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A SURVEY OF IOT FOR POWER THEFT DETECTION, FAULT IDENTIFICATION AND LOCATION TRACKING

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Abstract—Science and technology with all its miraculous advancements has fascinated human life to a great extent thatImagining a world without these innovations is hardly possible. While technology is on the raising slope, we should also note the increasing immoral activities. With a technical view, "Power Theft" is a non-ignorable crime that is highlyprevalent, and at the same time it directly affects the economyof a nation. Detecting and eradicating such crimes with theassistance of the developing scientific field is the "Need of theHour". With these views was this paper conceived anddesigned. Our paper provides a complete and comprehensivetool to prevent power theft which is very simple to understandand easy to implement. It includes three sections -transmitting, receiving, and processing sections. The mainobjective of this project is to indicate electric power theft toelectricity board. It is carried over through embeddedtechnology. Here wireless method is used to find out theelectric theft.

***Index Terms*—microcontroller, sensors, GSM modem, LCD display**

I. INTRODUCTION

Power theft is the biggest problem in recent days which causes lot of loss to electricity boards. In countries like India, these situations are more often, if we can prevent these thefts we can save lot of power. Electrical power theft detection system is used to detect an unauthorized tapping on distribution lines. Implementation part of this system is a distribution network of electrical power supply system. Existing system is not able to identify the exact location of tapping. This proposed system actually finds out on which electrical line there is a tapping. This is a real time system.

The power grid has become a necessity in the modern society.Without a stable and reliable power grid, tens of millions of people's daily life will be degraded dramatically. For instance,the India blackout in July 2012 affected more than 60 millionpeople (about 9% of the world population) and plunged 20 ofIndian 28 states into darkness. Indeed, the traditional powergrid, which is surprisingly still grounded on the design morethan 100 years ago, can no longer be suitable for today'ssociety. With the development of information system andcommunication technology, many countries have beenmodernizing the aging power system into smart grid, which isfeatured with two way transmission, high reliability, real-time. demand response, self-healing, and security. "A smart grid is an electrical grid which includes a variety of operational and energy measures including smart meters, smart appliances, renewable energy resources, and energy efficiency resources".

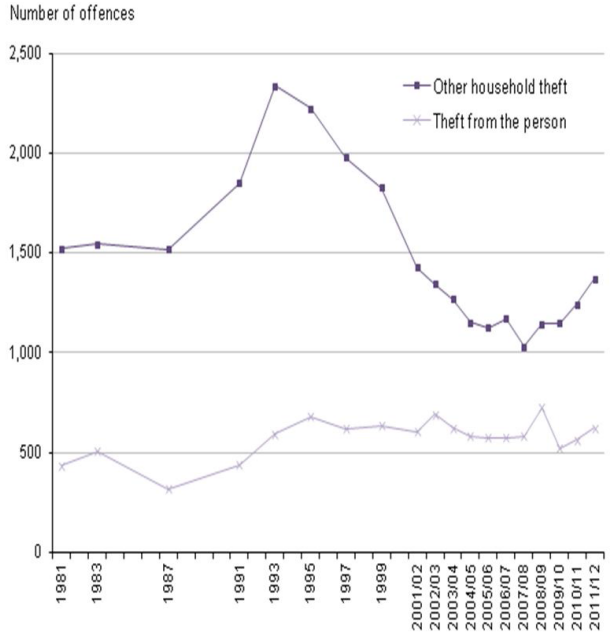

Figure 1: statistics of electricity theft in India

The problem challenging power utilities worldwide is the electricity, in other words using electricity from utility company without the company's consent. Significantly, it is enough to destroy the entire power sector of country. According to source 20% losses means the masses would have to pay extra 20% in terms of electricity tariffs. This paper discusses the problem of electricity theft as well as proposed new method for calculate and judge the seal braking and also whether electricity stealing is happened or not.

REVIEW STAGE

The existing system for detecting power theft is not an efficient one. The power theft happening is detected while taking the energy meter readings by calculating the difference between the power received in the transformer and that received in the destination. No measure is taken to prevent it.

Final Stage

The proposed system involves both detecting power theft and also taking necessary actions on the spot. Using the IoT application we can detect the power theft and the status of the transmission lines, capture the photos of the power theft and also track location.

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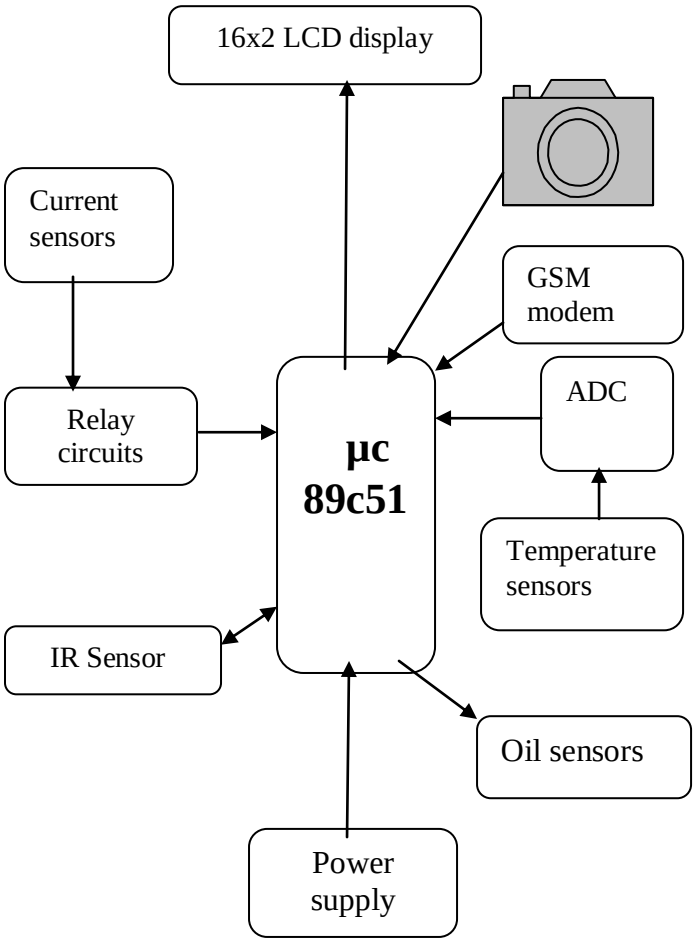
Figures: Block diagram



II. PROPOSED SYSTEM

In this project we will use an IOT (internet of things) technology as well as GSM modem. Project describes the automatic POWER THEFT detection system. Here we used an IR sensor, it has been placed near the electricity measuring instrument, It will sense the people or any object kept near the electric poles for power theft. And the current sensor generates the pulses, and microcontroller read that pulses and count it and also watches a message from GSM module. If any message received from GSM, microcontroller processes the information according to program, the line is supposed to take specific load, if in case more load is drawn. It will send theft message to the concerned vigilance department . The message sent once received by the head it will convert the smartphone using ARM 11 processor from silent mode to general mode and gives announcement in a very high voice. Once he gets the intimation about the theft he can take global photos by sending photo message to the arm 11 device to the vigilance team mail id. He can register a online complaint to the police, through the device. Using solid state relay other sensors are used to protect transformers by sending appropriate messages.

Generally all transformers are oil type in nature. They require regular maintenance like oil check, temperature control, fire protection. We use different sensors to maintain this. Whenever the oil level is low, it will generate message and send it to the maintenance dept .When the temperature of the transformer is going abnormal, it will intimate the maintenance team.

III. COMPONENTS REQUIRED

CURRENT SENSOR

A current sensor is a device that detects electric current (AC or DC) in a wire, and generates the pulses with fixed interval of time.

LCD-16X2

We are using 16x2 LCD (liquid crystal display)display, it will display the status of the system . It has a 16 columns and 2 rows. It will display a 16 letters in a one row or a one line.

SCR RELAY CIRCUITS

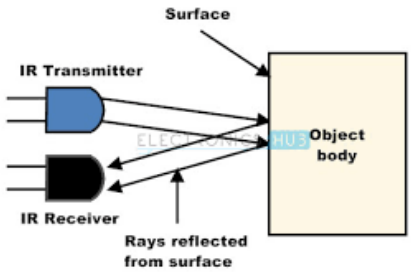
It acts as an automatic switch. We can use this solid state relay to trip on and trip off the electricity.

GSM MODEM

GSM circuit receives message and give it to the microcontroller, then microcontroller sends the appropriate message to HESCOM using GSM module.

IR SENSOR

It will sense if any abstract pass through that sensor path and it will operate in very low voltage, means power consumption is very low.



OIL FLOAT SENSOR

An oil float sensor is a device used to detect the level of liquid within a transformer.

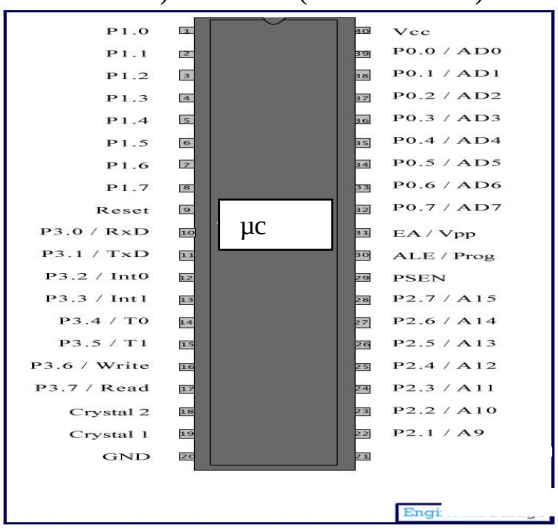
TEMPERATURE SENSOR
It is a device usedto check the temperature level in the transformer.

ANALOG TO DIGITAL CONVERTER (ADC)
Since temperature sensor gives an analog input and microcontroller accepts only digital, we use an analog to digital converter to convert the analog input to digital input so that the microcontroller accepts the input.

MICRO-CONTROLLER
Microcontroller is the brain of the project, it will run according to the program has to be written, here we have used as an SST 89C51 microcontroller.

FEATURES

- 8-bit 8051-Compatible Microcontroller (MCU)with Embedded SuperFlash Memory.
- It operates at 0 to 40 MHz and require power supply of 5V.
- 1 Kbyte Internal RAM.
- Programmable Watchdog Timer (WDT).
- TTL- and CMOS-Compatible Logic Levels.
- Temperature Ranges:– Commercial (0°C to +70°C)– Industrial (-40°C to +85°C).



SOFTWARE USED

- Embedded c.
- Keil-c compiler.
- Flash magic burner software.

IV. TECHNICAL SPECIFICATIONS

- Operating voltage of embedded circuitry is 5vdc.
- Current consumption of device in active mode 200mill amp.
- Operating frequency of device is 11.0592MHZ.

V. FUTURE SCOPE

- As mentioned above , we all know that electricity is scarce and at such time we cant afford for power being theft. If this system is implemented then the only the amount of power required will be consumed and there will be no wastage of power. And moreover even the money spent can be saved. Hence it will a way of helping in the economic growth of the country.
- In the present system, IoT energy meter consumption is accessed using Wi-Fi and it will help consumers to avoid
- unwanted use of electricity. The performance of the system can be enhanced by connecting all household electrical appliances to IoT.
- So, in future following objectives can be achieved to save power and avoid thefts:-
- We can make an IoT system where a user can monitor energy consumption and pay the bill Online.
- We can make a system where a user can receive SMS, when he/she crosses threshold of electricity usage slab.
- We can make a system which can send SMS to the concerned meter reading man of that area when theft detected at consumer end.

VI. CONCLUSION

In the era of smart city advancement, this project is concentrated on the connectivity & networking factor of the IoT. In this project, we are detecting the power theft, identifying fault and also tracking location of the fault area to take necessary measuresThe 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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