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Power Theft Identification by Using IOT

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Abstract: *Electrical energy is very important for everyday life and spine for the industry. Electricity power is indiscipline to our daily life with increasing need of electricity, the energy robbery is also growing, electricity theft is a hassle that keeps to plague electricity region across the country, the goal of this paper is to design one of these gadget with a purpose to try and reduce the illegal use of power and also lessen the probabilitiesof theft. In this research we have focused on the most common practice of stealing power which is tapping or tampering the meter. The system has been designed to detect the theft and also inform to the nearest substation and to the consumer. This model try to achieve theft control.*

Keywords: Energy Meter, ESP32 Controller, GSM Model, Opto coupler.

I. INTRODUCTION

Electricity is the modern man's most convenient and useful form of energy without which the present social infrastructure would not be feasible. When significance of electricity is at the growing aspect, then the stealing of this energy or illegal intake of electricity from the transmission traces could be prevented. Electricity theft has come to be a incredible task to the energy board. Electricity theft is the most important hassle in recent days which causes lot of loss to electricity boards. In international locations like India, the conditions are greater often, if we can save those thefts we can store lot of power. Electricity theft detection system is used to discover an unauthorized tapping on distribution lines. Theft also may occur by rewiring circuits to avoid an electric meter, or by tapping into another customer's electrical lines. The proposed electricity theft detection system helps to detect the theft which includes tapping on the distribution lines using a piece of wire, which is counting the current units by placing a wire before and after the meter reading unit. Electricity theft has been focused all over the world, but power theft in India has a significant effect on the Indian economy. There are variety of power theft has been taking place with the support of people from different walks of life, utility staff, consumers, labour union leader, political leaders and high level utility officials. The proposed system could be hidden in energy meter and as quickly as an try is made for the theft, it'll send an message to control unit of electricity board and consumer. This will shield distribution community from power theft accomplished with the aid of meter tampering, tapping and many others. In domestic electricity connection as well as industrial electricity supply there is a continuous growing of electricity thefts across the India, which ends up in lack of electricity energy and due to which we are facing the frequent issues of load shading in urban in addition to rural areas also. So as to overcome the need of electricity for whole state is in high demand energy management and monitoring has a significant role for the proper utilization and better energy management. In existing system the meter readers has to visit every home to take the consumed units and cost.

II. LITERATURE SURVEY

Detection of power theft in every houses and in industry for different methods of theft. A system is designed which will try to reduce the unlawful use of electricity and also lessen the probabilities of theft. Detect the theft and try to acquire theft manipulate[1].

Because of electric powered electricity theft, about 30-35 percent of the earnings earned through the electric board is going waste. Previous attempt to monitor the power theft has not resulted in well ordered manner because of the unlawful practices of some of the employs and consumers. This studies goals at reducing all these difficulties by fabricating a simple system to send a message whenever there is a power theft activity at a certain location[2].

The electricity theft detection using microcontroller has been proposed. This system reduces the cost of man power for providing information regarding theft by consumers[3].

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This paper consider a model to reduce the power theft. Use of GSM in this system provides a various advantages of wireless system. The government saves money by the manipulation of theft in energy meter and also more beneficial for customer side and the government side[4].

In this system the data collection and manipulation task becomes fast and easier. Also it can be easily installed before for consumer energy meter for checking the consumer status[5].

III. METHODOLOGY

The proposed system describes how to prevent the Tampering of Meter and Bypassing the Meter. The principle gain of this device over the alternative systems proposed in advance is that the structures proposed formerly useful discover power theft but do no longer stop it. While this system prevents the theft which means if the defaulter attempts to theft the energy by way of bypassing or tampering, he will now not be capable of use the electricity. Consumer can only get right of entry to the power via proper energy meter.

3.1 Theft Control Measures

A. Protection against Tampering

In this system if the customers or professional ones try and open the energy meter and tamper it to expose low or no energy consumptions. To remove this trouble, one leaf switch is used at establishing aspect of the proposed energy meter. Output of switch is attached to outside interrupt pin of microcontroller. In everyday conditions, the transfer can be closed and the Microcontroller will discover 5V as its outside interrupt pin. If consumer attempts to open the energy meter the switch might be opened and the Microcontroller will detect 0V at its external interrupt pin. If this occurs, the microcontroller disconnects the electricity without delay and consumer with the assist of GSM modem.

3.2 Protection against Tapping the Meter

In this proposed system to save you from tapping, modern transformers are used one after the other inside the distribution junction and sub junction. The output voltages of CT1 and CT2 are furnished to the ADC inputs of Microcontroller. If the distribution line energy is more and sub junction electricity is much less, then there might be difference among the output voltages of CT1 and CT2. The Microcontroller compares the voltages of CT1 and CT2 and if any considerable difference is observed, it disconnects the electricity immediately the usage of the Relay and additionally sends the information to the power board through GSM.

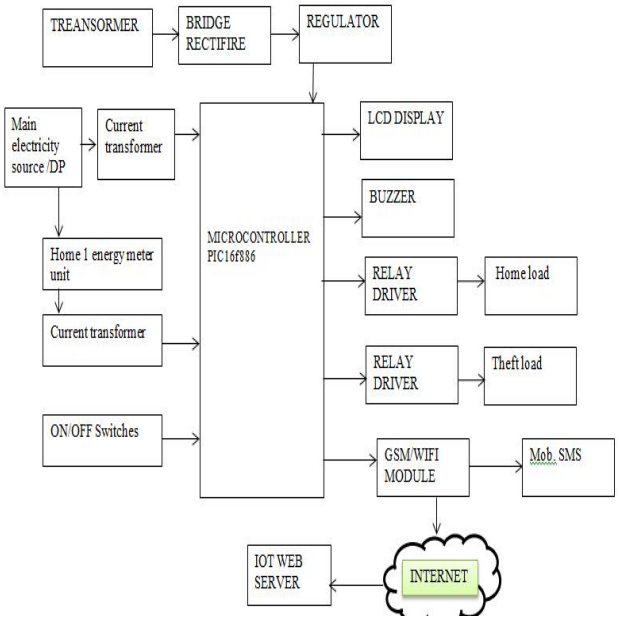

Figure 3.1: Block diagram of Power Theft Detection

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3.3 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 obtained from the rectifier is a pulsating DC voltage. Additionally sends this records to the electricity board and S So in order to get 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 given to a voltage regulator to obtain a pure constant dc voltage.

3.4 Microcontroller

Microcontroller is a series of low-cost, low-power on a chip microcontroller with integrated Wi-Fi and dual- mode Bluetooth. The Microcontroller series employs a Ten silica XtensaLX6 microprocessor in both dual-core and core variations and includes in-built antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules. Microcontroller is created and developed by Espressif Systems a Shanghai-based Chinese company, and is manufactured by TSMC using their 40 nm process. It is a successor to the ESP8266 microcontroller.

3.5 Optocoupler

An optocoupler is essentially an optical transmitter and an optical receiver connected by a nonconductive barrier. It uses beam of light to transfer energy from one circuit element to another, and it can handle incoming voltages of up to 7500V.

3.6 Electromagnetic Relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. Relays allow one circuit to switch a second circuit which can be completely separate from the first.

3.7 LCD Display 16 X 2

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being LCDs are economical, easily programmable, have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

3.8 GSM Module

GSM is a mobile communication modem; it is stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.

IV. EXPERIMENTAL SETUP

In this paper we are dealing with two types of power theft.If any power theft is detected then a message will sent to the KEB and consumer through GSM module. A registered SIM number is provided in the GSM module. The figure 4.2 shows the experimental set up of the proposed system

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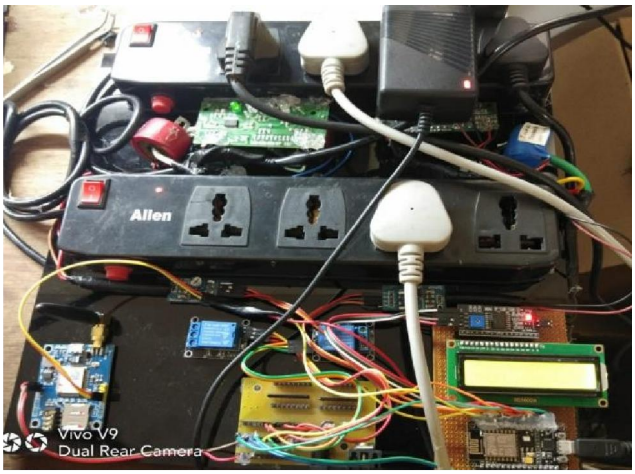

Figure 4.2: Experimental setup

The fig 4.3 showcase the energy consumed by distribution and sub junction and compares the power consumed by each junction.

Figure 4.3: Distribution and sub junction difference unit display

If there is any type of theft is happened on the distribution lines, immediately a message sent to the electricity office. Fig 4.4 shows the theft detected message with experimental set up.

Figure 4.4: Power theft detection message display(LCD)

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When the energy consumption is more than the threshold value the power will get cut-off using relay.

Figure 4.5: Automatic power cut-off message display

A message sent to the user to aware about the over energy consumption than the threshold value. Figure 4.6 shows the message of over energy consumption with experimental set up.

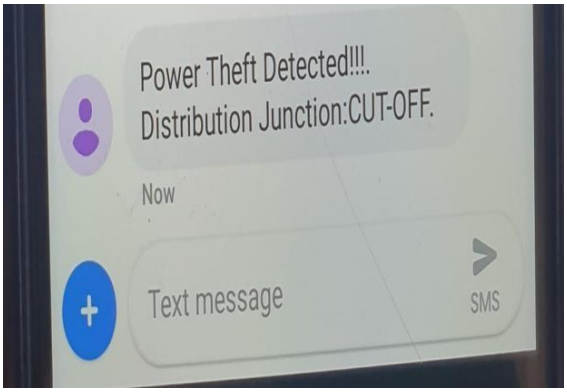

Figure 4.6: Theft detection message

V. CONCLUSION

At the end of the system we conclude that the system is used to solve major problems faced by existing electric supply systems like wastage of energy, power theft etc. Electricity Theft Detection and Monitoring has been designed and developed with proper integration of both the hardware and the software. In this system an intelligent power theft detection system is presented. It detects unmetered load (illegal load) instantly; and notifies the utility company for necessary action. The designed system has a high degree of reliability, sensitivity and efficiency. The study of various techniques is done to propose the new technique which is expected to have higher accuracy to detect theft in electricity. Thus technique would be helpful for the power authorities to further minimize the nontechnical losses in electricity distribution.

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