

# **IoT based smart energy meter monitoring, theft detection and disconnection**

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## **ABSTRACT**

The IoT based smart energy meter is based on Arduino. In this system we reduce the human participation in electrical energy maintenance. The theft of the electricity increases the costs paid by customer. Hence this system is used for the detection of theft. The Arduino checks the main meter and sub meter reading. If the difference between the main meter and sub meter is occurred then that theft has occurred message will be display on the LCD display and also display on the thingspeak. Customer can be access the thingspeak from anyplace. By using the consumer number it can be access on the globe at the anytime.

**Keywords-IoT, Arduino Uno, Energy meter, LCD Display, current sensor**

## **I. INTRODUCTION**

Now a days energy emergency is the major difficulties that the world faces. The best therapy for this is not the increases of energy production, but the actual use of available energy. Energy emergency can be reduced to a certain amount by properly monitoring the energy consumption and avoiding wastage of energy. But the main problem is that the energy monitoring cannot be done efficiently because consumer is not responsive of their power consumption.

The electricity bills are issued only when they will get an idea about their consumption. Bill is distributed only once in a month in India. So the consumer will be in dark about their energy usage during this period of time. This procedure has to be repeated numerous times to efficiently control the energy usage in a month. If customer can check their leap in the area of energy consumption on their mobile phone or laptop instead of checking energy meter, it will be a great leap in the area of energy management. Since nearly all of the people are today 24\*7 online, it will really a benefit if they can check their energy consumption online from everywhere on the globe.

## **II METHODOLOGY**

In this paper, we are explaining a technique of electricity energy meter reading based on IoT concept. This design implements the energy meter using the IoT concept. This whole procedure based on the Arduino. The internet of things is the internet operational of physical devices which permits object to exchange data in the above system energy meter is connected to the internet by using IoT. So there is a method to track their

energy consumption time to time for consumer so that they can control their use as they plan. This system is suitable for consumer and supply. This method eliminates man power during this connection and disconnection upload. It plays a vital role to inform supplier about any theft that is happening in the sensor.

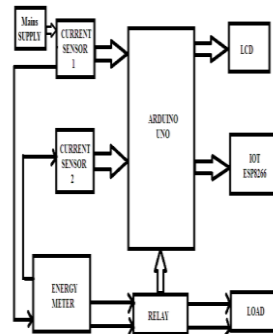


Fig. Block diagram of IoT based smart energy meter monitoring, theft detection and disconnection

### III. LITRATURE SURVEY

| SR.NO | NAME OF TOPIC                                                                                                  | AUTHOR NAME              | YEAR | METHODOLOGYUSED                                                                                           |
|-------|----------------------------------------------------------------------------------------------------------------|--------------------------|------|-----------------------------------------------------------------------------------------------------------|
| 1     | ARM based energy controlling system based on smart meter and web server                                        | Landi C.<br>Merola P.    | 2011 | Web server collects the measurements of power consumption.                                                |
| 2     | A new AMR method in Smart Networks for energy saving based on Smart Meter and partial Power Line Communication | Garrab A<br>Bauallague A | 2011 | AMR solution provides enhanced continuous application.                                                    |
| 3     | Design and application of Bluetooth smart energy meter                                                         | B.S.Koay<br>S.S.Cheah    | 2012 | Electronics energy measurement is continuously replacing current technology of electro-mechanical meters. |

### IV COPONENTS USED TO IMPLEMENT THE IDEA

- Arduino UNO
- IOT ESP8266
- CT SENSOR
- Energy meter

- LCD display
- RELAY

### Arduino UNO

Arduino UNO is a single board microcontroller. It construct the digital devices and control objects in a physical world.

### IOT ESP8266

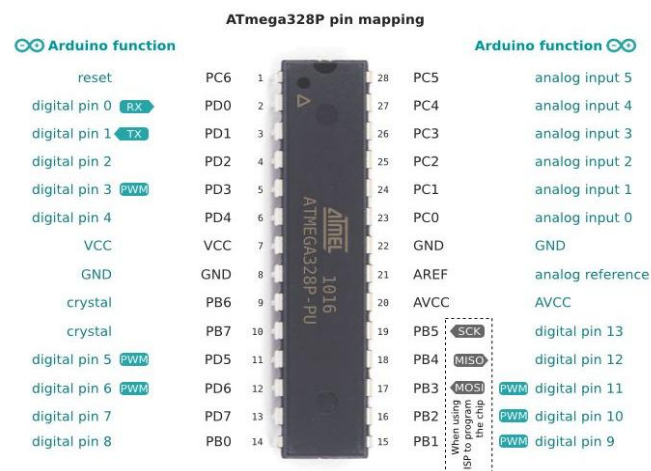
The Internet of things(IoT) is the network of devices, vehicles, and other objects embedded with electronics, software, sensors, and internetwork connection which support objects to collect and interchange data. Each thing is individually specialized through its embedded system but is able to internal operate within the current Internet communications.

### CT SENSOR

The CT sensor connect to an Arduino, the CT sensor output wants to be condition so it connect the input requirements of the analog input of Arduino, that is a positive voltage 0v and the ADC reference voltage.(The above Arduino board working at 5v and of the EmonTx working at 3.3v.)

## V. SIMULATION OF ARDIUNO

For the simulation part we have simulated the ARDIUNO with the Relay and load. The pin diagram of Ardiuno ATmega328P and the simulation part is shown below.



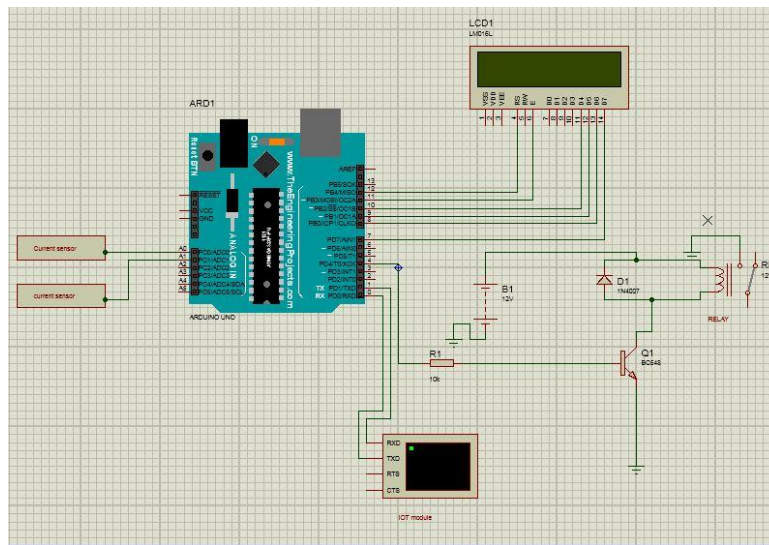


Fig Simulation of Lpc2148 with LCD

## VI POSSIBLE OUTCOMES

This project is focused on the connectivity and networking factor of the IoT. In this system, an energy consumption calculation depend on the calibration counting pulses is designed by using ATMEGA328P Microcontroller in embedded system domain. In the future, IoT and MC meter reading system is designed to continuously monitor the meter reading and if the customer does not pay the monthly bill service provider can disconnect the power source. This system also removes the human involvement, delivers effective meter reading and avoids the billing fault.

## VII ADVANTAGES AND APPLICATIONS

### ADVANTAGES

- Accuracy in meter reading.
- Improved security.
- Helps in successfully controlling energy use.
- Wastage of energy is avoided.
- Meter reading can be accessed from anywhere on the globe at anytime.
- Customer pay bill monthly
- Identified the theft status..
- This system discards the human involvement in energy management.

### APPLICATIONS

- Accessing information is easy for customer from energy meter through IoT.
- Theft detection at consumer end in existent time.

- Energy consumption units and temperature is display on LCD.
- By using remote server disconnection of service.

### VIII. CONCLUSION

This system helps in control the energy consumption and avoiding energy wastage is very important. This is an Arduino based design and implementation of energy meter by using IOT concept.

In the proposed system, meter reading system is designed to monitor continuously the meter reading and transfer the reading to certain server. This data can be access from anywhere on the globe at any time.

### IX FINAL RESULTS OF IoT BASED SMART ENERGY METER MONITORING, THEFT DETECTION AND DISCONNECTION

Thus we have successfully design smart energy meter monitoring using arduino. In this project we identify the theft of electricity and the status of the meter reading. This design implements the energy meter using IoT concept.

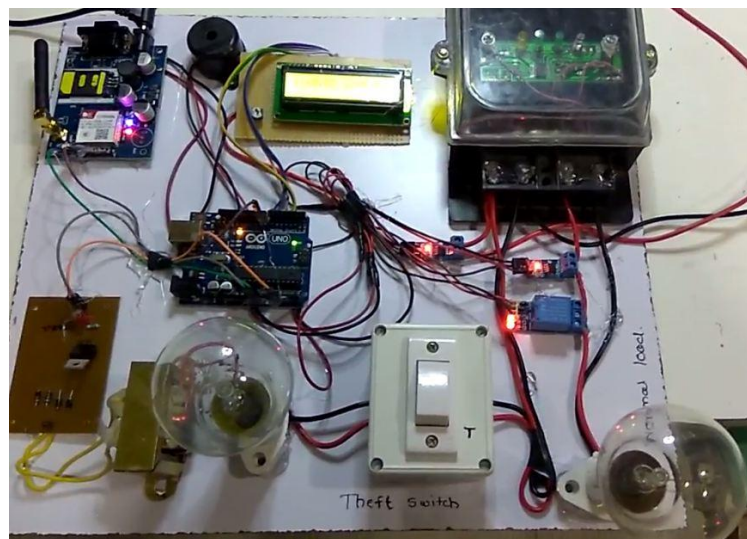


Fig. working model of IoT based smart energy meter monitoring, theft detection and detection

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