



## IOT BASED ENERGY MONITORING SYSTEM

**D.Sai Sowmika**

Dept of Electronics and  
Communication Engineering  
R.V.R & J.C. College of  
Engineering  
Guntur, India

**G. Rakesh**

Dept of Electronics and  
Communication Engineering  
R.V.R & J.C. College of  
Engineering  
Guntur, India

**D.Hari Charan**

Dept of Electronics and  
Communication Engineering  
R.V.R & J.C. College of  
Engineering  
Guntur, India

**D.Sai Krishna**

Dept of Electronics and  
Communication Engineering  
R.V.R & J.C. College of  
Engineering  
Guntur, India

- Abstract**—The internet of things concept enables us to connect the normal day to day devices with each other over the internet. The devices connected through IoT concept can be analyzed remotely. With the current technology, physical energy meters can be used to know the amount of power consumed. Thus monitoring and keeping track records of electricity consumption is a difficult task. To automate this, smart energy meters has been implemented by using IoT. IoT based energy monitoring system is found to be useful to the industry, household to get the data day to day energy usage. smart energy meter requires ESP8266 Wi-Fi module and necessary sensors. IoT based energy monitoring system which will display the real time data of power consumed through current and voltage sensors and the real time data can be send to cloud service and access data on the browser.

connected through IoT concept can be analyzed remotely. Smart energy meter using IoT is designed based on Twocategories:  
1:To use the electricity in an optimized manner  
2:Reduce the Power Wastage

### I.HARDWARE ASPECT

#### i.Arduino UNO

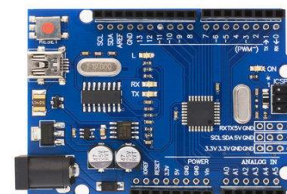
The Arduino Uno is an open-source microcontroller board created by Arduino.cc that is built on the Microchip ATmega328P microcontroller. There are both analog and digital connections on the board. The primary benefit of using an Arduino UNO development board is the ease with which we can connect it to other devices.

**Keywords:**Arduino UNO,Sensors, ESP8266,GSM

Thingspeak

### Introduction

The internet of things concept enables us to connect the normal day to day devices with each other over the internet. The devices

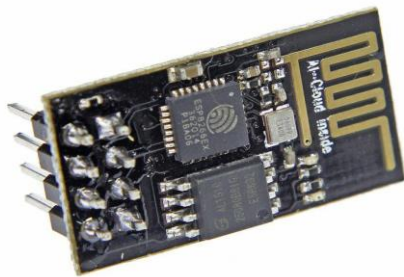


Features of Arduino UNO:

- Digital input/output pins are 14
  - Analog i/p pins are 6
- DC Current for each input/output pin is 40 mA
- DC Current for 3.3V Pin is 50 mA
- Flash Memory is 32 KB
- SRAM is 2 KB
- EEPROM is 1 KB
- CLK Speed is 16 MHz

## ii.ESP8266

A low-cost Wi-Fi microprocessor with microcontroller and TCP/IP networking capabilities is called the ESP8266.ESP8266 has been used instead of the Arduino UNO because it has Wi-Fi capabilities.The ESP8266 is capable of offloading all Wi-Fi networking tasks from another application processor or running an application.



## iii.Voltage Sensor

To measure the AC voltage from the load ZMPT101B AC Voltage Sensor was used.This is an ideal choice to measure the AC voltage using Arduino/ESP8266 like an open source platform



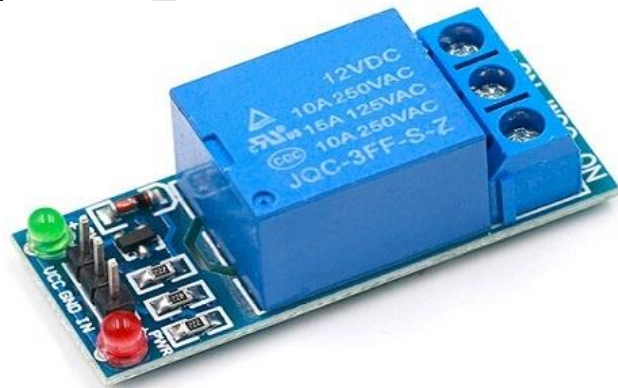
## iv.Current Sensor

The ACS712 is a completely integrated linear current sensor that uses the hall effect to measure the current that will be generated by the load.



## V.Relay

The relay module is a switch that can be electrically turned on or off to regulate whether or not electricity flows through it.Low voltages like 3.3V, like the ESP32, ESP8266, etc., or 5V, like your Arduino, are intended to operate them.



## Vi.GSM(Global System for mobile Communication)

When there is an overload, GSM is used to transmit a message.It is a cellular system that is open and digital that is used for mobile communication.It employs four distinct frequency ranges

Features of GSM are:

- Clear voice clarity
- Low power handheld devices
- Low service cost
- Ease of accessing network

### III.BLOCK DIAGRAM

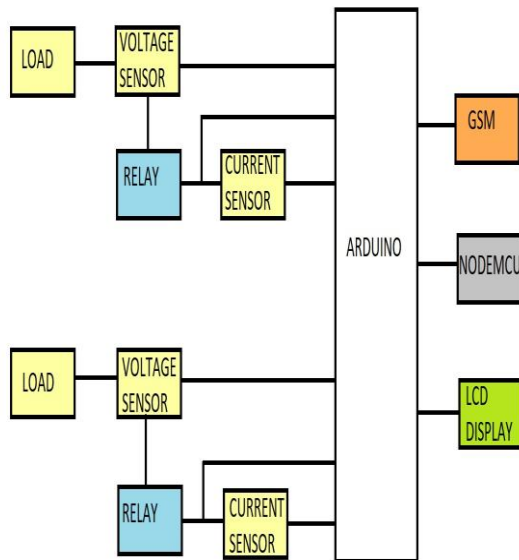


Fig (i).

Fig(i). depicts the block diagram of the IoT-based energy monitoring gadget. (i). To differentiate between a on load and an off load, two loads have been gathered.

### IV.METHODOLOGY

The design is finished exactly as shown in the fig.(i) The links are made based on the fig. (i) above. The electricity supply is delivered to the load. The code was created using the Arduino idle software. While the power source is running, the voltage sensor and current sensor gather data from the load and transmit it to the Arduino. The setup has been provided with a wifi network in order for the voltage and current readings to be constantly uploaded to the Thingspeak app, and when overload occurred, the load was turned off.

### V.RESULTS AND DISCUSSION

The load automatically shuts off using the relay and a message is sent to the mobile number that we put in the code if the load voltage and current values are higher than the reference

values.Voltage and current values are constantly uploaded in the Thingspeak app regardless of whether an overload occurs.



Fig (ii)



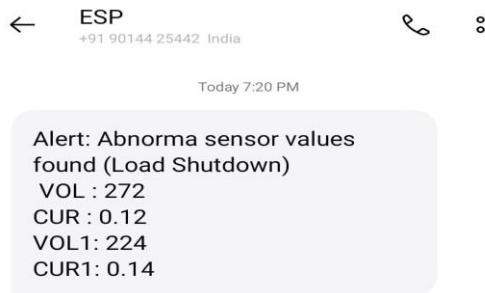
Fig (iii)



Fig(iv)



Fig(V)



Fig(Vi)

[7]"Garrab, A.; Bouallegue, A.; Ben Abdallah" , "A new AMR approach for energy saving in Smart Grids using Smart Meter and partial Power Line Communication

Fig(ii) to Fig(Vi) show the voltage and current values uploaded to the Thingspeak app as well as the message that appears when overload occurs. The voltage and current values are also shown in the LCD display.

## VI. REFERENCES

- [1] Anitha.k ,prathik, "Smart Energy Meter surveillance Using IoT" ,Institute of Electrical and Electronics Engineers(IEEE), 2019.
- [2] Devadhanishini, et.al" "Smart Power Monitoring Using IoT"5th International Conference on Advanced Computing & Communication Systems (ICACCS) 2019
- [3] Mohammad Hossein Yaghmaee Design and Implementation of an Internet of Things Based Smart Energy Metering" 6th IEEE International Conference on Smart Energy Grid Engineering 2018.
- [4] Himanshu kpatel "arduino based smart energy meter" 2nd Int'l Conf.on Electrical Engineering and Information & Communication Technology(ICEEICT) 2018.
- [5] Chinmaya Mahapatra,Akshay Kumar Moharana and Victor C. M. Leung "Energy Management in Smart Cities Based on Internet of Things:Peak Demand Reduction and Energy Savings",2017.
- [6]M. U. Saleem et al.: Design, Implementation, and Deployment of IoT Based Smart Energy Management System ;April 2021