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A review paper to detect electricity theft in power system

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ABSTRACT

The power sector is one of the most important sectors for the development of the country. Now a day's power theft is the center of focus all over the world, but India has a more significant effect on the Indian economy because the figure is so high. The theft causes huge loss of electricity to electricity board. India loss billions of rupees because of unbilled consumption & unlaughable usage of electricity. It always a difficult task for Indian government & electricity company to achieve their aim due to power theft. The recent researcher observes that 30-35% profit of electric board is waste in power theft. And this amount is recovered by increasing the price of electricity & the looser are an honest customer.

Electricity theft can be reduced by applying technical solutions such as tamper-proof meters, managerial methods such as inspection and monitoring, and in some cases restructuring power systems ownership and regulation. So the aim of our paper is to eliminate all this difficulty like overload & heavy power and revenue loss that occurs due to power theft by designing a simple device to send & receive massage to the receiver for locating the area where the theft is occurs. Then according to the type of theft done by the accused, device helps to deactivate the power supply of particular home or area.

Keywords: *Electricity Theft, Overloading, Power.*

1. INTRODUCTION

The power system is consists of generation, transmission & distribution. The power is generated at generating station then by stepping up it will transmit to the distribute sector. Then power from the substation is conducted to the consumers, between the substation & consumers there are various distribution transformers for their particular region.

As we know for the domestic purpose we need single phase supply. Single phase supply is taken from the transmission line to the meter. To save money people start to steal electricity by avoiding government officials. There are various methods of power theft, which are given below:

- Direct hooking from line
- Injecting foreign materials into the meter
- Drilling holes into electromechanical energy meter
- Inserting film
- Depositing a highly viscous fluid
- Using strong magnets like neodymium magnets
- Changing the incoming and outgoing terminals of the meter
- Damaging the pressure coil of the meter
- Resetting energy meter reading
- Exposing the meter to mechanical shock

- Improper or illegal calibration of energy meters

Electricity theft can be reduced by applying technical solutions such as tamper-proof meters, managerial methods such as inspection and monitoring, and in some cases restructuring power systems ownership and regulation. So the aim of our paper is to eliminate all this difficulty like overload & heavy power and revenue loss that occurs due to power theft by designing a simple device to send & receive massage to the receiver for locating the area where the theft is occurring. Then according to the type of theft done by the accused, device helps to deactivate the power supply of particular home or area.

2. THEORY

I) Construction

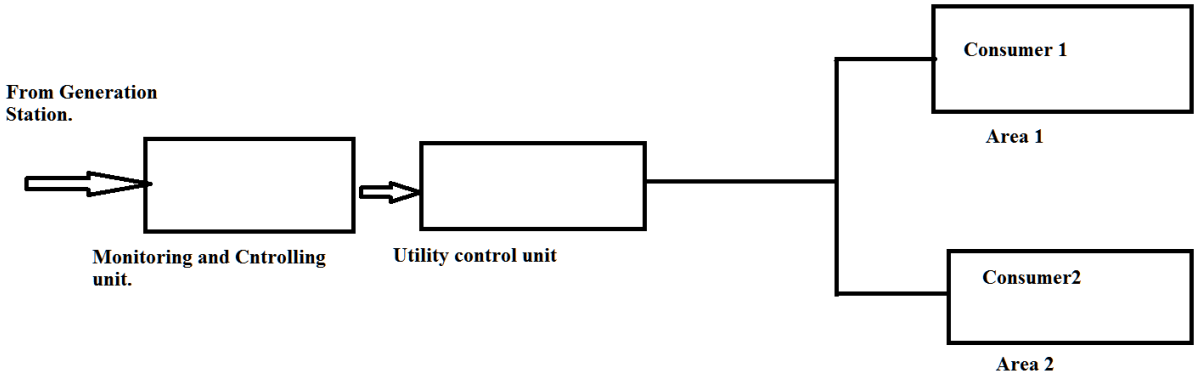

Fig.1 Block Diagram

The equipments used to design the whole system according to the layout are given below.

a) Power supply:

The power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. This power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal. The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage (no frequency) with the amplitude of +5V and +12V for various applications.

b) Transformer:

A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled electrical conductors. Here we use PT to step down the 230v supply up to 12v. And CT is used to calibrate the difference between the primary and secondary emf.

c) Bridge Rectifier:

When the input connected at the left corner of the diamond is positive with respect to the one connected at the right-hand corner, current flows to the right along the upper colored path to the output and returns to the input supply via the lower one. When the right-hand corner is positive relative to the left-hand corner, current flows along the upper colored path and returns to the supply via the lower colored path.

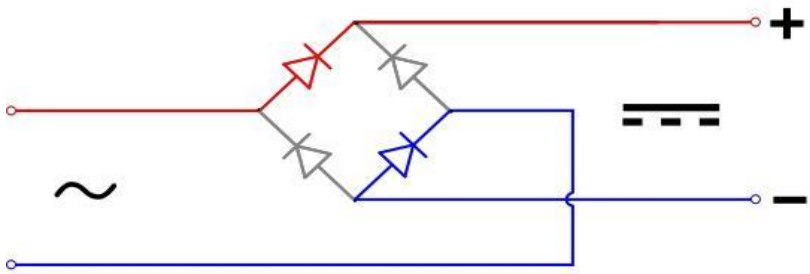

Fig.2 Bridge Rectifier

d) Microcontroller (ATmega328):

The ATmega328/P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328/P achieves throughputs close to 1MIPS per MHz. This empowers system designed to optimize the device for power consumption versus processing speed. It required 16MHz clock frequency to operate.

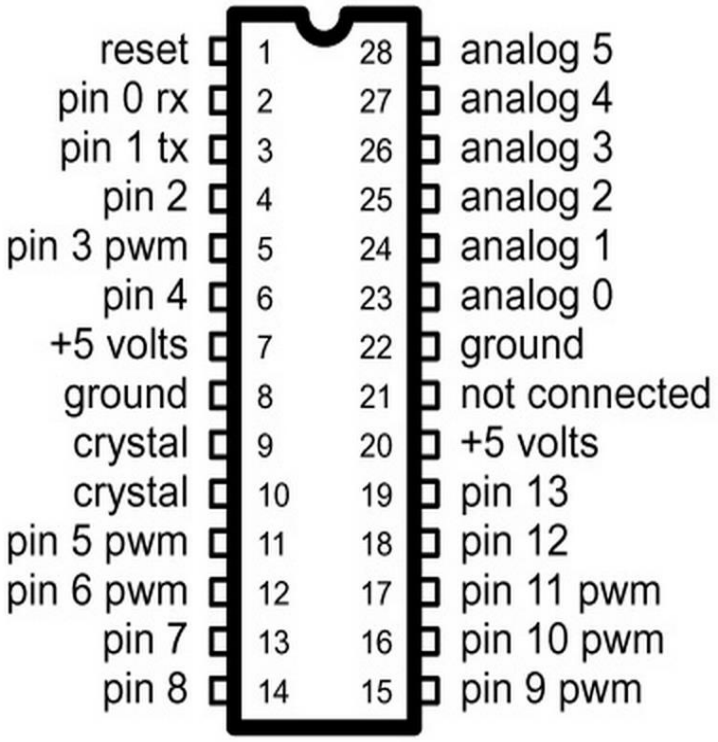

Fig.3 Pin diagram of ATmega328

e) LN358 Comparator IC:

The LM358 datasheet specifies that it consists of two independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

f) **Relay Driver IC ULN 2003:**

The circuit used for driving a relay can be termed as a relay driver circuit and it can be designed using various integrated circuits. These relays are needed to be driven for activating or to turn ON. So, relays require some driver circuitry to turn ON or OFF (based on the requirement).The relay driver circuit can be realized using different integrated circuits such as ULN2003.

g) 16x2 LCD display:

LCD stands for liquid crystal display. Character and graphical LCD's are most common among hobbyist and dy electronic circuit/project makers. Since their interface serial/parallel pins are defined so its easy to interface them with many microcontrollers. Many products we see in our daily life have LCD's with them. They are used to show the status of the product or provide an interface for inputting or selecting some process.

h) Regulator IC 7805:

A voltage regulator is one of the most widely used electronic circuitry in any device. A regulated voltage (without fluctuations & noise levels) is very important for the smooth functioning of many digital electronic devices. A common case is with micro controllers, where a smooth regulated input voltage must be supplied to the micro controller to function smoothly.

i) IR Sensor (Infrared Sensor):

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiations.

j) HC05 Bluetooth transmitter:

HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with controller or PC. HC-05 Bluetooth module provides switching mode between master and slave mode which means it able to use neither receiving nor transmitting data.

II) Working

a) Monitoring &controlling section:

Supply coming to the monitoring & controlling unit through the power transformer. Power transformer stepped down the supply of 230v AC to 12v ac. The controller IC ATmega 328 need 5v dc supply so the 12v ac is rectified by the bridge rectifier. Bridge rectifier gives 12v pulsating dc output. Ten this output is given to c filter which eliminates the ac component from the supply & gives 12v pure dc output.

Regulator 7805 IC converts 12v dc into 5v dc & remaining 7v dc is dissipated in the air & then 5v gives to the ATmega 328 IC. It also required 16MHz clock frequency to activate ATmega 328 Ic. The 16MHz clock frequency is given to the controller by using crystal oscillator. When there is any problem in power transmission then a clock pulse is received by the controller & then the program saved in the controller is executed and the massage is sent to the mobile and display the interruption on LCD display. The person who monitors the display or who had a massage on mobile can able to disconnect the power supply by giving instruction.

b) Utility control unit:

This is connected to the distribution transformer before supply conducted to consumer end. It helps to connect or disconnect the power supply. When there is any problem such as meter bypassing or hooking on the transmission line, the instruction is given to controller IC then the controller IC gives the command to relay driver IC ULN2003. As IC ULN2003receives command it will connect or disconnect the relay of a particular line.

c) Consumer end:

Consumers use various methods for stealing electricity as per above information, according to this our sensor senses the interruption. If someone bypasses the meter then an interrupting pulse is delivered to the controller Ic and then from it a massage is delivered to the mobile connected to the server by Bluetooth transmitter. And also it displayed on the LCD display i.e. particular home is bypassing the meter. Then the operator is able to cut the supply of particular home by giving the command to controller IC then controller IC gives the command to relay driver IC & then supply get cut off.

3. CONCLUSION

Electricity theft is a major problem in improving the power system. Because of its government and electrical companies have a great loss of billions of dollars per year, to provide a quality of electric energy efficient power to the consumer. To reduce this loss first we have to study the problem correctly & find a technical solution for that problem. By the above mention design, it can be concluded that losses due to theft can be reduced by informing the authorities that where the theft is occurs. The proposed system delivers the message to the authorities as soon as there is any attempt to theft the electricity & then authorities have all the rights to take action on it.

4. REFERENCES

[1] M.A.O liveira and C.C. Barioni, “Technical loss calculation by distribution system segment with corrections from measurements”, Proc.20th International Conference and Exhibition on Electricity Distribution, Prague, Czech Republic, June 2009
[2] C. J. Bandim, E. R. Alves ., A. V. Pinto, F. C. Souza, M. R. B. Loureiro, C. A. Magalhges and F. Galvez-Durand, “Identification of Energy Theft and Tampered Meters Using a Central Observer Meter: A Mathematical Transmission and distribution conference and exposition” 2003 IEEE PES, vol. 1, pp. 163-168,2003.
[3] “Wireless Electricity Theft Detection System Using Zigbee Technology” Virendra Pandey1, Simrat Singh Gill2, Amit Sharma3 1(EC, final year), 2(Assistant Professor), 3 (Assistant Professor) MIT, MORADABAD.
[4] “Theft detection and smart metering practices and expectations in the Netherlands” P.Kadurek, Student member, IEEE, J. Blom, J. F. G. Cobben, W. L. Kling, Member, IEEE1
[5] “Electricity Theft Localization Based On Smart Metering” Frank VAN DEN BERGH TU/e – NL
[6] “Electricity Theft Prediction on Low Voltage Distribution System Using Autoregressive Technique” A.I. Abdullateef, M.J.E. Salami, M.A. Musse, A.M. Aibinu, and M.A.Onasanya
[7] “Electrical Power Theft Detection and Wireless Meter Reading” presented by Sagar Patil, Gopal Pawaskar, Kirtikumar Patil”
[8] Donald G, Wayne H.Beaty, “Standard Handbook for Electrical Engineers” 11th Edition, McGraw Hill, 2003, New York
[9] Croft, Terrell, Summers, Wilford I, “American Electricians' Handbook” 11th Edition, McGraw Hill, 2008 New York.