DEVLOPMENT OF ADVANCE ANTITHEFT SYSTEM FOR ELECTRIC DISTRIBUTION SYSTEM

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Abstract -- Electricity is one of the fundamental necessities of human beings, which is commonly used for domestic, industrial and agricultural purposes. Power theft is the biggest problem in recent days which causes lot of loss to electricity boards. In a country like India, these situations are more often and preventing using automatically until the power theft is not being cleared. In the proposed Advanced Antitheft system. Is an electric device having energy meter chip for measuring the electric energy consumed and a wireless protocol for data communication. Our system can also send an alert to the energy supplier in case of any power theft detect at the consumer side and cutoff the supply based system integrates digital energy meters installed at consumer unit with an electric supply companies to monitor, profile and control energy flow.

Index Terms – Electricity theft , Power theft controlling, Node unit, Central unit AC to AC power adapter.

I. INTRODUCTION

Many developing countries confront the wide spread theft of electricity from government-owned power utilities. In India, electricity theft leads to annual losses estimated, about 1.5 percent of GDP.The government has set a specific goal to raise the distribution rate of the electrical power supply, which is now around 70% to 80% to 100%. Power companies are plagued by power theft. The theft of electricity is the major concern of the transmission and distribution losses in the supply of electricity worldwide. Electrical power by altering, slowing, resetting, swapping, or disconnecting an electric meter Theft also may occur by rewiring circuits to avoid an electric meter, or by tapping into another customer's electrical lines. The fraudster might use devices to program the theft of power only during certain periods of the day or week. A fraudster may rewire their property to illegally use power from cheaper sources of power, or from meters that are billed at lower rates. Mainly the electricity is being stolen via bypassing the energy meter therefore this wireless system is utilizes to overcome this type of the theft of the electricity and is very beneficial for the authorized agency to control its revenue loss as all of us know that the cost of fuel is increasing day by day hence the intensity of stealing the electricity and using it as a substitute is also increasing, therefore, it is needed much to design a system that can detect the theft of the electricity.
This paper divided into three part:

1) To Sensing the electricity theft.
2) After finding the reasons fast action to remove theft in distribution line.
3) Real-time power monitoring at houses.

II. ELECTRICITY THEFT

Theft of electricity is the criminal practice of stealing electrical power. It is a crime and is punishable by fines and/or incarceration. It belongs to the non-technical losses There are various types of electrical power theft, including Tapping a line or bypassing the energy meter. According to a study 80% of worldwide theft occurs in private dwellings and 20% on commercial and industrial premises. The various types of electrical power theft include. Like direct hooking from line what's known as "Cable Hooking" is the most used method. 80% of global power theft is by direct tapping from the line. The consumer taps into a power line from a point ahead of the energy meter. This energy consumption is unmeasured and procured with or without switches

III. POWER THEFT CONTROLLING

Electricity theft is basically an illegal way of getting the energy for different uses, resulting in loss for utility companies. Power thefts can never be totally eliminated in our Country. In the very efficient system of some countries like Japan, Europe and US efforts have devised different methods Compulsory to reduce power thefts to acceptable levels. Everything occurs for a reason, so the reason for this substitution is losses in electrical systems.
There are mainly two types of losses.

1). Technical losses.
2) Non-Technical/Commercial losses.

In this method, an electricity will supply to distribution unit to load side/consumer side unit. To determine the theft in distribution line provide a dummy load in the middle of the distribution module and load side module. This dummy load is an advance antitheft system determine the electricity theft producing in a distribution.

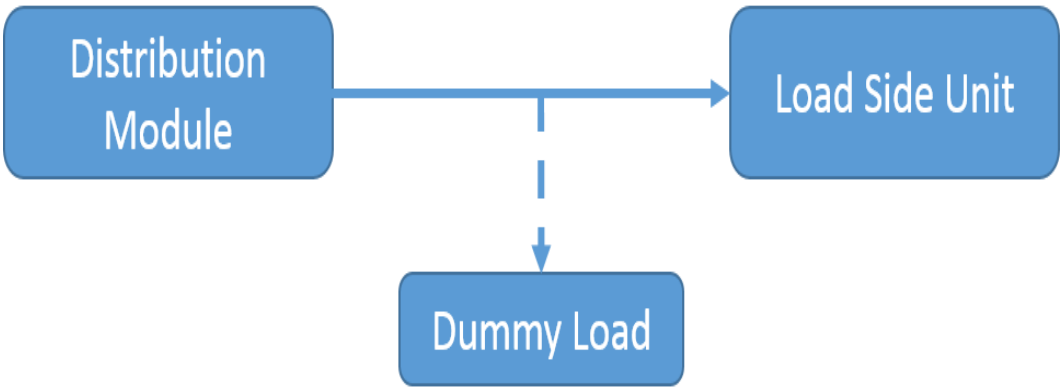

Figure 1. Working model

Electricity losses can actually be computed by finding the energy supplied, subtracting the amount of energy billed/paid we can evaluate it as follows.
Total Energy Losses = Energy Supplied − Bills paid…… [1]
Total Energy Losses = NT L + T L…… [2]
Percentage losses are calculated as:
Percentage Loss = (Received value-Sold Value)/Received value*100

1. NODE UNIT

Electricity theft is being done in such that fashion. In tampering condition there is no current entering the energy meter and due to which the energy meter does not count the units being utilized by the consumer. To reduce such type of electricity theft we have used identical Current Transformers to measure and detect the current leaving and entering the advanced energy meter i.e. CTs on the phase and neutral wire and feed it to the microcontroller where they are compared. If both the values are different from each other, then it is detected by the microcontroller as a sign of theft and the electricity supply will be disconnected and at the same time signal is sent to the energy supplier company via SMS and is displayed on LCD.

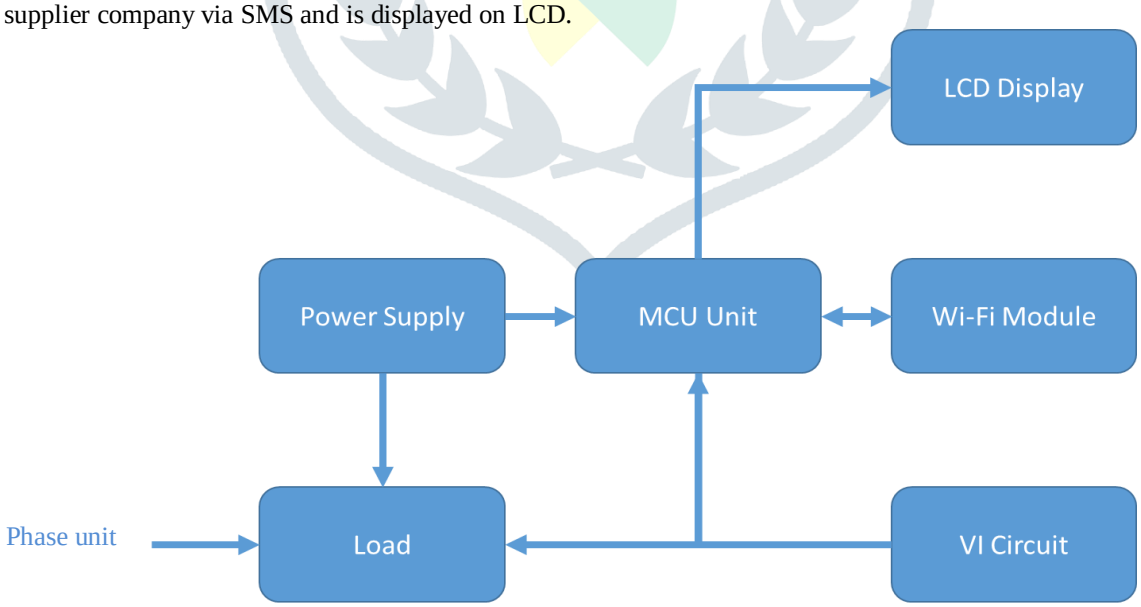

Figure 2 Node side unit

2. CENTRAL UNIT

If any theft detect in transmission line in case Central Unit communicate with a node side unit and central node unit Supply will be disconnected and at the same time signal is sent to the energy supplier company via SMS.

Relay circuit and LCD display is provided to update information like Voltage, Current, Units and billing or sudden power cut to the energy supplier company. This research highlights the general theory of action, power theft control and results.

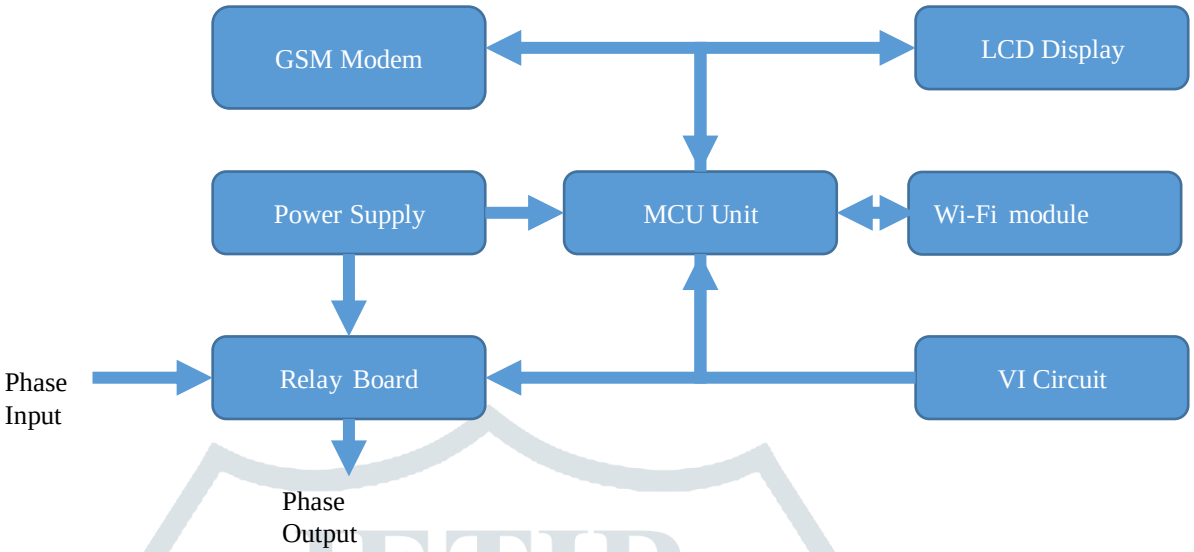

Figure 3. Central unit

IV. AC TO AC POWER ADAPTER

An AC voltage measurement is needed to calculate real power, apparent power and power factor. This measurement can be made safely (requiring no high voltage work) by using an AC to AC power adaptor. The transformer in the adapter provides isolation between the high and low AC voltage As in the case of current measurement with a CT sensor the main objective for the signal conditioning electronics detailed below is to condition the output of the AC power adapter so that it meets the input requirements of the Adriano analog inputs: a positive voltage between 0V and the ADC reference voltage (Usually 5V or 3.3V - month). The output signal from the AC voltage adapter is a near-sinusoidal waveform. If you have a 9V (RMS) power adapter the positive signal peak should occur at +12.7V and the negative signal peak should occur at -12.7V. However due to the poor voltage regulation with this type of adapter when the adapter is un-loaded (as in this case) the output is often around 10V-12V (RMS) giving a peak voltage of around 14V-17V. The signal conditioning electronics needs to convert the output of the adapter to a waveform that has a positive peak that's less than 5V (3.3V in the case of the (emonTx) and a negative peak that is more than 0V and so we need to 1) scale down the waveform and 2) add an offset so that there is no negative component. The waveform can be scaled down using a voltage divider connected across the adapters terminals and the offset (bias) can be added using a voltage source created by another voltage divider connected across the Arduino's supply (in the same way as we added a bias for the current sensing CT circuit) Resistors R2 and R1 form the voltage divider that scales down the power adapter AC voltage and resistors R3 and R4 provide the voltage bias. Capacitor C1 provides a low impedance path to ground for the a.c. signal. R1 and R2 need to be chosen to give a peak-voltage-output of around 1V, for an AC to AC adapter with an AC 9V RMS output a resistor combination of 10k for R1 and 100k for R2 would give Peak-voltage-output

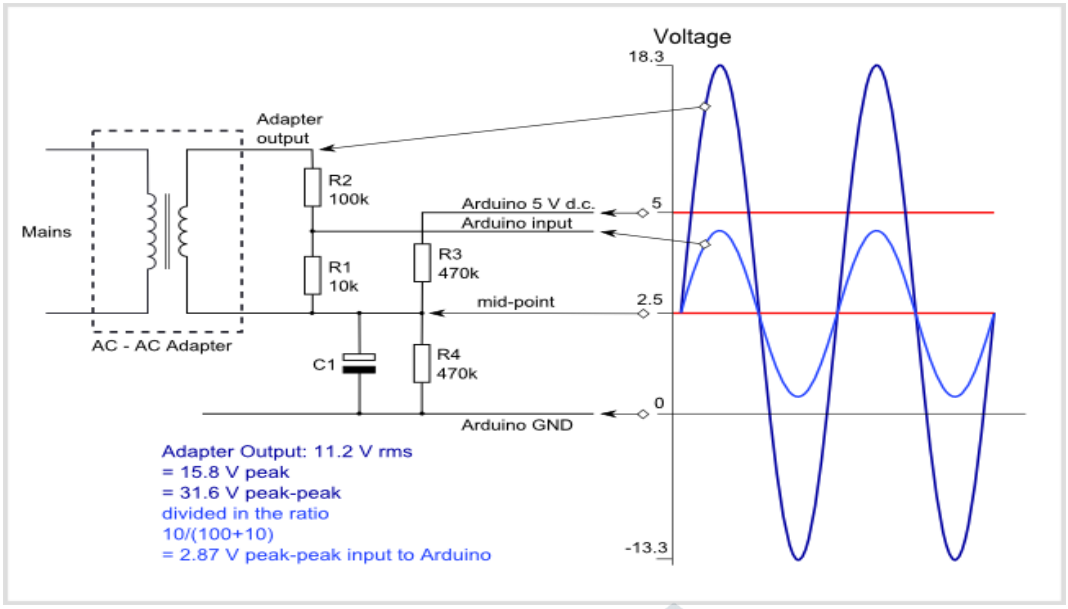

Figure 4. Arduino AC voltage input

V. SIMULATION AND RESULT

Including voltage measurement via AC-AC voltage adapter and current measurement via a CT sensor This guide details how to build a simple electricity energy monitor on that can be used to measure how much electrical energy you use in your home. It measures voltage with an AC to AC power adapter and current with a clip on CT sensor, making the setup quite safe as no high voltage work is needed. The energy monitor can calculate real power, apparent power, power factor, rms voltage, rms current. All the calculations are done in the digital domain on an Arduino

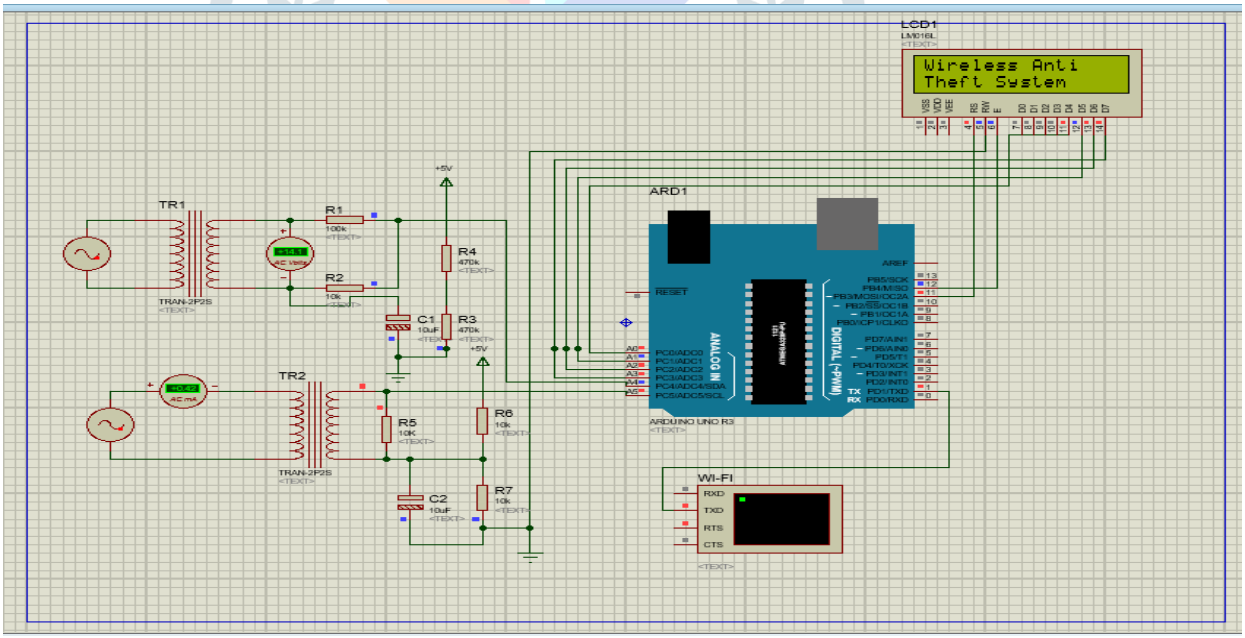

Figure 5. Paper simulation starting

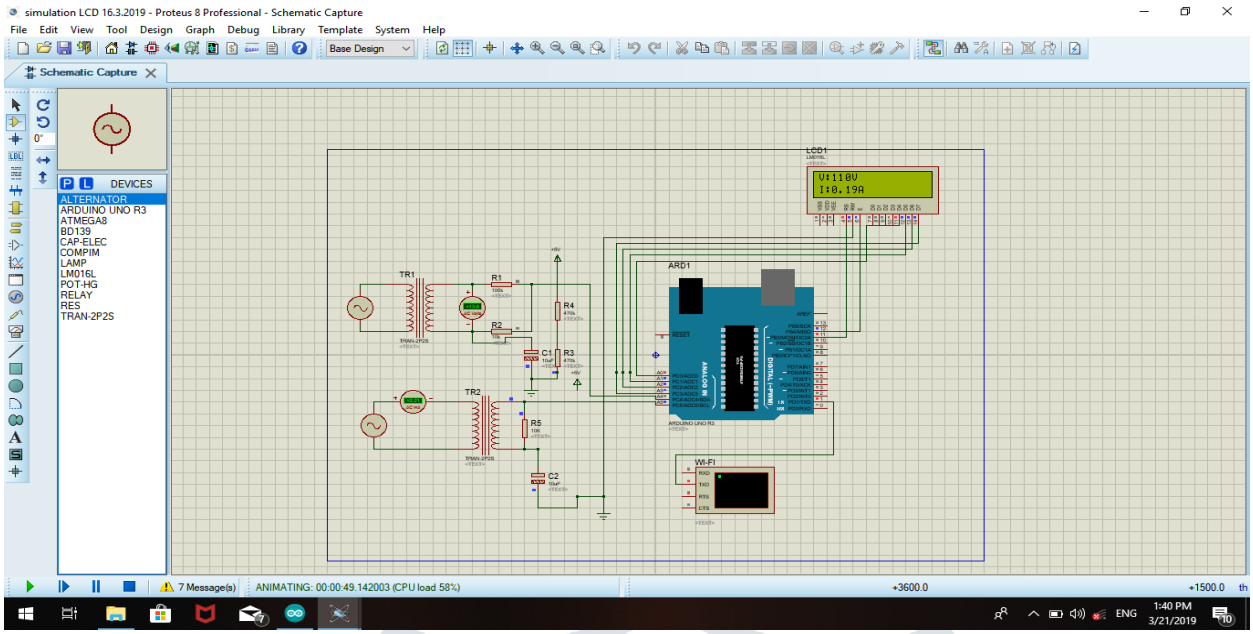

Figure 6. Paper simulation Reading

VI. HARDWARE IMPLEMENTATION

In the Figure 7, Schematic diagram of a proposed system is shown. The Hybrid system consisting of Set of capacitors, Current Transformer, Bridge Rectifier, ATmega328P, LM 7805, ESP8266 01, Resistor. Transformer-1, Transformer-2, NPN type BD 139 Transistor, Relay, AMS 1117 Regulator, LED, GSM Module

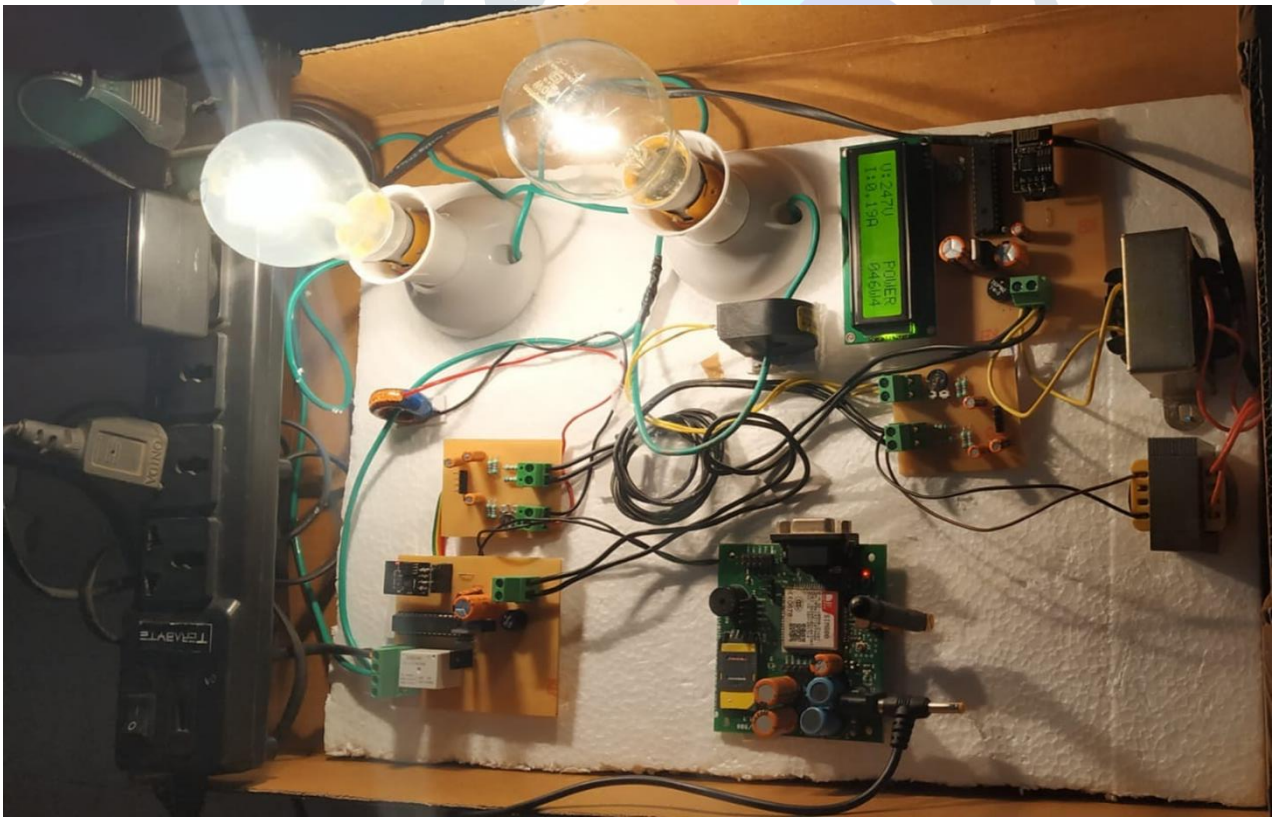

Figure 7. Paper Hardware

VII. CONCLUSION

The research of this paper gives innovative method of power theft detection for meter tampering and direct hooking of overhead conductors. The developed system is, simple, easy to operate and cost effective. It saves
Time. And domestic and industrial use of our advanced antitheft system is an easy and low power energy metering and theft control system that can be used for calculating the units and their respective energy billing, for selective load shedding and for theft control at a very low price. The whole system works on sending and receiving of SMS between the energy supplier and the user. Finally, discuss the challenging issues in energy theft detection and provide some research directions. In the future, the smart grid requires more accurate and efficient energy theft detection

VIII. ACKNOWLEDGMENT

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