Technique to Prevent Power Theft Losses using Static Device

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Abstract - *In developing contries like india, power theft is an very compressive issue which causes the reduction in economical growth of country and uneven supply of electricity. It dispointed not only to working industry but also to residential areas. The total power loss is the combination of transmission power loss and distribution power loss. The reason for high power loss are ; the unsufficient transmission and distribution capacity, too many transmission stages,insufficient load distribussion, substantial remote rural electrification etc. E lectricity theft can be found in the form of illegal connection, unpaid bill, irregularity in billing, meter tampering. The source of transmission power loss may be directly driven by network investment. Distribution power loss arise from several areas which includes theft, unbilled accounts and approximate customer account. Approximately the extend of electricity theft in asample of 102 countries are agreemented.*

Power company faced many mejor challeges of stolen e electricity.Power stolen is non ignorable crime that is high extensive an these directly affect the economical condition of contry. Technology is on their raising slope we should also note that increasing illegal activity. This paper introduce the prevention of electrical power theft using static device.

Keyword:zerocrossingdetector,PIC16F886micro-controller,regulator,driver,Tricetc.

1. INTRODUCTION

Our aim of project is to prevent the power theft by banned tapping and meter fraud.it also implies the work as voltage stabilizer feed a constant voltage to the load. Electric meter can be controlled, Thus causing them to stop, Under register or by passing the meter. Electricity theft is one of the biggest problem damaging the power sector of Nigeria; it includes any activity done, in order for the consumers of electricity to use electric power without the proper consent of the utility so as not to pay for the energy. Consumers, Who are prevent with electric meter, Quickly use power with out paying for it. This theft or fraud can be threatening as well as false. A power regulator is a device which connects in series to power. Supposed just by keeping the device connected it will instantly control and stabilize power usages at that instant.This system can claims savings between 20% And 30% Electricity. It is known that the electricity that comes to our homes will not stable in nature.

 By changing a taps of transformers any wayFurther this high voltage used by user throug hour system in which we regulate the voltage across the load upto a distinct limit. Those user who are operating their electrical devices through banned hooking or energy meter by passing can be actually undergo by this high voltage, Which may cause damages to the operating devices.

2. METHODOLOGY

In our project we are uses a power electronic device like TRIAC to control the power. Power electronic is used to minimize the mechanical arcing and fast reaction time. In addition to this we also made a arrangement for under or over voltage conservation which don't have any actual energy meters. Microcontroller estimate the incoming voltage coming from line with the help of Analog to Digital Controller present inside the microcontroller. It is used to control a positive as well as negative half cycle of incoming Alternating Current for that a firing angle control method is used for controlling a firing angle of any AC voltage. It is necessary to record every positive or negative half cycle. Hence a Sinusoidal Wave Cycle Monitoring ZCD(Zero Crossing Detector) is use in our project, which brief a controller about initial point of every cycle. Once controller knows the voltage across the load and signals from sine wave cycle monitor. Controller calculate the firing angle and gives firing angle and firing angle pulse to the AC to AC converter in which TRIAC is used.

 It used to form a static switch for operation. It can operated on high voltage and high frequency as compared to mechanical switches, like a relay. The output of AC to AC converter is further give to reactor which is nothing but a type of single core step-up transformer. (230v-300v transformer is used in our project), which gives a 230v output at 150v AC input. The output 230v is further used by different types of load. The voltage across load is measured by the PIC(Peripheral

Interfaced Controller)-microcontroller with the help of potential transformer (PT). Potential transformer is used to step down to voltage across the load to be measured and rectified to DC, because microcontroller can read a voltage up to 5v DC only. In or project we are using relay for tripping the input voltage in case of very high voltage and low voltage which is beyond controllable limit. The relay used for 12v and controller can give peak of 5v. Hence it is required to amplify the 5v-12v for used to driver circuit. The microcontroller is used to control the firing angle of TRIAC to give the angle of triggering.

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Block Diagram:
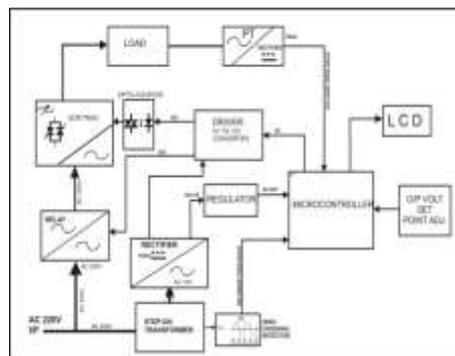
Fig-1: Block Diagram

In the above block the main aim is keep the balance and control the voltage across load. Initially controller check the incoming voltage coming from line with the help of ADC (analog to digital converter) present inside the Microcontroller. Our aim is to control a positive as well as negative half cycle of incoming AC for that a Firing angle control method is used. For controlling a firing angle of any AC voltage it is necessary to monitor every +ve/-ve half cycles, hence a Sine Wave Cycle Monitor(Zero Crossing Detector) block is used in our project, which gives inform the controller about start point of every cycle.

Once controller knows the voltage across the load and signals from sine wave cycle monitor, controller calculate the firing angle and gives firing pulse to the AC to AC converter in which our static switch formed by a TRIAC/SCR is used. Static switch can control on high voltage and high frequency as compare to the mechanical switches like relay. The output of AC to AC converter is give more to load. The controller is measured voltage across the load with the help of (PT) Potential Transformer. Potential transformer is used to step down the voltage across the load to be measure and rectified to DC, because microcontroller can read a voltage up-to 5-volt dc only.   In this project we are using a Relay for tripping the input voltage in case of very high voltage and low voltage which is beyond control-able limits. The relay used in our project is of 12-volts and controller can give maximum of 5-volt, hence it is necessary to amplify the 5-volt to 12-volt for which a Driver circuit is used. Microcontroller requires a 5-volt DC to work, and same will be generated with the help of Power Supply which comprises of a Step down transformer, rectifier, filter and regulator. Transformer step down the 220-volt AC to 12-volt AC, rectifier and filter converts this 12-volt AC to 12-volt DC, and regulator converts a 12-volt DC to a constant of 5-volt DC.

Block diagram of the proposed ; system The function of WaveRectifierisacircuit,

- **Full Wave Rectifier (12VAC to 12VDC):** A Full Wave Rectifier is a circuit, which converts at both polarities of input waveform to pulsating DC (Direct current),and yields a higher average output voltage in this two diodes are use one of cycle and the other diode conduct during the other half at applied voltage (ac voltage).

- **Driver**: A Microcontroller digital logic output pin supplies very low current near 10mA to external devices such as relays (high power relays) can require less than 100mA and they require more voltages. The device which used high DC current in order to control this devices a transistor-based driver circuit is used to applies current to required level it current and voltage level are in average range, the transistor acts like a high current switch controlled by the low current logic signal.

• **PIC Microcontroller**: In our project we are using a PIC microcontroller which has Restricted Instruction Set Codes(RISC) architecture due to which controller requires only One   to complete a single   execution. In our project we are using a 28 pin micro- controller having 16K/b of 1.2K/b of and 256 bytes of

• **Opto-coupler and driver :** An opto-coupler are designed to provide complete electrical isolation between an input low voltage side (controller side) and output high voltage side (TRIAC side) circuits.
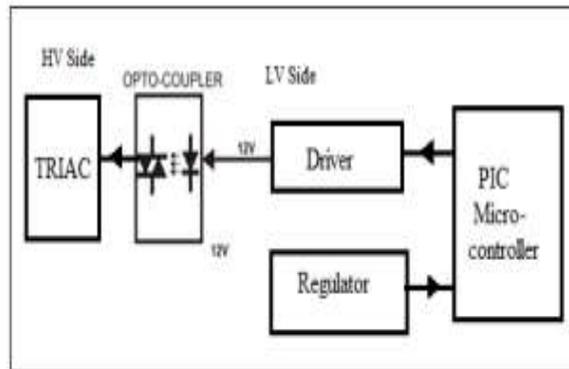
Fig: Opto-Coupler

• **LCD:** LCD stands for (Liquid Crystal Display); It used to display the operation of device. LED screen is an electronic display module.

• **Voltage Regulator**   voltage regulator is a system designed to frequently maintain a constant voltage level. It is used to stabilize the voltages used by the controller and other elements.

• **zero crossing detector**: It is used to monitor a sine wave cycle. It is a one type of voltage comparator, used to distinguish a sine wave form transition from +ve and -ve thatco insides when input crosses the zero voltage condition. In alternating current, the zero-crossing is the immediate point at which there is no voltage present. In a sinusoidal wave or other simple waveform, this normally happen twice during each cycle
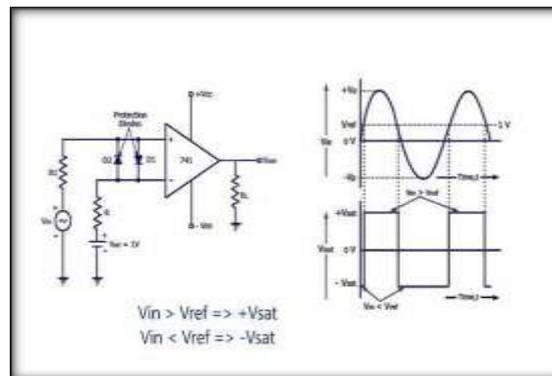
Fig-3: Zero Crossing Detector circuit

TRIAC:TRIAC is an triode for alternating current. TRIAC controls it over two halves at AC waveform. It is an static device which used to switching the operation. A static device is such device that converts one type of energy to another type of energy without any physical movement.

3. Hardware of Project.
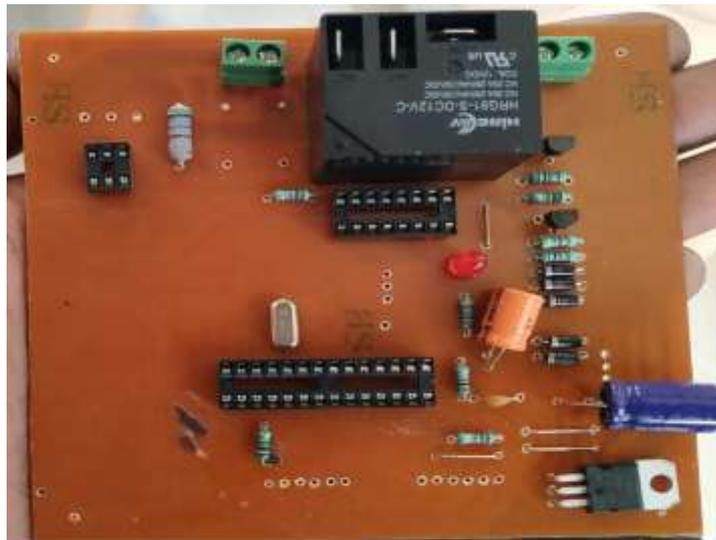
4. RESULT

The aim of our project is to prevent the power theft, it control the power by monitoring microcontroller. The project will apply when electricity supply authority passed the high voltage (220-300) for few minutes i.e, 1-3min, then power theft will be prevent by setting the firing angle of TRIAC by using microcontroller.

In our project we give 230V-300V, after completing the operation, the output voltage feed variable between 210-240V across the load. The actual purpose of project is to be controlling high voltage and converted into required voltage.

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Output table:

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Sr. No	Input Voltage supply	Ouput Voltage For Legal consumer	Output Voltage For Illegal Consummer
1	230Volt	230Volt	230Volt
2	300Volt	230Volt	300Volt

5. CONCLUSIONS

Microcontroller based device which we design is easy to execute and beneficial for both energy supply authority and user. It also provide additional feature such as stabilize the voltage, it meal a constant voltage. It also gives the information of total load used in house on request at most of the time. The statistical load used and profile can help user manage their energy utilization. This system is secured and proper because it can access by automatic operation. This device has the efficiency to faced the high voltage and supply the constant voltage to household appliances.

This device help to reduced the stolen of power by executing a high voltage through our system which stabilize the voltage, whose consumer used electricity by bypassing the meter or illegal hooking they will suffer by this high voltage. As this device stabilizes only higher voltage but by using active reactor in system, we can also maintain the output voltage if input voltage drop down to 160Volt. It will completely terminate the power theft and will increase revenue for the government and save electricity.

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