REAL TIME ENERGY CONSUMPTION MONITOR

[1]Ms S. Nandhini, [2]Abhijith P, [3]Vaibhav M , [4]Rahul Krishna Pallath , [5]Satyajeet Sarfare
[1]Assistant Professor , [2,3,4,5] Student of B. Tech
[1]Department of Computer Science and Engineering,
SRM Institute of Science and Technology.

Abstract : Power utilization has expanded exponentially over the previous years ,the expansion in the power charge unavoidable. The power resources in the present world are by and large non-limitless and in this way are getting depleted at an exasperating rate and a circumstance like this requires a provoke thought. Various units of force are being misused due to indiscreet use in private parts of India reliably .In this paper we have proposed method to monitor and manage problems based on electric power. Keen attachment is the power checking and administration system.it will distinguish or focus on the issue by improving the clients learning of vitality devoured by the apparatuses associated with the fitting. A standout amongst other preferred standpoint is that the attachment client can turn on or off the gadgets associated with the fitting or even timetable the gadgets. The framework comprises of temperature sensor, PIR movement sensor, sparkfun strong state transfer, low current sensor breakout and USB divider charger. The evaluated cost of the power utilized can likewise be known from the application. The application informs the clients, which apparatus is utilizing greater power and recommends a few hints to screen the power use.

Index Terms - **Power Monitoring, Management, Smart Plug, Relay, IOT.**

1. INTRODUCTION

Out of the total power made an offer of 65.8% is held by non-sustainable power sources. Stores of non-sustainable power sources are speedy depleting and the rate at which they are debilitating, everyone must gain ground towards assurance of intensity. The power use rate increases by 7% each budgetary year.

With the extension in dependence on electrical contraptions, the customer doesn't know why his capacity charge is when in doubt too high than foreseen. An evident clarification behind this being most of the contraptions are up 'til now eating up compel in spite of the way that it's not required. The provider of intensity in like manner ought to physically go to each home for checking the last bill. The response for every last one of these issues is to screen the clients' ability use. That they're set up to go when we do. The estimations of intensity eaten up by particular machines at our home are recuperated on the versatile application which is taken from the cloud with the help of the WIFI module. Finally, in the wake of focus the use precedents of the contraptions the application slaughters a device by customer approval if it's directly not being utilized. This is done with the help of hand-off drivers attached to the devices.

This framework makes us confine the power energizes by to 40%. This can be ensured in case we track every device and keep an eye in the unlikely event that it is getting the ideal proportion of imperativeness. This structure whenever utilized fittingly supports us in saving force and to restrain the expense.

2. LITERATURE SURVEY

India is one of the biggest makers and deal with the utilization of this petroleum product keeping in mind the end goal to decrease greenhouse outflows . Reports uncover that these petroleum products may last up to 2030. Thus, in view of the measurements we have to monitor our utilization of these petroleum derivatives. This undertaking, in this manner, helps in following consumption of power and killing the machines when we are away, and which are not in use.Through this task, we are tending to a large number of extensive issues which we would like to locate an appropriate answer for. These issues are essentially identified with electrical power utilization and electrical power networks. Initially, one of the issues that we wish to solve is the increasing power consumption trends.This could be the most imperative issue that the entire world is anticipating to tackle. Individuals, these days, areexpanding their electrical power consumption essentially. Second, through this undertaking we wanted to show the absence of electrical power utilization awareness innovations.

At the present time, there are numerous battles that are occupied with lessening electrical power consumption and urging individuals to do as such; nonetheless, these crusades do not have the required innovation which will help the mindful general population towards their goal of maximum reduction in energy consumption as words are never enough to fulfill goals in general. The third issue we are tending to is the increasing natural issues that are identified with the increasing power consumption, and the

fourth issue we are after is the need for power utilization information by the different energy companies around the world. Energy companies might want to have the enough learning about how individuals devour their electrical vitality.

Internet of things (IoT) is an increasingly repeating topic, it demonstrates a smart environment made up of objects such as RFID labels, sensors, actuators and cell phones, which cooperate and work together with each other to create savvy applications that can enhance quality of life.Remote observing of electrical consumption is one type of IoT with the possibility to influence human life consistently with the objective of reducing the consumption of electrical energy.

3.OVERVIEW OF THE SYSTEM

This paper deals with a device to monitor electricity usage and the circuit for powering off the devices when they are not in use. The software part of the system consists of a mobile and web based application platform myDevices Cayenne, which allows the user to remotely turn on or off the device connected to the plug , set triggers ,timmer and shows the statistical graph regarding the electricity consumption, temperature, current usage , etc by the plugged in device appliance.

3.1 ARCHITECTURE

To design Smart Plug we are using a standard plug. The PIR Sensor is place in the Switch socket. The relay is made using a triac and driver optocoupler. The main advantage is that it requires very less I to on and act on a large V range. Input output pin of module can precisely drive a SSR without use of transistor. The schematic of the solid state relay is as follows:
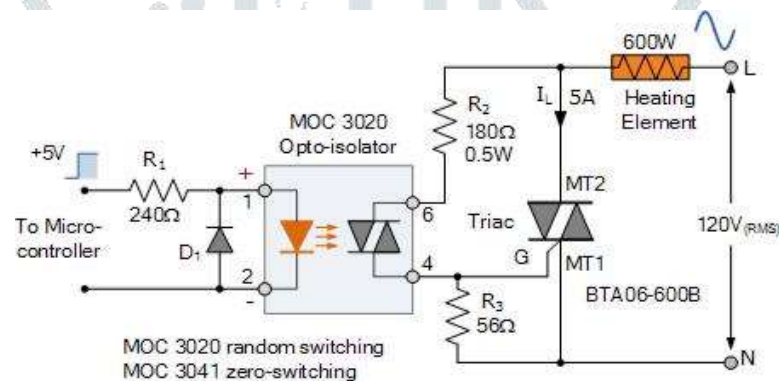

Fig. 1 Solid state relay schematics

The control circuit is operated by charger. The output is 5V but board requires 3.3V for reliable operation. So we are using a 3.3V regulator (AMS1117) IC for the conversion. The sensor (DS18B20) for sensing the temperature is connected to board. The program is transferred in the SparkFun ESP8266-12E board module and then it is connected to regulating board module. Though we used Sparkfun ESP8266-12E module for program testing & development, we are using generic board so it fits in the box . The current sensor is used to measure amount of current. We do not use any V sensor for measurement as we have the 220V as standard voltage in our country to calculate consumption rate. The triac and the current sensing device is linked to the plug in series with source. The output of the sensor ACS712 is 5 Volts and is not adaptable with the board. The analog pin of the SparkFun ESP module can endure only 1V. For the voltage conversion we add a voltage divider (5K and 1K) to get 1V output for 5V. The final device image is displayed in fig.
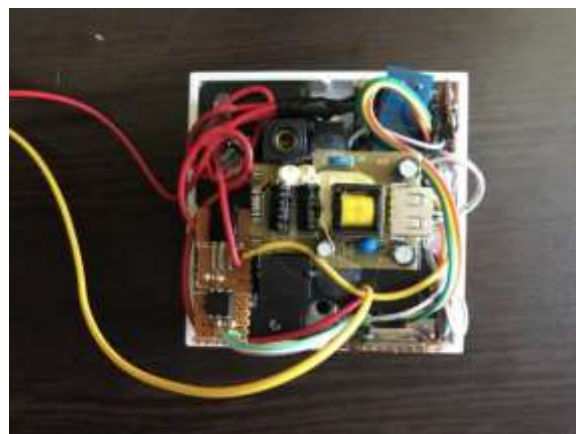

Fig. 2 Plug top view

4. METHODOLOGY

For the proposed system we will remote monitor temperature, voltage, current, energy and control the device automatic, voice, manual,or proximity by using a current sensor , temperature sensor and a PIR sensor.

To regulate the parameters to monitor and control we set the channel before programming as it would be needed during writing the code. For this reason we prepare the Cayenne myDevice environment first.

The smart plug using SparkFun ESP8266 wifi board, The following are it's features:

- Remote and Local Control - As the device software is based on Cayenne, we can easily switch on/off the device connected to plug using smartphone app or Web app.
- Motion Control - The device connected to the plug can turn on/off with the help of PIR Sensor with your omnipresence and this feature can be turned on or off from the option on Cayenne Application.
- Control with Voice - You can control the state of plug by asking Alexa.
- Power Scheduling – Create pre defined schedules for the plug and set the timer from Dashboard.
- Thermal Protection – Temperature sensor will accordingly switch off overheated appliances and notify you via the submitted medium of communication.
- Details Monitoring - It is easy to monitor voltage, temperature current and realtime state.
- Energy Usage Statistics – Monitoring the power consumption is efficient due to display of data in graphically manner.

The Cayenne environment is set as follows . First we add 3 Widgets. 2 for Value Display Temperature and Current and one for Gauge Display Widget for monitoring Voltage. 3 buttons, 1 to switch state of the Plug. The other one is for sanctioning PIR sensor and for adjusting timer. Next we add 2 State Display Widget to supervise the state of the Plug. To adjust the time, we add one Slider. After toting all the widgets, dashboard looks in this manner.

Fig 4.1 Dashboard

```
#include "WemoSwitch.h"
#include "WemoManager.h"
#include "CallbackFunction.h"
WemoManager wemoManager;
WemoSwitch *light = NULL;
void setup() {
        Serial.begin(9600);
  pinMode(PLUG, OUTPUT);
  pinMode(pirPin, INPUT);
        Cayenne.begin(username, password, clientID, ssid, wifiPassword
  sensors.begin();
  wemoManager.begin();
  light = new WemoSwitch("Smart Plug", 80, plugOn, plugOff);
  wemoManager.addDevice(*light);
  delay(100);
  digitalWrite(PLUG, LOW);
}
```
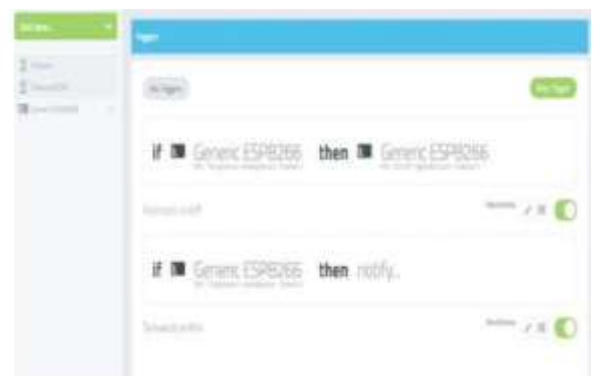
Fig 4.3 Algorithm Snippet for Alexa Voice   Fig 4.2 Trigger for notification

5.RESULT

For the proposed framework we have tried gathered its utilization design for a time of days to decide the units devoured and to check the cost brought about for the comparing utilization. By utilizing the proposed framework, we can set aside to

20% of power each month. The mobile application has shows an accurate reading when cross checked with a tester. Therefore we can say that the framework works with an near total accuracy. For large scale practical use in future, This module can be inbuilt in the switch boards for utilizing a method to monitor the consumption of electricity usage by the appliances. This would help in centralised monitoring of all appliances and save a lot of electricity. The following images shows the successful working of the mobile application.

Figure 5.1 Screenshots

6. CONCLUSION

In this paper, we have talked about how to screen the power utilization of individual machines in the family unit from one place at home without changing the wiring of the home. The information of utilization of power at our house is currently simple by the examined proposed framework, as now we can know it on our portable and in a comprehensible and reasonable way. This framework too empowers us to screen the apparatuses from a remote region. The proposed framework encourages us spare about 20% of the power month to month. On the off chance that the temperature of the room is checked and after that the gadgets are turned on and off, in light the encompassing temperature then the odds of sparing the power cost increments by 35%. Subsequently, for future work, we can include the temperature detecting gadgets to the proposed framework.

This structure can be utilized in residential and business structures. This can be utilized as a remote gadget and it can likewise be utilized as inbuilt gadget in the fittings and switch sheets in future. This would take into account a remote getting to and checking of the power utilization and would end up being extremely helpful in saving power and subsequently setting aside extra cash and furthermore helping the environment.

The framework has been working great with the 240V control supply at home and the gadgets are very much aligned to give the exact readings. These gadgets are working well with the high voltage apparatuses client authorization if it's presently not being used. This is finished with the assistance of hand-off drivers appended to the apparatuses.

This system causes us to limit the power charges by up to 40%. This can be guaranteed on the off chance that we track each apparatus and check on the off chance that it is getting the perfect measure of vitality. This structure if used appropriately encourages us in sparing power and to limit the cost.

7.REFERENCES

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