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DESIGN OF GSM BASED POWER THEFT DETECTION AND LOAD CONTROL

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Abstract

In this paper, we are trying to find the power theft in house or in industries by many ways. Voltage and current are more responsible for any machine to work which is useful for our day to day survival in household or in industries. Electricity is indiscipline to our each day lifestyles with increasing need of electricity. The power theft is likewise growing; management of theft is an issue that continues on plaguing power phase crosswise over complete nation. The intention of this paper is to stipulate any such framework which is ready to plot to reduce the illegal usage of power and further more decrease the chances of theft. This challenge can evidently acknowledge the power theft. This model decreases guide control work and plan to accomplishes theft control. Here is a detection device is designed to gather a circuit and test its outcomes.

Key words: Current sensor, voltage sensor, liquid crystal LCD display, GSM PIC18F4520, Relay Energy Meter.

1 Introduction

Power thieving is an extremely common issue in the country, were humans are high and additionally the utilization of power place unit in the end enormous [1]. In India, systematically there is very growing variety of power theft crosswise over domestic power affiliation and additionally mechanical electricity offer, that brings regarding lack of electricity companies energy and attributable to that we generally tend to area unit dealing with the incessant problems with load shading in urban and additionally provincial regions if you want to defeat the need of power for whole nation[2]. Likewise the approaches that utilizing which thieving have to be practicable region unit innumerable hence we can ne'er monitor but a thieving is going on, and this issue is need to are understood as in advance than time table as can also moderately be predicted [3]. During this theoretical we tend to propose an influence thieving identification framework to acknowledge the thieving that may be a created by the foremost well-known methodology for doing the thieving which is bypassing the meter utilizing the a trifle of wire, people basically sidesteps electric meter that is tallying the current unit by setting a wire antecedently [4-9], then once the actual fact the meter reading unit. Once somebody try and power thieving, the projected structure connected to the meter, it'll send sms to manage unit of electricity board[10]. A current electrical device within the framework, one will place input aspect of post line. Alternative current transformers area unit set at the appropriation functions of the house lines [11-14]. The yield of CT esteems is given as contribution to PIC microcontroller modification over easy contributions to process [15]. At that time PIC is bothered the knowledge current and also the same of yield current [16]. Within the event that considered outcome has any negative esteem then this specific post is recognized as thieving purpose [17,18]. This contrasted esteem is transmitted with power board, this esteem show in liquid crystal display show [19]. The info can then be forthwith handled by the microcontroller and a SMS are going to be sending through the GSM technology [20].

2 Methods

In this projected framework GSM innovation will transmit the meter readings and theft indication messages to the consumer and electricity board. This procedure will happen when needed that suggests if SMS is gotten from approved server transportable transmission amongst consumer and government. At that time the energy theft is controlled by IR device and overload machine identification. Likewise will cut the power provided to that particular energy meter in keeping with demand of approved server transportable.

A. Seal Tempering Circuit

If the individual tries to theft the power from energy meter then IR device can send the flag to PIC microcontroller then it'll send the message to station controller convenient through GSM electronic equipment.

B. Overload detection

In the event that the individual utilize high power equipment's, which are not allowed to use with household or domestic energy meter, that means on the off likelihood that they are theft the power in energy meter with less reading in energy meter, which is less cost for household purposes. The individual utilize management in homes at time our circuit builds an impact on station controller through GSM with help of PIC controller and cut the facility provide consequently by utilizing hand-off.

3 Working

Simulation

In the proteus simulation software, all the required components were created and connected as per the requirement. The microcontroller is coded to detect the power theft and send instructions to GSM to send an SMS to the registered mobile number in the program. Instead of the GSM a virtual terminal is used to display the results.
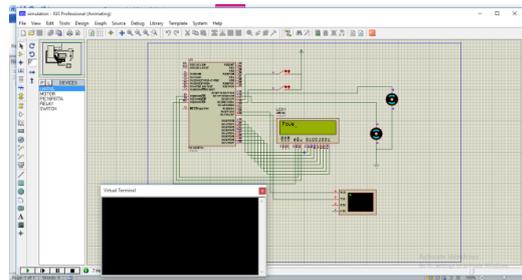

Fig 2: Normal circuit in Proteus

Fig 2 is normal circuit which is drawn in proteus work bench. In this circuit, two motors are used, with two switches. When the simulation is started, the microcontroller checks theft and displays in LCD display as power normal.
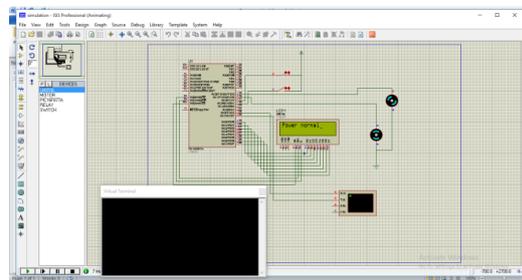

Fig 3: when one load is ON

Fig 3 shows, circuit when one load is in ON condition. If one load is switched ON, the microcontroller remains same as power is normal.
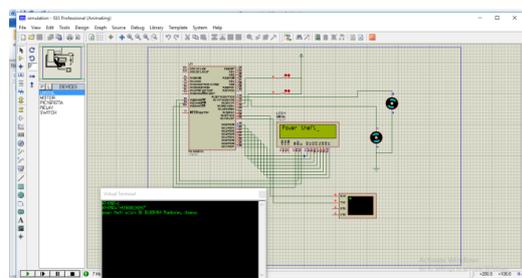

Fig 4: High power consumption in proteus

Above fig 4 shows, when both loads are in ON condition. If both loads were ON, the microcontroller detects the theft and displays in lcd. Send an sms to the registered mobile number using gsm, which is displayed on virtual terminal.

Hardware

The circuit designed with GSM, pic microcontroller, energy meter, relays and loads is connected with power supply. It works in three different circuits are

connected to pic microcontroller, which helps to find the theft of power. They are

1. Seal tempering circuit,
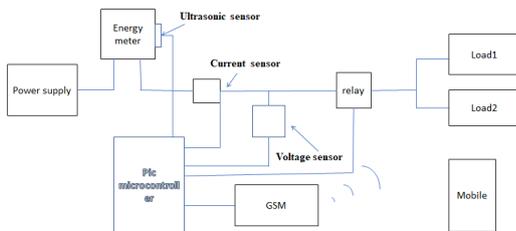2. Over load detection circuit,
3. Load control circuit.

Fig 1: Block Diagram of GSM based power theft detection and load control

Fig 5: hardware project

Above fig 5 shows, hardware kit of GSM based power theft detection and load control. Every component is explained under proposed work

a. Seal Tempering circuit:

For every energy meter, there will be a seal which is made by the electricity board for not opening that energy meter. There might be a chance of opening the energy meter and doing illegal activities to decrease their unit readings. In such cases an IR sensor is connected to the energy meter to detect that seal tempering. IR sensor is used to detect the distance between any two objects. By placing an IR sensor between the opening doors of energy meter, it will find distance between the doors and sends a signal to the pic microcontroller if the distance is increased, which is an indication of opening the energy meter. Then the pic microcontroller knows that there is tempering in

energy meter and sends a command to GSM module to send an SMS to registered mobile no. in the controller.

b. Over Load detection circuit

Many electricity consumers try to decrease their electricity bill using many ways. One of them is using industrial machines under domestic energy meter supply. To find it, we can use a current sensor and voltage sensor in the circuit. These sensors will find the voltage and current utilizing by the load in that circuit and send that values to microcontroller, where it compares with the predetermined range of current and voltage readings.

c. Load control circuit

If the microcontroller finds that there is seal tempering or overload detection, it will sends SMS to the registered mobile number in the microcontroller, which is an indication for the electricity board about the illegal activities doing by a particular customer. In this project a function is coded, which can switch off the load to that particular GSM modem number house.

Fig 6: When one load is ON

In above fig 6, the hardware kit started working. Initially, only one load in ON condition and consumes less current than maximum allowed power.

Fig 7: When both loads are ON

In fig 7, both loads are in ON condition. Voltage and current sensors are included in the circuit, which will find the current voltage consuming by the loads. If load consumption is higher than fixed range in pic microcontroller while coding, then pic controller sends a command to GSM modem to send an SMS to registered mobile number.

Fig 8: Disposing energy meter

Above fig 8, shows disposing energy meter. Opening of energy meter is illegal, because the consumer can try to do malfunction the energy meter for showing low units of electricity in energy meter. Less amount of electricity bill can be possible by malfunctioning the energy meter. So, when consumer tries to open the energy meter, an ultrasonic sensor, which is placed to the door, finds disposing and send a signal to pic microcontroller. As we are coded pic microcontroller already, it will send a command to GSM to send SMS to registered mobile number.
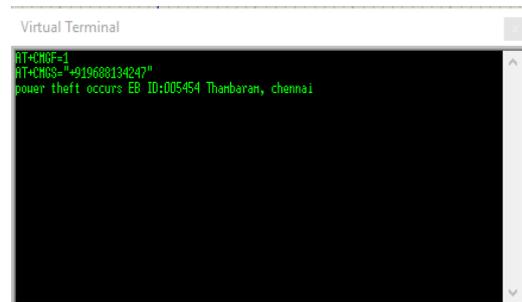
4 Results
Simulation Results

Fig 9: Result in proteus

Above fig 9 is the output obtained in proteus software when both loads were in ON condition. By finding the power theft in the simulation, the microcontroller sends a sms using gsm, which is displayed in the virtual terminal shown below.

Hardware result

Below fig 10 shows, about high power consumption in load, which is high than fixed range of that consumer energy meter.

Fig 10: SMS about high load

After receiving a command from the pic microcontroller, GSM sends a message to a particular number which is registered in microcontroller while coding the program.
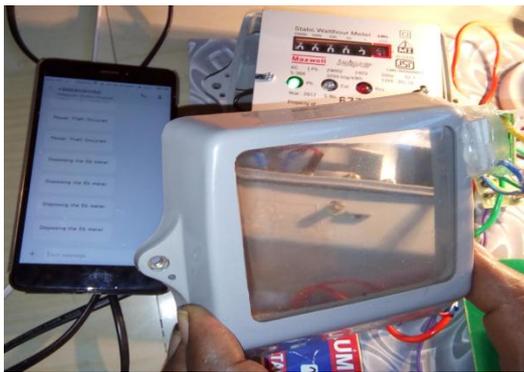
Fig 11: SMS about disposing energy meter

By opening energy meter for illegal activities, an ultrasonic sensor finds about opening energy meter. From the ultrasonic sensor, pic microcontroller finds that there is tempering of energy meter is occurred and sends a command to GSM to send an SMS about disposing of energy meter, which is shown in fig 11.

Below fig 12 is showing the SMS from GSM modem to a registered mobile number in pic microcontroller.
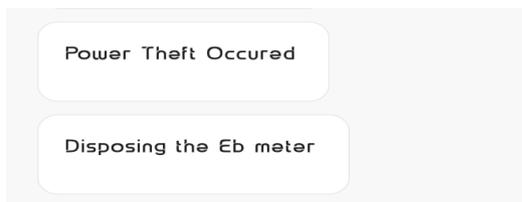

Fig 12: message from GSM modem to registered mobile

Fig 13: Load control with SMS

We can control the load, when we find about tempering of energy meter or when using high power consumption machines that are not allowed in house hold single phase energy meter. By sending a SMS to a particular GSM modem number, we can control that load. Here, we coded in this pic microcontroller as '*A' to cut the power for any particular house. So, by sending an SMS as *A the load gets OFF, which is shown in above fig 13.

5 Conclusion

A hardware project is developed to monitor the electricity using this circuit in an energy meter. Without any human interference, this project automatically detect theft occurred in a particular house. Through the GSM number, electricity board can find that customer details by maintaining proper records about the customers. This project helps to reduce the man power by automatic monitoring by the microcontroller.

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