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GSM BASED POWER THEFT MONITORING AT LOCAL DISTRIBUTION SYSTEM WITH PREPAID ENERGY METER

Prof. D. R. More*1, Vijay A. Patil2, Pravin M. Patil3 and Avinash S. Shete4

*1Department of Electrical Engineering

2,3,4D.Y. Patil Technical Campus, Talsande

ABSTRACT

At this point of technological development the problem of illegal usage of electricity can be solved electronically without any human control .The implementation of this system will save large amount of electricity, and there by electricity will be available for more number of consumer then earlier in highly populated country such as INDIA.

The proposed meter is set to carry a unique identification number such as the consumer's phone number which may be encrypted into the memory of the microcontroller. Electricity theft is being detected as the GSM module sends message to the distribution company. Revenue generated can be increased through the use of the proposed meter as unaccountability by utility workers and billing irregularities are eliminated. The results obtained from the simulation shows that immediately an illegal load is connected to the utility system either within the residential meter jurisdiction or otherwise stated, the GSM module alerts the utility company no matter how small the illegal load is so, The system prevents the illegal usage of electricity.

Key words: *GSM network, WTSN,WCSN,DMC, Microcontroller (AT89C51).*

I. INTRODUCTION

Electricity theft is not a new phenomenon but it is becoming important because of its impact on the cost of electricity to consumers and the utility companies alike. Unlike other forms of theft, electricity theft hardly carries strict penalties. Recently, there has been the development of more policies and stronger legislative power to deal with those who take part in the fraudulent extraction of electricity. There are four main ways that electricity can be accessed illegally. Electricity can be fraudulently accessed through illegal hook-ups, meter tampering or bypass, billing irregularities and unpaid bills. Illegal hook-ups occur when electrical wires are directly connected to the grid system from the individual's premises.

High risks of electrocution and electrical fires are associated with this type of electricity theft technically, this type of theft is not so complicated and is usually practiced by poorer households. It is also very easy to detect. Meter related theft is hardly found among poor households because it is technically sophisticated and usually requires some electrical wiring knowledge. Meter tampering can be done by inserting a device into the meter resulting in an inaccurately lower reading on the meter. This tampering can be detected only by an audit on the premises or by discrepancies in the electricity bill.

Meter bypass occurs when some of the wiring of the premises is engineered to not pass through the meter. Like meter tampering, this is also very difficult to detect. Billing irregularities is a manifestation of corruption in the utility company through bribes to utility officials. Usually, the meter reader is compensated for not reporting the accurate electricity usage of the property. Refusal to pay electricity bills is a common practice by all socioeconomic groups. The utility company has the greatest control over this since they are able to disconnect customers for unpaid bills. Disconnections are usually a prelude to another form of electricity fraud.

Power theft is a serious problem and it does among confronting most Power theft when not checked and prevented can derail the growth and progress of an economy. It can also leads to frequent power outages due to

lack of funds by the Electricity company to import power equipments like transformer and others to augment the demands of electrical power to both domestic and industrial consumers.

II. METHODS OF THEFT

A) Connection of supply without meter:- Connection of supply without meter following disconnection for non-payment or by squatters occupying empty properties.

B) By passing meter with cable:-

It connected in to the supply side of the metering installation (i.e. the meter terminals, metering cables, and the cut out of the service cables.) This is most common way of power theft.

C) Interfacing with the meter to slow or stop:- The disc including use of electrical devices which stop the meter or cause it to reverse.

D) Interfacing with the timing control.

E) Unpaid bills:- Non-payment of bills by individuals, government institutions and untouchable VIPs results in utility running at a loss and a must continually increase in electricity charges.

METHODS OF IDENTIFYING THEFTS:-

A) Financial Rewards – Utility companies encourage consumers to report electricity theft, sometimes offering big reward for information leading to conviction of anyone stealing electricity. Unfortunately, most cases are never identified in both domestic and industrial setup due to lack of timely information. Both domestic and industrial setup due to lack of timely information.

B) Periodic Checks – Electricity theft frequently takes place after service has been disconnected. Some utility companies periodically checks disconnected meters if customers has not contacted them to reconnect services. This labour- intensive, manual process has little chance of success given that the apartment averages 70% turnover of tenants annually.

C) Meter Readers – Utility meter readers typically suspect that electricity theft is taking Place when they find a broken meter tag or other signs of tempering. But as more utility companies outsource the meter reading function to third parties, training meter readers to detect theft is becoming more difficult and less efficient. In addition third part meter readers do not read disconnected meter.

III. PROBLEM DEFINIG

The already existing methods which may be utilized in tackling electricity theft in some countries where practiced include proper enforcement of electricity regulatory laws, periodic and impromptu checks of consumer homes, electronic tampering detection meter and use of prepaid meter. The limitations of using the smart meters is that: consumers feel it discloses privacy of their homes which is not ethically true and that it interferes with radio frequency and create problems in radio transmission profile.

Periodic checks are not 100% efficient due to its laborious and sluggish nature. Adopting this kind of method in electricity theft reduction will delay accurate and effective reading of the meters in remote areas that are non-accessible. In the past, committees that were set-up see it as an avenue to amass wealth rather than strictly punish defaulters thus all these reasons have hindered the growth of our power sector.

The proposed methodology has the following advantages over the existing schemes, which are outlined hereunder.

A) In the Existing Meters, manual billing is often restricted and delayed by bad weather condition in other cases the printed billing may even get lost whereas the proposed meter, prevents house to house visitation in order to issue bills as it requires consumers to pay for the consumption before its usage.

B) The need for the disconnection of power supply before is no longer taken care of by the electrical workers because the proposed meter automatically disconnects it when the consumers units have been used up.

C) In using the prepaid, the consumer pays for the units needs. It also manages the customer's consumption as it provides credit control and facilitates affordability.

D) GSM application in system monitoring: Nowadays, GSM modules are used to transmit the meter reading from one end to the other. The main aim of this work is to use the GSM network alongside the prepaid meter in reducing theft and losses. It is also used in remote monitoring and records the energy meter reading. This also can be used to disconnect the power supply to the house in case of non-payment of electricity bills. The GSM modem with SIM card is required for each energy meter which aids continuous reading. In case of tampering, it immediately sends

signal to the central server of the utilities. Another advantage of the GSM is that it enables the utility engineers efficiently plan for network expansion while delivering a higher quality of supply.

E) Mobile Phone Based Recharging: In this work Prepaid Energy meter may be recharged from a remote location by using a mobile phone. The user transfers the amount to the service provider bank account and the service provider makes a call to the system, and recharges by entering digits from its key pad. The recharging can be done from any mobile set but the system access code must be put in to the system to log into the energy meter. The energy meter sends a pulse to the microcontroller indicating a unit is consumed.

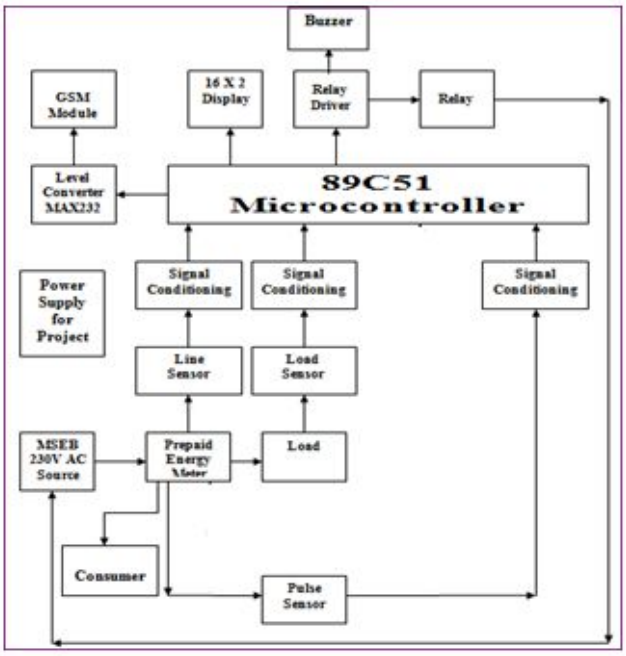

Fig1:-Block diagram power theft monitoring at local distribution.

IV. RESULT

Line	Load	Meaning		Condition On Display And Electricity Board Side
0	0	line on	load on	load and line on normal condition
0	1	line on	load off	load off and line on normal condition
1	0	line off	load on	load on line off theft detected
1	1	line off	load off	load and line off normal condition

Formula Used For This System Total Power Supplied From= Power taken by all consumer + line loss
Double pole substation-
If the difference between left hand side and right hand side of above equation is more than specified limit value then there is definitely power theft at any point in the distribution system and it will be detected and the location of theft will be displayed on computer which is placed at nearby substation. The losses in the line are calculated mathematically. So using this system we can detect the theft at point in distribution system. **OR**
Power theft can be calculated by using the following formula:
Difference (dmc) =collected data–measured data Where, collected data is the data stored in the.
WTSN and measured data is the data transmitted by the WCSN. If difference is negligible then there is no power theft otherwise there is a power theft.

V. CONCLUSION

The design and construction of a GSM-based prepaid meter has been achieved. This technology reducing the heavy power and revenue losses that occurs due to power theft by the consumer. The design provides that power theft can be effectively curbed by detecting where the power theft occurs and informing the authorities.
Also an automatic circuit breaker may be integrated to the unit so as to remotely cut off the power supply to the house or consumer who tries to indulge in power theft. This system design mainly concentrates on single phase electrical distribution system, especially.
The proposed system provides the solution for some of the main problems faced by the existing Indian grid system, such as wastage of energy, power theft, and transmission line fault.

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AUTHOR'S PROFILES

	Name: Mr. Patil Vijay Ashok Department of Electrical Technology, Shivaji University, Kolhapur. Email Id: vijaypatil5880353@gmail.com Mob No: 9673698483
	Name: Mr Patil Pravin Maruti Department of Electrical Technology, Shivaji University, Kolhapur. Email Id: pravinpatil2151.pp89@gmail.com Mob No:9689085425
	Name: Shete Avinash Shirish Department Of Electrical Technology, Shivaji University, Kolhapur. Email id: avinashshete6582@gmail.com Mob No: 9096006166