

IOT BASED SMART ENERGY METER

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ABSTRACT

In this paper the idea of smart energy meter using IOT and Arduino have been introduced. In this method we are using Arduino because it is energy efficient i.e. it consume less power, it is fastest and has two UARTS. In this paper, energy meters which is already installed at our houses are not replaced, but a small modification on the already installed meters can change the existing meters into smart meters. At present our domestic energy meters wants in the smartness and theft detection. Consequently electricity boards don't have remotely control over their energy meters. In this paper our Endeavour is to make these energy meters smart using AI technology like IOT. A proposed. Using internet of things electricity Board can monitor consumption for monthly bill cycle and whenever there is theft detected. It can remotely cut the power supply of the consumer. All data exchange can be done over cloud storage.

KEYWORDS: Internet of things, arduino UNO, human touch sensor, ESP 8266 wi-Fi module, MQTT protocol.

INTRODUCTION

Many developing countries suffering from a widespread theft of electricity. Indian government Leads to annual losses due to theft of electricity is about 1.5% of our GDP. In this present paper we have emphasized more on making our energy meter smart rather than detecting at theft. We are using iot for automation because world is gone beyond the internet of things. Currently there are almost 9 million interconnected gadgets and it is estimated that it will touch almost 60 billion gadgets by 2020. Main Advantage of this system is that due to internet of things we can monitor and control our energy meter globally. Here it is possible that number of energy meters can be interconnected with the proper programming. In this cutting edge Technology arduino UNO is used as a brain of the system it can measure the consumption and costs the consumer. At the same time this controller continuously communicates with the web server using ESP 8266 module. This happens due to the proper coding of the controller.

BLOCK DIAGRAM

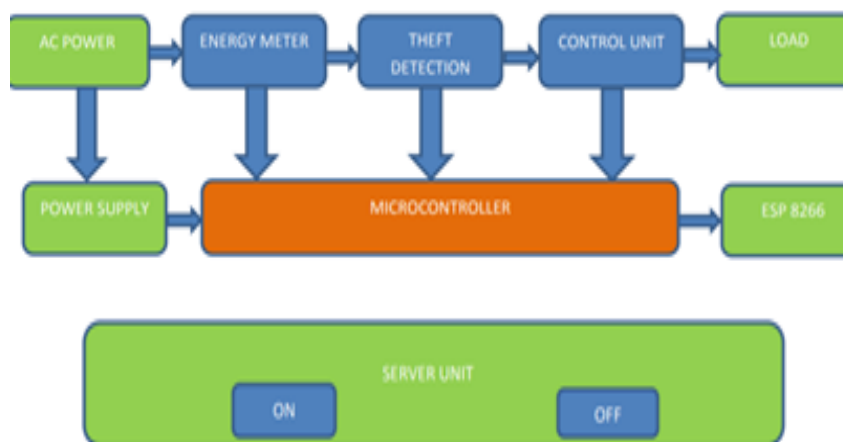


Figure no.1 - Block Diagram of IOT based smart energy meter

ARDUINO UNO

Implement this system we have used arduino uNO as a main controller it uses atmega 328 p microcontroller. Arduino is having total of 14 pins out of which 6 pins can be as digital input PWM and other 6 pins can be used as analogue output. It Uses 16 megahertz crystal oscillator. It has serial communication port, USB port through which we can connect arduino board to the computer as well as mobile. It uses 5 volt supply which we have given it from adaptor. Arduino UNO is best in its series and it is mostly preferred by engineers. It uses Arduino IDE 1.0 software.



Photo no.1 – Arduino UNO

HUMAN TOUCH SENSOR

We have used human touch sensor detect electricity theft as a dummy model.it houses ttp 223 b IC which is capacitive touch switch module. When fingers touches proposed area sensor gets high. That is if anyone interferences our energy metre theft is detected by this sensor. Power consumption is very low. 3 to 5.5 volt is required to power up this sensor

ESP 8266 WIFI MODULE

ESP 8266 having inbuilt SOC with integrated TCP/IP protocol stack this feature can give any microcontroller access to our wi-Finetwork.ESP 8266 is pre-programmed with AT command . That's why we have to only connect it on arduino board. In our project this Wi-Fi module send data to cloud storage. Here data is analysed and we can control our hardware using MQTT dashboard. This Wi-Fi module is having powerful onboard processing and storage capacity so that we can connect sensors to it and other electronic devices and communicate over internet.

MQTT DASHBOARD

We have chosen mqtt dashboard as our server unit. MQTT is nothing but MQ telemetry transport machine to machine iot protocol that is a Android app(iotmqtt dashboard). Here our Wi-Fi module communicates with broker via satellite link so that practically we can control our energy metre over internet. It consumes amount of power and minimum data packets. In this IOT application we can easily design button, switches, graphs, and so on.

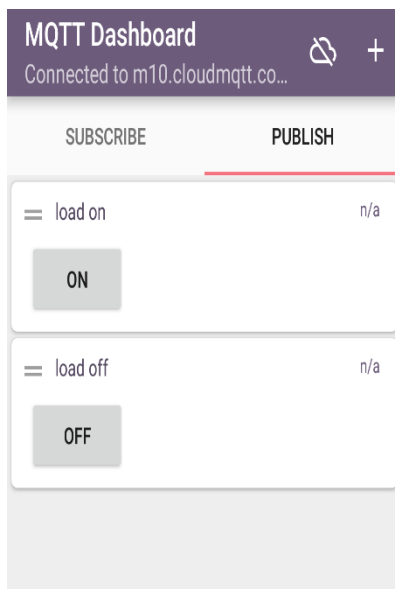


Photo no.2 Screenshot of MQTT Dashboard application

WORKING PRINCIPLE

In this proposed system, we have replaced the ordinary meter by metering module which consist of metering IC and microcontroller which scans the energy meter automatically and transmits this collected data to the remote station. Internet of things (IOT) is the main method of communication between the energy meter and the web server. IOT, being a 2.5G mobile technology, is available all over the world. It is also ideally suitable for data transfer over an internet between a central location and mobile devices. The reading information from the energy meter in real time is uploaded to a central database via IOT Each user of the system may access this information via the Internet. Arduino microcontroller is interfaced with energy meter and Arduino.

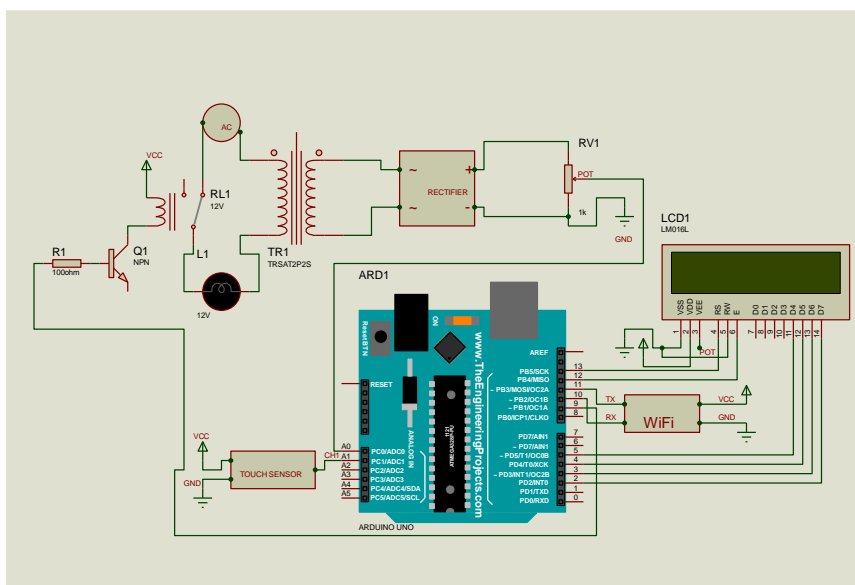


Figure no.2 – Circuit diagram of energy meter

RESULTS

From Results obtained by this project we have supervisory control over our hardware and globally we can on and off our energy metre using iot application. current transformer at the consumer end measure consumption of that particular load, costs it and displays it on LCD display. When the theft is detected our Wi-Fi module communicates with IOT application and all notifications have been displayed on iot application. Thereafter, we can remotely on and off this energy metre for bill payment and theft detected.

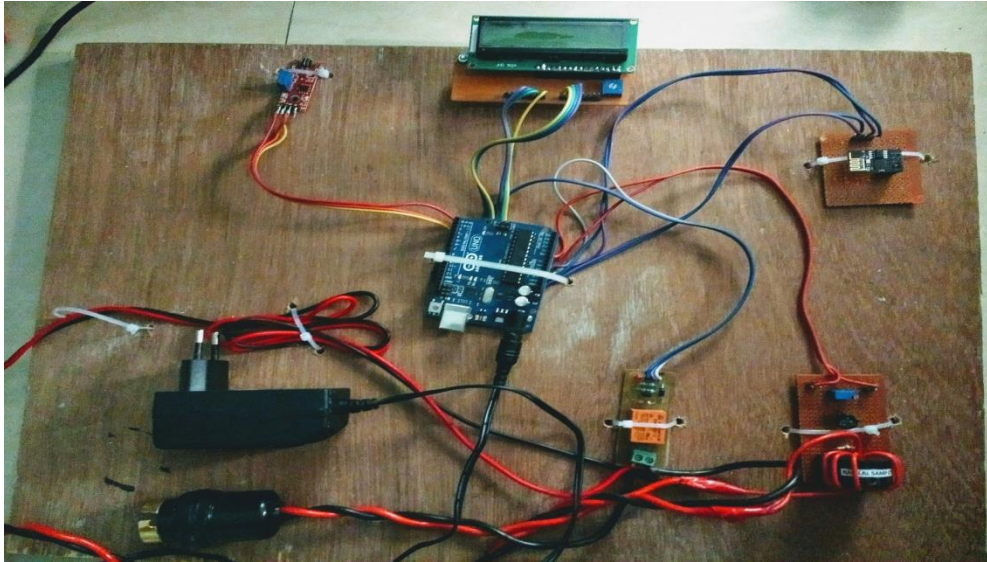


Photo no.3 Smart energy meter (Hardware)

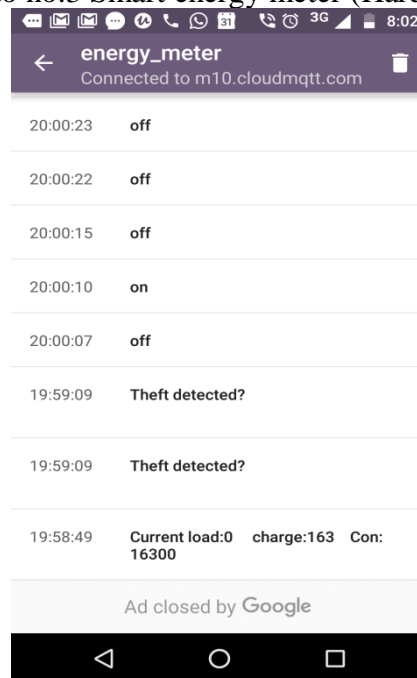


Photo no. 4 – Screenshot of output

CONCLUSION

In the era of smart city advancement, this project is concentrated on the connectivity & networking factor of the IOT. Hence it reduces the wastage of energy and bring awareness among all of us.

Using this project we have achieved following objectives:

- 1) Ease of accessing information from consumer over IOT
- 2) It can detect theft and communicate over internet to the server unit.
- 3) We can monitor our energy meter and remotely ON and OFF supply.

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