Power Theft Prevention

A. SHYAM JOSEPH[1], V. KRISHNALAKSHMI A MATHUMITHA[2], R. HARRINI[3]
[1] *Assistant Professor, EEE Department, Sri Ramakrishna Engineering College, Coimbatore, India.*
[2,3] *B.E Student, EEE Department Sri Ramakrishna Engineering College, Coimbatore, India.*

Abstract- ***Power theft is a major problem in distribution side, all over the world. This is illegal and should be strictly prohibited. Power theft can be defined as the usage of the electrical power without having any contract with the supplier. Nowadays the most common type of power theft is done by hooking directly from the distribution lines. This project focuses on the prevention of unofficial power consumption. The circuit consists of Node MCU, Current sensor, Relay, LCD, IOT platform. In this project a current sensor is used at actual load side for reading the value of current. Through the IOT platform, the value of current is sent to the Node MCU. The Node MCU is programmed for a certain value of current. If the value of current is exceeded, then there is an occurrence of power theft, it will be shown in the LCD display. Through the IOT, the data is sent to cloud platform. If power theft occurs, then the information is passed to the PC of the control room.***

Indexed Terms- ***Power Theft, Node MCU, Current sensor, Relay, LCD, IOT platform.***

I. INTRODUCTION

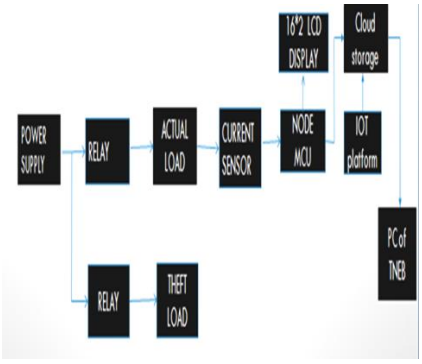
Electricity theft is a very common problem in countries like India, where the population is very high and the users of electricity are ultimately tremendous. In India, every year there is a very increasing no of electricity thefts across domestic electricity connections as well as industrial electricity supply, which results in loss of electricity companies energy and because of which we are facing the Frequent problems of load shading in urban as well as a rural area so as to overcome the need of electricity for the whole country. Also, the ways using which theft can be done are also innumerable so we can never keep track of how a theft has occurred, and this issue is needed to be solved as early as possible.

In this paper, we propose an electricity theft detection system to detect the theft which is made by the most common way of doing the theft and that is tapping power from the line. Power supply is given to the lamp. Current sensor is connected to the lamp and it is sensing how much current is consumed. Then it sends the data to Node MCU. If there is no power theft then LCD display shows the text "No power theft occurred". While tapping the power from the power chord and which is used for theft load, then the LCD display shows the text "Power theft occurred". An IOT platform is created, then the node MCU sends the data to the cloud storage. That will be shown in personal computer. IOT

II. METHODOLOGY

This project clearly uses three main modules of Node MCU, Current sensor, LCD display, Lamp.Power supply is given to the lamp. Current sensor is connected to the lamp and it is sensing how much current is consumed. Then it sends the data to node MCU. If there is no power theft then LCD display shows the text "No power theft occurred". While tapping the power from the power chord and which is used for theft load, then the LCD display shows the text "Power theft occurred". An IOT platform is created, then the node MCU sends the data to the cloud storage. That will be shown in personal computer.

III. BLOCK DIAGRAM



IV. COMPONENTS DISCRIPTION

A. Node MCU

Node MCU is an open source firmware for which open source prototyping board designs are available. The name "Node MCU" combines "node" and "MCU" (micro-controller unit). The term "Node MCU" strictly speaking refers to the firmware rather than the associated kits. Both the firmware and prototyping board designs are source. The firmware uses the Lua scripting language. The firmware is based on the eLua project, and built on the ESP8266. It uses many open source projects, such as luacjson and SPIFFS. Due to resource constraints, users need to select the modules relevant for their project and build a firmware tailored to their needs.

B. Power Supply

The Node MCU can be powered via the USB connection or with an external power supply. The power source is selected automatically.

The power pins are as follows:

- VIN. The input voltage to the Node MCU board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.[8]
- the regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.
- 3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- GND. Ground pins.

C. Current sensor

For measuring current in a circuit, a sensor is required. ACS712 Current Sensor is the sensor that can be used to measure and calculate the amount of current applied to the conductor without affecting the performance of the system.ACS712 Current Sensor is

a fully integrated, Hall-effect based linear sensor IC. This IC has a 2.1kV RMS voltage isolation along with a low resistance current conductor.

ACS712 Current Sensor uses Indirect Sensing method to calculate the current. To sense current a liner, low-offset Hall sensor circuit is used in this IC. This sensor is located at the surface of the IC on a copper conduction path. When current flows through this copper conduction path it generates a magnetic field which is sensed by the Hall Effect sensor. A voltage proportional to the sensed magnetic field is generated by the Hall sensor, which is used to measure current. The proximity of the magnetic signal to the Hall sensor decides the accuracy of the device. Nearer the magnetic signal higher the accuracy. ACS712 Current Sensor is available as a small, surface mount SOIC8 package. In this IC current flows from Pin-1 and Pin-2 to Pin-3 and Pin-4. This forms the conduction path where the current is sensed. Implementation of this IC is very easy.

D. LCD Display

LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. Most of us would have come across these displays in our day to day life, either at PCO's or calculators. The appearance and the pinouts have already been visualized above now let us get a bit technical.

16×2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8×1, 8×2, 10×2, 16×1, etc. but the most used one is the 16×2 LCD. So, it will have (16×2=32) 32 characters in total and each character will be made of 5×8 Pixel Dots. A Single character with all its Pixels.

E. Lamp

An LED lamp or LED light bulb is an electric light for use in light fixtures that produces light using one or more light-emitting diodes (LEDs). LED lamps have a lifespan many times longer than equivalent incandescent lamps, and are significantly more efficient than most fluorescent lamps, with some LED chips able to emit up to 303 lumens per watt (as claimed by Cree and some other LED manufacturers). However, LED lamps require an electronic LED driver circuit when operated from mains power lines, and losses from this circuit means that the efficiency of the lamp is lower than the efficiency of the LED chips it uses.

F. Working

The Node MCU acts as a microcontroller. The Node MCU board is connected with the Current Sensor and the LCD display is also connected to it.

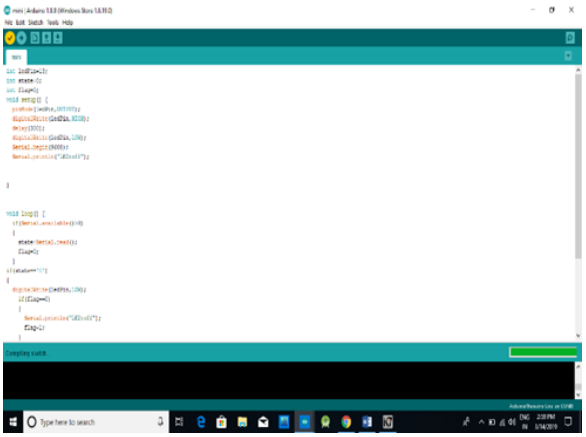
The working is as follows: Power supply is given to the lamp. Current sensor is connected to the lamp and it is sensing how much current is consumed. Then it sends the data to node mcu. If there is no power theft then LCD display shows the text “No power theft occurred”. While tapping the power from the power chord and which is used for theft load.[9]Then the LCD display shows the text “Power theft occurred”. An IOT platform is created, then the node mcu sends the data to the cloud storage. That will be shown in personal computer.

V. APPLICATIONS

The system can be incorporated for almost all type of users. The concept is well suited especially for villages and interior areas. By this design we conclude that the power theft can be effectively solved by detecting where the power theft occurs inform the authorities.

VI. RESULTS

The Node MCU programming is done in the Arduino IDE app for the Current Sensor and the LCD display. For the application to be developed the Node MCU is programmed for the functioning of the LCD display and the current sensor that is connected to it. If there is no power theft occurs, then the data will be sent to the node MCU through the current sensor. The message “No power theft occurred” will be shown in both the LCD display and personal computer in TNEB through cloud storage. If there is a power theft then the data will be sent to the Node MCU. The message “Power theft occurred” will be shown in both the LCD display and Personal computer in TNEB.



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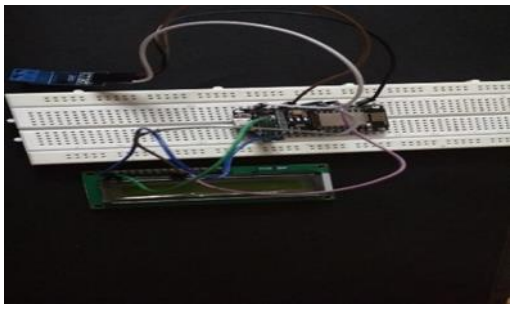
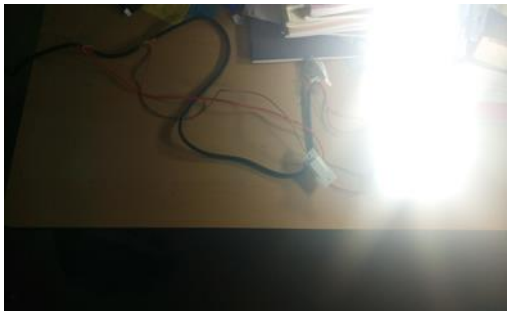
Here the hardware connections are made.



a. When the actual load is ON

b. When the theft load is ON



CONCLUSION

Nowadays in rural as well as urban area some people direct hooking on transmission line so they can avoid by using distractive electrical voltage As well as a current which directly affect on our home appliances they cannot work in proper way. So this is beneficial for energy distribution company they Reduces the illegal power theft. Using IOT, power theft detector kit has been implemented and the same also done using GSM for the purpose of backup protection. In case of internet failure the alert will be made through text message. By using above IOT techniques the crime of stealing power may be brought to an end, thereby a new bloom may be expected in the economy of our motherland and also there will be less scarcity for power utilization.

SNAPSHOT OF THE PROJECT

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