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"GSM Based Electricity Theft Detection"

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Abstract

This paper presents a detection of power theft in every houses and in industry for different methods of theft. Electrical energy is very important for everyday life and spine for the industry. Electricity is indiscipline to our daily life with increasing need of electricity the power theft is also increasing, power theft is a problem that continues to plague power sector across whole country the objective of this project is to design such a system which will try to reduce the illegal use of electricity and also reduce the chances of theft. This project will automatically collect the reading and also detect the theft This model reduces manual manipulation work and try to achieves theft control.

Keywords*:* GSM, Current Transformer, PIC18F4520, Energy Meter.

1. Introduction

Electricity theft is a very common problem in country, were population is very high and the use of electricity are ultimately tremendous. In India, every year there is very increasing number of electricity thefts across domestic electricity connection 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 rural areas so as to overcome the need of electricity for whole state. Also the ways using which theft can be done are 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 abstract we propose an electricity theft detection system to detect the theft which is a made by the most common way of doing the theft and that is bypassing the meter using the a piece of wire, people simply bypasses electricity meter which is counting the current unit by placing a wire before and after the meter reading unit. The proposed system will be hidden in such meter and as soon as an attempt is made for the theft, it will send SMS to control unit of electricity board.
In this system current transformer are used, here one current transformer is placed in input side of the post line. Other current transformer are placed at the distribution points of the house lines. The output of CT values is given as input to PIC microcontroller convert analog inputs to digital. Then PIC compares the input current and the same of output current. If compared result has any negative values then this particular post is detected as theft point. This compared value is transmitted to electricity board, this value display in LCD display. The information will then be quickly processed by the microcontroller and a SMS will be send through the GSM technology.

2. Existing System

In this existing system wireless communication system of energy meter used with Zigbee, relay control and GPRS. The cryptographic method is used to secure the communication channel and zigbee for the transmission of data in a serial process. Drawback of this process is to collect the readings, going in the particular range of area and manually cut power supply if needed.

3. Proposed System

In this proposed system GSM technology used to transmit the meter reading to the customer and government with the required cost. This process will be happen when needed that means if SMS is received from authorized server mobile transmission between customer and government. Then the energy theft controlled by IR sensor, Bypass detection. Also cut the power supply automatically as per request of authorized server mobile.

4. Block Diagram Description

4.1 PIC 18F4520

The PIC is the main part of automatic reading and theft control. It is based on low power 16 bit microcontroller. PIC 18F4520 consist of high performance and low cost of network technology. PIC 18f4520 belongs to a class of microcontroller of RISC architecture. It has internal 10 bit analog to digital converter.

4.2 Block Diagram

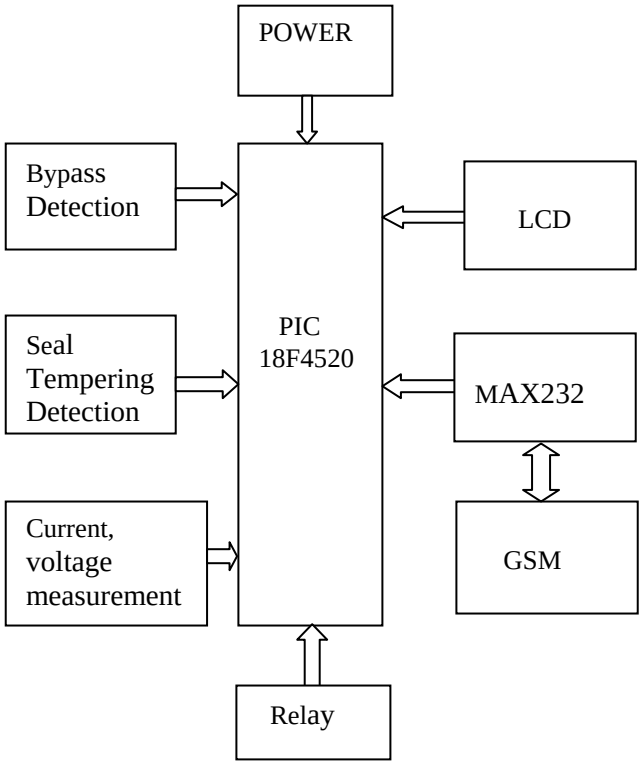


Fig. 4.2.1 Block Diagram

4.3 Power Supply

The input to the circuit is applied from the regulated power supply. The AC input that is 230V from the main supply is step down by the transformer to 12V and is fed to a rectifier. The output obtain from the rectifier is a pulsating DC voltage. So in order to gate a pure DC voltage, the output voltage from the rectifier is fed to a filter to remove any AC components present even after rectification. Now this is given to a voltage regulator to obtain a pure constant dc voltage.

4.3 Seal Tempering Circuit

If the person theft the power in energy meter like, if he remove the seal which on energy meter then IR sensor will send the signal to PIC microcontroller then it will send the message to substation controller mobile through GSM modem.

4.4 Bypass detection unit

If the person use a the power without connecting to energy meter, that means if he is bypassing the connection in energy meter without any reading in energy meter the person use power in houses at time our circuit send a message to substation controller through GSM with help of PIC controller and cut the power supply automatically by using relay.

4.5 Power Measurement Unit

In the power measurement unit, the one CT is used to measure total current used and measuring voltage, we use bridge of diode for converting AC to DC and then voltage divider circuit reduce voltage level at measurable scale.

4.6 GSM Modem &MAX232 IC

GSM Modem-Max 232 is built with dual band GSM engine-SIM 900A. As mentioned in the above sensing circuit there is power theft then it will send message to microcontroller as per our program and it will send message to GSM through Max 232. Also if mobile received SMS from authorized mobile phone to cut the supply, then supply is off by using relay.

4.7 LCD Display

The commonly used 16x2 LCD display custom made characters, numbers, alphabets, and special characters. When there is no theft occur in energy meter then the LCD will display voltage current and power. If theft is occurs then it display THEFT IS DETECTED.

5. Flow chart

To program a PIC controller to detect a power theft on following flow chart as shown in fig 5.1

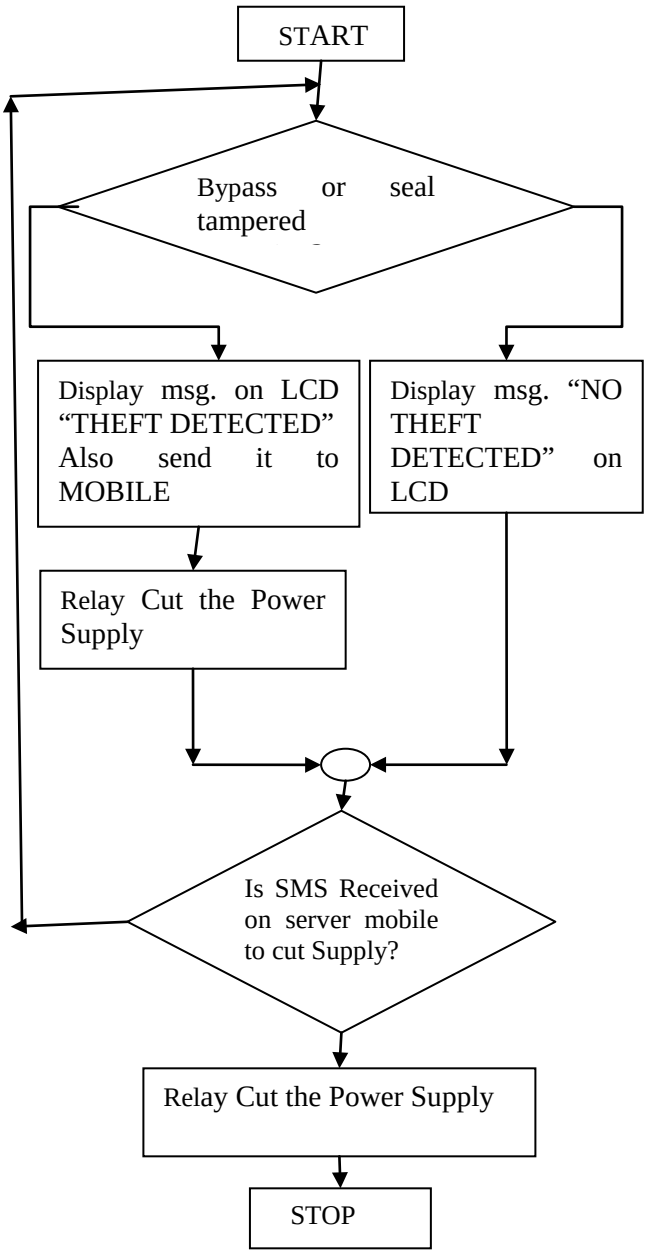


Fig 5.1 Flow chart

6. Hardware Design

The hardware of the automatic meter reading and theft control system by using GSM module our project at designing such a system which will automatically collect the reading and also detect the theft. Current transformer is used to measure the total power consumption for house or industrial purpose. This recorded reading is transmitted to the electricity board as per his demand for transmitting the reading of energy meter GSM module is used.

The energy theft is control by IR sensor, IR is placed in the screw portion of energy meter seal. If the screw is removed from the meter message is send to the electricity board. The measuring of energy meter and monitoring of IR sensor is done with a PIC microcontroller. Then bypass of meter is detected by using to CT. One is in energy meter another is placed on electricity pole.

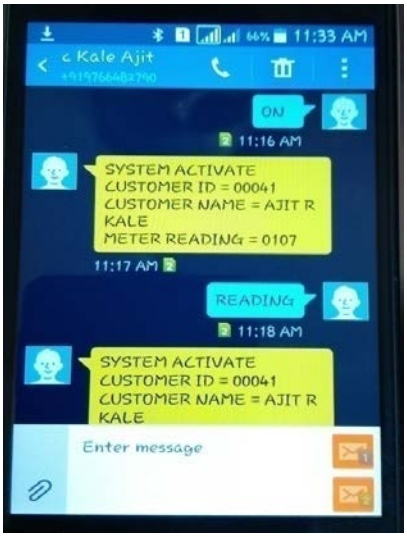
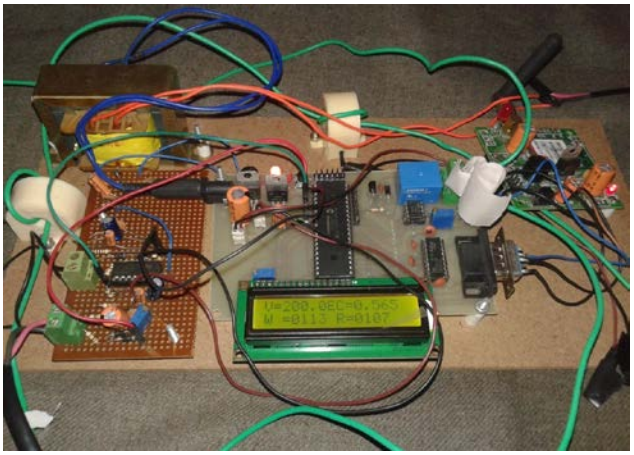


Fig. 6.1 SMS send for system ON



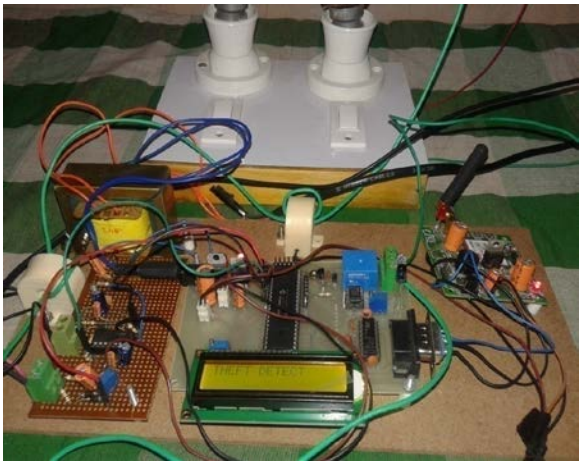
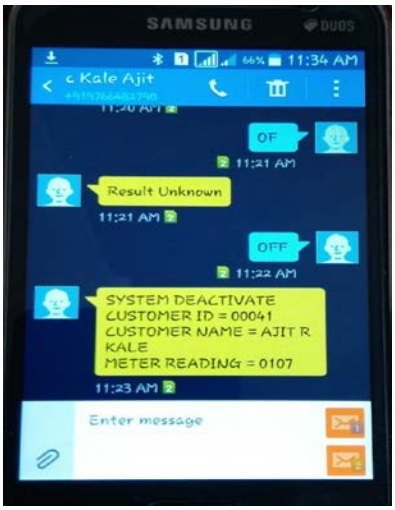


Fig 6.2 System is ON



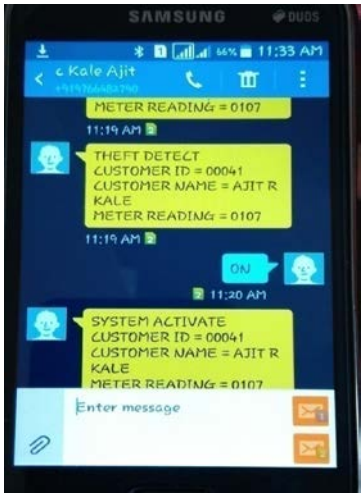


Fig 6.3 Theft Detected and System is Off

7. Conclusion

The project model reduces the manual manipulation work and theft. Use of GSM in our system provide the numerous advantages of wireless network systems. The metering IC ensure the accurate and reliable measurement of power consumed. Hence we are trying to manipulate cost wise low when compared to other energy meter without automatic meter reading and theft control.

7. Acknowledgement

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8. References

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