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HOME AUTOMATION USING SMARTPLUG

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Abstract *This paper presents a economical and easiest way out to control and supervise the home appliances using the smart plug it is a control switch which can be accessed through WiFi association. It coordinating current sensor and NodeMcu ESp8266. Clients can plug gadget into the existing control plug to remotely and automatically switching ON and OFF control, get data of device's for control utilization. There are two ways to get access the smart Plug, that's, either interfacing its specifically in WiFi remote or local client and terminal equipment, enabling the intelligent control of the home appliances.*

Keywords: Smart Plug, Home Automation, Wi-Fi, BLE, Android Smartphone.

1.INTRODUCTION

An effective use of loT for Environmental Condition Monitoring and Controlling in Homes. We also provide fault detection and correction in any devices connected to this system automatically[1].All the devices within the home can be connected by the virtue of blooming automation industry and wireless connectivity. This improves the comfort, energy efficiency, indoor security, cost savings of the home. Small and constrained embedded devices are used to remotely monitor the conditions within home and control the home appliances[2].SMS-based control of home appliances using the GSM technology without trying to access other local networks. Also, it is affordable to all classes of people as the hardware used in it is inexpensive which helps to know and control the status of different home appliances [3].A smart home needs to be human-centric, where it tries to fulfill human needs given the devices it has. Various works are developed to provide homes with reasoning and planning capability to fulfill goals. A solution is to solve the planning problem the weighted CSP is used. Knowledge representation to help in generating planning rules is also proposed, as well as methods to improve performances[4].Smart Plug is a power monitoring and management system. It will target the problem of energy saving by enhancing the user's knowledge of energy consumed by the appliance connected to the plug[5].This paper presents development of a Wi-Fi smart plug which is able to switch on/off remotely electrical appliances connected. It also monitors their energy consumption[6].A smart home appliance control system with positioning sensor which can connect home appliances with peripheral devices via wireless communication interface. Combining the GPS on smart phones, it enables location scenario control, making home appliance control easier[7].The use of the Internet of things (IoT) applied to a control of an actuator that works through temperature and approximation values[8].Smart home control system based on CoZNET to mitigate the effect of interference and reduces the energy consumption of the smart home appliances. The interference control system divides the wireless channels among the sensor nodes and the WIFI users based on Multi-Attribute Decision Modeling (MADM). Similarly, a smart light control system is used to tune the illumination level in a room by incorporating the natural light. A management station is designed to control the working time of the smart home appliances[9].The utility of individualized location determination for home automation. While current home automation systems provide localization at a GPS level, they do not identify users' locations within a building[10].

The existing smart plugs focusing only on remotely switching ON and OFF and energy monitoring. smart plug is not extremely smart still it require control signal from human to operate. This paper will define an method in which we implement an Home automation using smart plug to control and monitor the various appliances.

2 .PROBLEM STATEMENT

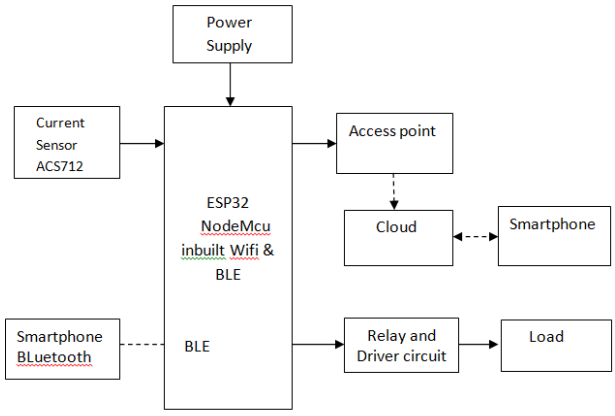
Smart plug can be used only for remotely switching ON& OFF and the energy monitoring of the appliances. It does not used for any other function. Most of the Appliances used in homes do not optimize energy consumption., the total power

consumption for a home can be determined though we cannot separately identify and observe the energy consumption of the different appliances. The Main objective of the smart plug is to control, automate and monitor the home appliances. This is achieved through the current sensor interfaced to cloud through a controller connected to internet. By doing this, we can fully automate the home without disturbing the existing control and also optimize the energy consumption.

3.PROPOSED METHODOLOGY

The proposed smart plug implemented in a plug and play Category and it has a low implementation cost and provides the ability to measure and record instantaneous energy consumption and also it automatically switching ON the appliances when the user get into the room by Bluetooth beacon. This device can directly get connected to existing home controller and turn out to be part of the system. The smart plug control which incorporates different control algorithms for controlling a specific category of appliances.

4.BLOCK DIAGRAM



The Esp32 in Fig-1 is one of the most popular board with inbuilt antenna, switches, and power amplifier. Esp32 contain power management modules, filters, and low noise receives amplifier. Esp32 is a low-cost device which supports both Wi-Fi and Bluetooth functionality. It specially designed for wearable electronics and IoT applications. Esp32 operated in ultra-low power with extra features like dynamic power scaling, power modes. Esp32 is capable of functioning reliably in an industrial environment with -40◦C to+125◦C.

Fig -1: Esp32

The ACS712 in Fig2 is sensor to measure AC/DC current up to 20A. The sensor can even measure high AC mains current and is still isolated from the measuring part due to integrated hall sensor. The current sensor operates from 5V and outputs analog voltage proportional to current measured on the sensing terminals.

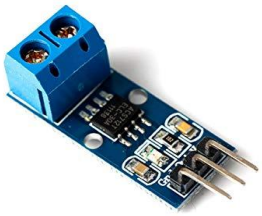


Fig-2: ACS712

The MOC3021 in Fig-3 is an very widely used opto-coupler and can be quite easily obtained from many sources. It comes in 6-pin DIP it can be used for triggering Traics They are normally connected to another power switch like a Triac in our case, this TRIAC will be able to provide enough current to drive the loads and will be controlled using the opto-coupler.

Fig-3: MOC3021

Triacs in Fig-4 are widely used in AC power control applications. They are able to switch high voltages and high levels of current, and over both parts of an AC waveform. This makes triac circuits ideal for use

in a variety of applications where power switching is needed. BTA16-600 is 16Amp rating Triac. Its Gate trigger voltage is 1.5V and reverse voltage rating is 600V. Its operational temperature range is from -40 to 125 ℃

Fig -4: BTA16

5. EXPERIMENTAL PROCEDURE FOR SETUP AND TESTING

This system measures the two most important parameters of current and nearness of user, the different steps for hardware and software implementation of Home automation using smart plug are described as below.

Step1: Connect current sensor to NodeMcu Esp32 using jumper wires.

Step2: Open Arduino Software ide, Click on Tools -> Board -> Board Manager

Step3: Install esp32 libraries

Step4: Select correct NodeMCU board and PORT number

Step5: Write code for interfacing sensor with NodeMcu Esp8266 in text editor of Arduino IDE.

Step6: Save the code and compile it. After compilation if any error occurs, debug it.

Step7: Connect the NodeMcu Esp32 module to Arduino IDE using USB connection.

Step8: Upload the code to NodeMcu Esps32.

The prototype of smart plug system has been tested by controlling the smart plug over internet and making smartphone near to the Esp32. Current sensor sense the current consumed by the load and voltage is taken as constant as per standard. After that ESP32 calculate the power consumed by load as per program send the data to the user.

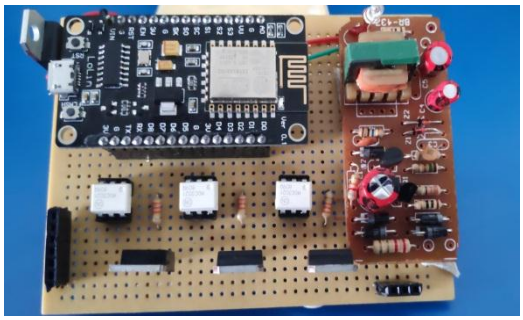


Fig -5: Experimental setup

6. RESULT

The system is working as per the requirement. The diagram below shows the complete prototype implementation of the proposed system.

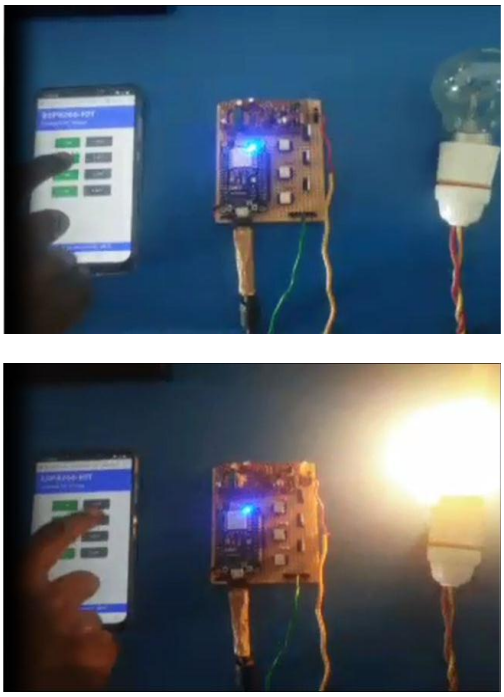


Fig-6 : Light is Turned ON and OFF by smartphone

Fig-7: Complete smart plug prototype

7. CONCLUSIONS

There are number of designs are built in this automation field but this system Home automation using Smart plug has been experimentally proven to work it does not disturb the existing control instead of it by connecting appliances to the smart plug Automation can be achieved . Those appliances can be monitored and controlled successfully. The implemented system works according to the user expectation. which is operated in two different conditions either smart phone user present at home by that it can sense how much Bluetooth of smartphone near to the system then as per coding it automatically switching ON and OFF the appliances or other is manually controlled over smartphone both can be access and control the appliances.

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