating/minute (mechanically).The application are commonly used in switching circuit, Home Automation projects to switch AC loads, To Control (On/Off) Heavy loads at a predetermined time/condition, Used in safety circuits to disconnect the load from supply in event of failure, Used in Automobiles electronics for controlling indicators glass motors.

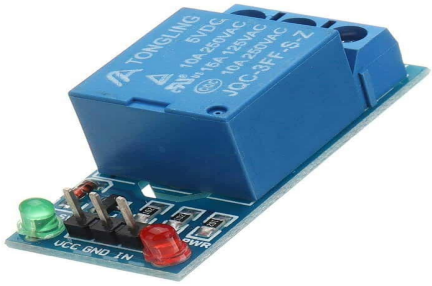

Fig 3: 5V Relay Module

4) LED (LIGHT EMITTING DIODE):

The LED is a PN junction diode which emits light when an electric current passes through it. In the LED, the recombination of the charged carrier takes place. The electron from the N-side and the hole from the P-side are combined and give the energy in the form of heat and light. The LED is made of semiconductor material which is colourless, and the light is radiated through the junction of the diode. The flow of current is because of the movement of electrons in the opposite direction. The recombination shows that the electrons move from the conduction band to valence band and they emits electromagnetic energy in the form of photons
. The energy of photons is equal to the gap between the valence and the conduction band. The gallium arsenide phosphide is used for the manufacturing of LED which emits red or yellow light for emission. The LEDs are also available in green, yellow amber and red in colour. If the receiver get signal the red LED automatically changes to green LED because of the signal passing through the antenna.

Fig 4:LED

5) AC Socket and Plug:

AC power plug and socket connect electric equipment to the alternating current and power supply l in buildings and at other sites. Electrical plugs and sockets differ from voltage and current rating, shape, size, and connector type. some types of plug to be used across large regions to facilitate trade in electrical appliances, and for the convenience of travellers and consumers of imported electrical goods. Some multi-standard sockets allow use of several types of plug improvised or unapproved adaptors between incompatible sockets and plugs may not provide the full safety and performance of an approved socket-plug combination

Fig 5:AC socket

6) Connecting Wires:

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminium.

Fig 6: Connecting wires

IV. BLOCK DIAGRAM

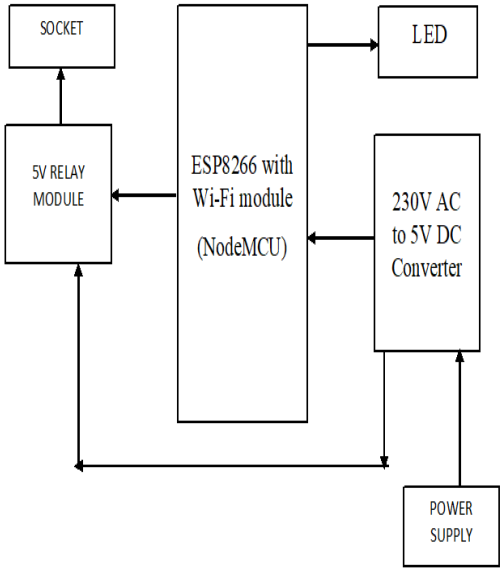

Fig 7: Block Diagram

ESP 8266 – Node MCU

ESP acts as a heart of the system. ESP consists of many pins such as

Power pins (3.3 V).

Ground pins (GND).

Analog pins (A0)Analog pins (A0).

Digital pins (D0 – D8, SD2, SD3, RX, and TX – GPIO XX)

Ground and Vin connections are given from the Node MCU to the relay and also for the 230V to 5V DC Converter. And from the D5 pin to the LED and LED is also grounded via GND pin. And D2 is given to the Relay and D1 to the Tactile or Push Button. The code is dumped on ESP 8266 in order to get the output correctly. The code is dumped using Arduino IDE.

230V AC to 5V DC Converter

This acts as a second main component in the system. The main part of the work is to convert the 230V AC Current as an input to 5V DC Current as an output in order to connect to any devices such as chargers etc…

There will be mainly 4 pins such as AC pins and +V and -V for DC pins. +V is connected to the Vin and whereas -V is connected to the GND pin. And for AC pins the socket's Ground and Neutral is connected in order to get the input.

5V Relay

This is also one of the main components of the system. The working part of relay is mainly used for switching purposes. Relay's one side terminal is connected to the ESP and another side is connected to the Socket in order to switch between the commands received by the ESP 8266. It is a relay interface board, it can be controlled directly by a wide range of micro-controller such as Arduino. It uses a low level triggered control signal 3.3 to 5V DC to control the relay.

LED

Light Emitting Diode (LED) is used for indication for the supply. Red LED is used to indicate whether the connected components are working or not and whereas the Green LED indicates whether the Output is working or not.

Power Supply

Power Supply is used for supplying the power in order to deliver to other components such as Relay, Converter etc… It acts as an input for the whole system.

Socket

Socket is used for supplying the power and acts as an Output for the whole system.

V. FLOW DIAGRAM

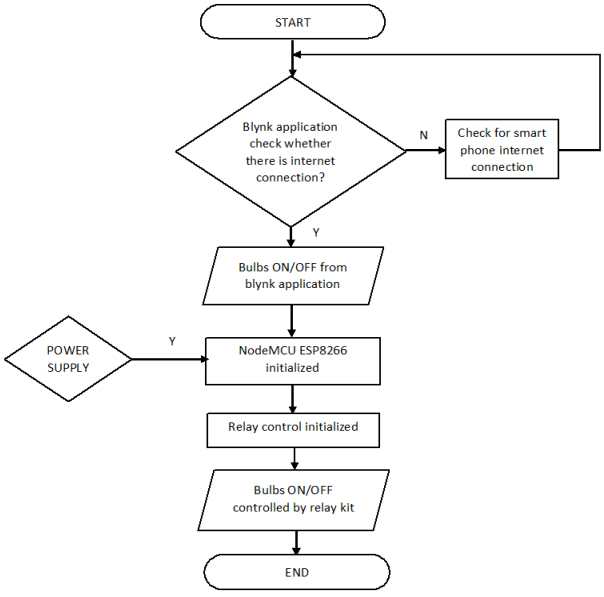

Fig 8: Flow diagram

VI. RESULT

Fig 9: Before Output (Blynk App Button on Mobile Phone Turned Off)

Fig 10: After Output (Blynk App Button on Mobile Phone Turned On - Highlighted in Green Colour)

The above shown result is done by pressing the ON / OFF button widget on the Blynk application on the respective Android smartphone for electric appliances.While the system is turned on and connected to a Wi-Fi internet connection, the output is obtained. If at any time the internet connection is lost or has a bad signal, then it also affects system performance.

VII. CONCLUSION

Based on the results of analysis of all data obtained by smart home with the Blynk and Node MCU ESP8266 module, the following conclusions can be drawn:

1. Smart Home with Internet of Things (IoT) based Node MCU ESP8266 Module can be designed with various components, hardware and software support so that it can be arranged into a smart home system that is controlled with the Blynk android application according to what is intended.

2. The Smart Home with this Internet of Things (IoT) based NodeMCU ESP8266 Module can be implemented to control some of the home electronics performance including lighting controls, fan control, temperature monitoring, early warning systems and etc.

VIII. REFERENCES

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