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IoT Based Power Theft Detection

Prof. S.R. Deshmukh
Asst.Prof.MGI-COET, Shegaon
sagardeshmukh04@gmail.com

Mr. Shubham Lohiya
MGI-COET, Shegaon
shubhamarjunchouhan@gmail.com

Miss. Bhagyashri More
MGI-COET, Shegaon
more18bhagyashri@gmail.com

Mr. Shubham Chouhan
MGI-COET,Shegaon
shubhamarjunchouhan@gmail.com

Miss. Dhanashri Malasne
MGI-COET,Shegaon
malasanedhanashri@gmail.com

Abstract— Electrical power theft is a major problem in power system network in developing countries like India, which is illegal and should be strictly prohibited. Power theft is nothing but usage of the electrical power without any contract with the supplier. Power utilization and misfortunes must be intently checked with the goal that the produced influence is used in a most effective way. The purpose of this paper is to propose a system, which keeps the unlawful utilization of intensity. The point of this paper is to propose a framework, which keeps the unlawful utilization of power. In order to prevent power robbery, the area of intensity burglary is to be known so suitable move will be made on the lawful guilty parties.

Keywords-User, IOT Based Power Theft Detection , Arduino controller.

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I. INTRODUCTION

Nowadays in the society usage of electricity in illegal manner become a popular technique to every human being. The only criteria of every consumer are to get free energy without paying any extra bills to the electricity department, about Rs.3000 crores of money are wasted per year in India due to power theft. Using of power in an illegal way is nonignorable crime in any ware in the world. We should have to know about the quantity of fossil fuels on the earth surface is limited, so we have to use them efficiently and limitedly to leave some of them for future generation survival. With the use of electricity in unauthorized way may leads to high transmission losses results loss of economy to government. So, in this paper a power theft detection system is proposed to identify the burglary which is made by the most well-known method for doing the robbery and that is, by using excess power beyond the limit of meter. Now of mechanical improvement, the issue of unlawful use of power can be settled electronically with no human control alongside that meters are associated with the web utilizing IOT idea. In this paper the proposed method is efficient in working compared to others. In this method IOT technology is used to detect frauds committed by the consumers with continuous monitoring of consumption of power in mobiles. If the consumer committed any fraud activity the location of power theft is to be known so that appropriate action will be taken on the legal offenders. The production, transmission and distribution of electrical energy leads to many operating losses. While the losses involved in production can be technically defined, the transmission and distribution losses cannot be precisely quantified with the information sent by the recipient. This illustrates the implication of non-technical parameters in the

transport and distribution of electricity. Overall technical losses occur naturally and are due to power dissipation in transmission lines, transformers and other power system components. Technical losses in Transmission & Distribution are calculated with information on the total charge and the total energy bill. While the technology on the slopes of elevation, we should also note the growing immoral activities. From a technical point of view, the theft of energy is a crime that cannot be ignored and, at the same time, has had a direct impact on the economy of a country.

The theft of electricity is a social problem, so you have to eliminate it completely. Energy consumption and losses need to be closely monitored so that the energy produced is used in the most efficient way possible. The system prevents the illegal use of electricity. At this stage of technological development, the problem of the illegal use of electricity can be solved without any human control using GSM and IoT technologies. The implementation of this system will save large amounts of electricity and will be available to more consumers than before, in highly populated countries such as India and China. Theft of energy can be defined as the use of electrical energy without any legal contract with the supplier.

II. PROPOSED METHOD

In the society it was seen lot of people doing illegal power theft like unauthorized tapings from lines during functions and meter bypassing etc. these led us to do something to stop power theft as much as we can that is so why we choose "power theft detection" as a main project. IoT is the recently evolving technology.

The major components of system are Arduino, GSM, LCD, ESP module and Current transformers. Current sensing is done by current transformers because Meters cannot be used for

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high currents. Two CTs are used, one is connected at load side to measure the current through load and other C.T is connected at supply terminals to measure the current supplied by source.

The important component in this circuit is Arduino controller. It receives current signal from two current transformers by the means of bridge rectifier. Then it compares those two current magnitudes by the conditional operator. The two C.T.s shows almost the same values as there is no theft load. Here the system is in healthy condition.

The Arduino cannot access current signal. So we have to interface the C.T. by means of voltage only. Therefore we have to convert the current signal into voltage signal. It can be converted by placing a resistor in series and taking voltage across the resistor and passing that voltage signal to arduino. Resistor is used because the secondary of current transformer should never be open circuited. The corresponding current can be obtained by calibration which can be done by connecting various loads and measuring different voltages and currents respectively.
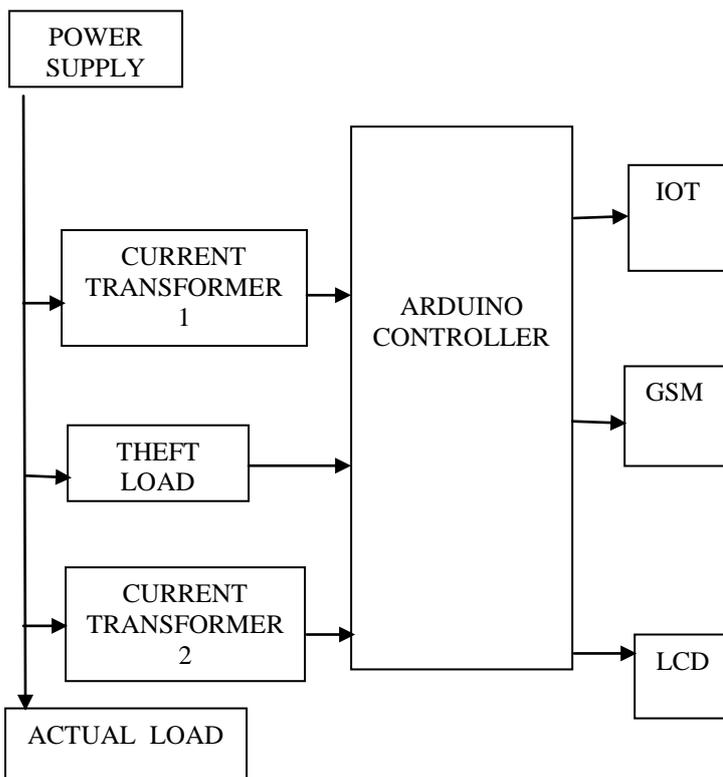

Fig.1: Block diagram of IOT Based Power Theft Detection

A rectifier can also be used to convert current signal into voltage signal. As the rectifier converts AC signal to DC signal, the output across the resistor connected in the rectifier circuit can be taken as the voltage signal. The secondary of the C.T is connected to the input of bridge rectifier. To reduce the ripple content in the output a capacitor is used. A resistor is connected at the output side to measure the voltage across it. This voltage signal is given to the Arduino and the corresponding current can be calculated by the calibration.

Thus the current signal from the C.T is converted to the voltage signal for the purpose of access to the Arduino controller. The same above procedure is also repeated for the C.T. connected at the load side. Program is written for accessing the voltage signals from the rectifier circuits. Condition is specified in the program for comparing the voltage magnitudes. If the variation is more than the specified value, that means the condition is violated. Then the control moves to the alert functions namely SMS.

If any tapping is done, i.e, power theft is there. Then two transformers shows different values. The source current is more than the actual load current. If there is any deviation more than the specified value then controller sends the signal to LCD, GSM and Internet of things.

The GSM is used for sending text message to the substation members by placing their mobile number in the code. IoT is used for sending tweet to the officials through internet.

LCD is used for the purpose of display. It shows the status of the load current and source current and also the amount of current that is deviated. GSM module will sends the text message to authority / person whose mobile number is given in the program according to the signal given by the Arduino controller. The ESP module allows is used to connect the Arduino board to the internet, so that the people in the substation can know the information about the power theft through internet and allowing them to take appropriate action against the offenders.

A. ADVANTAGES

1) Security is automated.
2) Economy of country is saved.
3) In case of failure of internet alert can be generated through GSM.
4) Does not affect the power transfer capability of line.

B. APPLICATIONS

1) Used in distribution system.
2) Can be used in AMR

III. HARDWARE DESCRIPTION

The following components are used for making the proposed prototype:

A. *COMPONENTS USED:*

1) Arduino UNO
2) ESP8266
3) GSM module
4) Liquid crystal display
5) Current transformer
6) Bridge rectifier
7) Voltage Regulator (LM1117)
8) Voltage divider
9) Lamp load
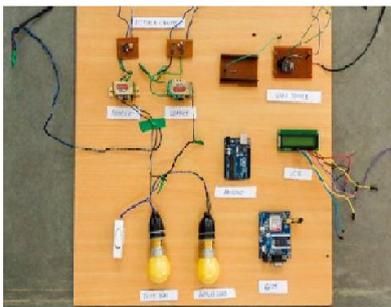10) Resistor

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11) Capacitor

Fig.2: Hardware Prototype of the System

IV. OUTPUT

The output of this system can be monitor through mobile, it displays the current and power values continuously. when theft detected it displays "theft detected" message on the one of two LCD's. and also, we get location address of the theft occurrence place through GSM and GPS to mobile.

Fig.3: Output before Occurrence of Theft

From fig.3 we can infer that the output of the system before occurrence of theft, it displays the current and power values of the line

Fig.4: Output after Detection of Theft

From fig.4 we can infer that the output of the system after occurrence of theft, it displays a message that "Theft Detected" on one of the two LCD's.
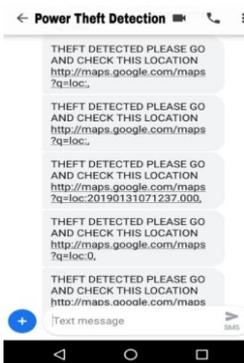

Fig.5: Output in Mobile after occurrence of Theft

From fig.5 we can infer that the message sent to the mobile after occurrence of theft, it sends the address of location and by clicking on that link we can get directions of location.

V. CONCLUSION

Even though there are many methods to detect electricity theft but they are insufficient to detect exact location of theft therefore it causes lot of revenue loss to the system. IOT technology in power theft detection brings enormous changes in the country's economy and makes utilization of energy in efficient manner. This system can be further improved to monitor all the places on one screen i.e., many to one connection is possible with future technology. Using IoT, power theft detector kit has been implemented and the same also done using GSM for the purpose of backup protection. In case of internet failure the alert will be made through text message. Using the GSM and IoT techniques above, it is possible to put an end to the crime of stealing power. We can therefore expect a new flowering in the economy of our country and there will also be less shortage for the use of energy.

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