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POWER THEFT MONITORING ON IOT PLATFORM USING NODE MCU

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ABSTRACT

Utility companies in India estimate that electricity theft costs them over billions of rupees. The purpose of this project is to provide design of electricity theft monitoring system which allows violators to be detected at a remote location. In India the power theft is major problem which causes the loss of electricity in Billions of rupees in all the sector collectively. 80% power loss of energy is occurred in the rural areas. In rural areas people use mostly the high rated motors and other instruments. Theft of electricity can be detected with the help of our system and can be implement on the major scale in rural areas. This system will minimize the power theft to minimum.

Keywords: power, electricity, power sector, microcontroller, sensor.

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I. INTRODUCTION

India is the power theft hub especially in rural areas and the area which have the population moderate to high. This causes the Indian power distribution sector more losses and electricity board to compensate the losses of electricity increases the prices of the electricity.

There are two types of power theft which are meter tampering and direct hooking on cables. Meter tampering is done in the residential area by using magnets on meter and by short circuiting the connection. Mostly direct hooking on cables is done.

II. OBJECTIVE

The objectives are: -

It might be time saving if distribution company personnel take studying through this wi-fi technique.

It could offer a digital document in case of any judicial dispute.

- To maximize the profit margin

III. BLOCK DIAGRAM

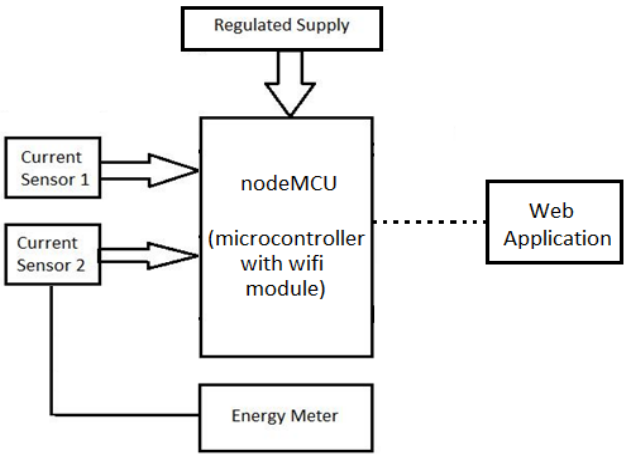

Fig 1: Block diagram of power theft

The block diagram consists of nodeMCU microcontroller and energy meter as shown in above figure. Microcontrollers are provided with regulated DC supply for its internal working. Current sensors are interfaced with two different microcontrollers placed at power sending end terminal and power utilizing end i.e. near energy meter. NodeMCU controller boards are provided with internet connection which allows microcontroller board to send data at web server.

This system helps in recording load current data wirelessly over the internet applications which leads in system data security and safety at lower cost. The 230V AC power

Supply is given to one pin of current sensor; the other pin of current sensor is connected to the load through the relay. The input of 5V for nodeMCU is given by rectifier circuit and a voltage regulator LM7805 from the 230V supply.

The analog output pin of current sensor is given to nodeMCU through A0. The VCC and GND of current sensor and relay are connected to nodeMCU.

IV. WORKING OF SYSTEM

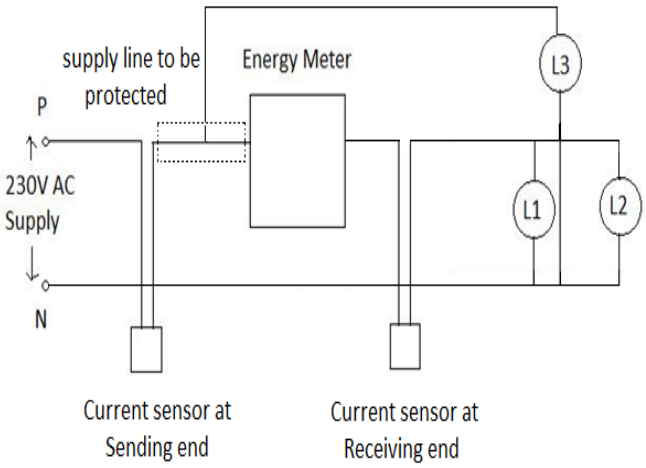

Fig 2: circuit diagram

One of the current sensors is connected to the energy meter and main supply connections. This current sensor measures incoming current or actual load current near energy meter. Second current sensor is interfaced with secondary nodeMCU unit which placed at power sending utility. Both nodeMCU units send these current value data to web application where both sending end and receiving end load current will be compared.

The load current data at IoT server can be further used to analyze and load management by power generation and distribution companies.

` To covert 230-volt strength supply into 12 volt we used 12-volt step down transformer so now the electricity deliver might be 12 volts. Now our device requires five volts so we used voltage regulator 7805 so we get five-volt power deliver which is given to our system

V. COMPONENTS DETAILS

A. nodeMCU microcontroller board

NodeMCU is an open source IoT platform. As the operating voltage range of ESP8266 is 3V to 3.6V, the board comes with an LDO voltage regulator tokeep the voltage steady at3.3V. The output of the regulator is also broken out to one of the sides of the board and labeled as 3V3. This pin can be used to supply power to external components.

Fig 3: node MCU

B. Relay as Circuit Breaker

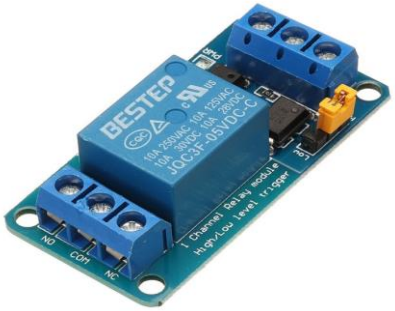

Fig 4: Circuit breaker

Relays are most usually used switching device in electronics. In our project relay is used as circuit breaker. When power theft is occurred, the relay come in picture and it acts as circuit breaker.

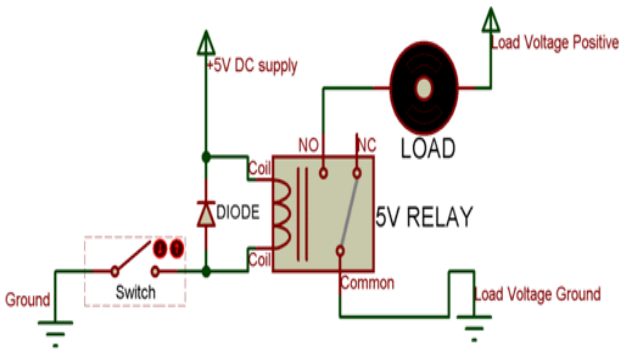

Fig 5: working diagram of current sensor

C. ACS 712 current sensor (Hall Effect Sensor)

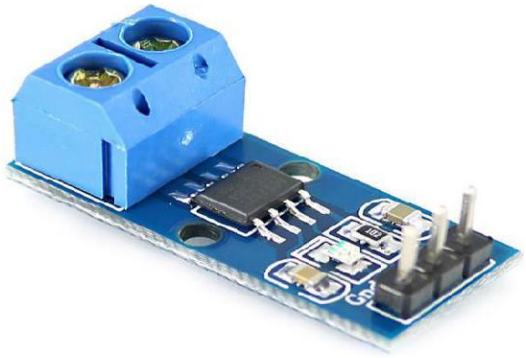

Fig 5: working diagram of current sensor.

The current sensor used in our project is ACS 712. It is a Hall Effect sensor. We have used 5v current sensor because it is compatible for us.

The overload of the current causes the damage to the system to protected the system from damagewe are using the current sensor.

Measuring the voltage can be done by externally without affecting the system and on the other hand measuring the current is complex method.

D. Energy meter

Fig 7: Energy meter

We have used standard energy meter. The energy meter measures the energy consumed by the consumer. This instrument is placed at every consumers house, industry, organization, commercial building.

The units are measured in kWh. Energy meter measures the voltage and current, then calculate the power by using formula P=VI.

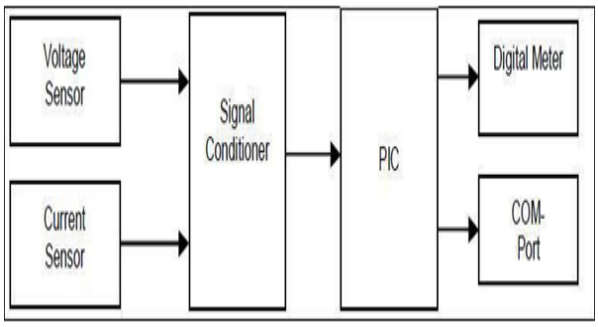

Fig 5: energy meter working (block diagram)

VI. SCOPE

The main aim of this system is to control and monitor power theft occurring in rural and urban region. It can be implemented by utility system to reduce electricity losses and eventually increase profit

VII. CONCLUSION

In developing countries electricity theft may be a common practice especially in remote areas, as they're doing not pay utility bills to a government company just in case of electricity and gas also. To unravel these hassle governments must believe a thought to supply help in terms of subsidy to regulate this issue. With this device the service company can accumulate the bill any time with one message. The info series and manipulation task become speedy and calculation could also be accomplished very effectively.

The progress in generation approximately electrical distribution network may be a non-prevent process. New matters and new generation are beinginvented. The proposed system found to be bit complex as a long way as distribution

Network cares, but it’s an automatic device of theft detection. It saves time as properly as help to maximize margin of profit for utility company operating in electricdistribution community. Utility company can keep a continuingeye onits costumer.

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