Electricity Theft Detection & Notification Using IOT

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Abstract: In India electricity generation is less and demand is more. In industrial, rural, agriculture areas the available electricity is less. So that electricity thefts are increasing every year across domestic as well as industrial domains which increases cost paid by customer and can have serious safety consequences.
So that, the project's aim is to design a system which overcome these problem which means design a system to monitor the power consumed by the load to detect and notify the electricity board about electricity theft through IOT (Internet of Things). In this project hall sensor detect power theft and send command to GSM module which sends the theft information message to electricity board. The implementation of this system save large amount of electricity and also prevent theft of electricity

Keywords: Internet of things, GSM module, Microcontroller, Hall sensor, electricity theft detection, electricity board.

I. INTRODUCTION

Nationally, total transmission and distribution losses approach 23% and in some states, losses exceed 50%." According to the World Bank estimates, power theft reduces India's GDP by around 1.5%. A recent study by the NDTV also concluded that 40% of the electricity in India is still unpaid.
On the other hand, this action does not lead to an increase in costs at the level of the industry as a whole.
Detecting electricity theft has been traditionally addressed by physical checks of tamper-evident seals by field Personal and by using balance meters. Although these techniques reduce unmeasured and unbilled consumption of electricity, they are insufficient. Indeed, tamper- evident seals can be easily defeated, and although balance meters can detect that some customers are fraudulent, they cannot identify the culprits exactly. Despite the security vulnerabilities of smart meters, the higher-resolution data collected by them is seen as a promising technology that will complement traditional detection tools. They have clear potential to improve metering, billing and collection processes, and the detection of fraud and unmetered connections. Common methods of theft range from compromising the physical security of meters to directly connecting loads to electricity distribution lines. Default of payments has been a major problem, due to suboptimal levels of monitoring and enforcement.
The lack of technology and insufficient distributor incentives were the major contributors to this problem.

II. LITERATURE SURVEY

The literature survey describes the various methods of power theft detection and control. A brief description of various methods given by different authors is given below.

[1] ZHOU Wei, "GSM based monitoring and control system against electricity stealing" electricity-stealing prevention became a big problem to the electricity board. Based on the kind of electricity-stealing and actual demand of prevention of stealing electricity, realizes the behavior of electricity-stealing with remote monitoring. Objective of this system is to design a system in order to avoid the displeasure for the users from pilferage bill irrespective of the use of the electricity due to pilferage using GSM module.
[2] Louis J. Romeo, "Electronic Pilferage Detection Systems: A Survey", Library & Archival Security, they said that wireless electricity pilferage detection system using ZigBee technology present inefficient and less costly way to adulterate the wireless technique used in this research paper. This wireless system is used to overcome the pilferage of electricity via bypassing the energy meter and hence it also controls the revenue losses and utility of the electricity authorized agency. Mainly the electricity is being stolen via bypassing the energy meter therefore this wireless system is utilizes to overcome this type of the pilferage of the electricity and is very beneficial for the authorized agency to control its revenue loss as all of us know that the cost of fuel is increasing day by day hence the intensity of stealing the electricity and using it as a substitute is also increasing therefore it is needed much to design a system that can detect the pilferage of the electricity.

[3] H .G .Rodney, this system presents of design and development of Automatic meter reading (AMR) system. AMR system is a boom for remote monitoring and control. Controller reads energy pulses & current signals. If current is drawing & energy pulses are normal, then no power pilferage is being done & buzzer is off. If balanced is finished and load is operating, then it indicates power pilferage. Whenever power pilferage is detected, then ARM7 will send this meter information to buzzer circuit through buzzer driver. And this controller also disconnects power to the loads to avoid power pilferage.

[4] P. Kadurek, Student member, J. Blom, J. F. G. Cobben, W. L. Kling, Member they provide insight into the illegal use or abstraction of electricity in the Netherlands. The importance and the economic aspects of pilferage detection are presented and the current practices and experiences are discussed. The paper also proposes a novel methodology for automated detection of illegal utilization of electricity in the future distribution networks equipped with smart metering infrastructure. The necessary data requirements for smart meters and distribution substations are defined, in order to unlock this feature in distribution network.

[5] G. L. Prashanthi, K. V. Prasad, researched to record the power consumed by a model organization such a household consumers from a commonly located point. Recording the power means measuring the power consumed exactly by the user at a given time. The energy used by the user is measured and the records are sent to the controlling substation whenever needed by the person at the nearest substation. The feedback from any of the consumers helps in analyzing the usages between legal and illegal users which helps in controlling the power theft. Communication between the house hold meters and the substation is done with the means of wireless communication. The scope of this study is limited with the detection of power theft and not identifying the exact location.

[6] Soma Shekara Sreenadh Reddy Depuru, Lingfeng Wang, Vijay Devabhaktuni focused on the factors that provoke the consumers to steal electricity. In view of these ill effects, various methods for detection and estimation of theft are discussed. This paper proposes an architectural design of smart meter circuit. Motivation of this work is to detect illegal consumers, and conserve and effectively utilize energy. As well as smart meters are designed to provide data for various parameters related to instantaneous power consumption.

III. CONCEPT AND DESIGN

Electricity theft detection using IOT this project is about to develop and fabricate the circuit that can detect the electricity pilferage by using IOT. In this proposed system there are three sections, detection, monitoring &controlling.

These three sections are,

1) Detection unit
2) Monitoring unit
3) Controlling unit

In this design The detection is done by Hall sensor. The monitoring is done through IOT (Internet of Things) and separate web site for project. Controlling section consist of microcontroller. The Web site used here display the pilferage is detected. The microcontroller is used at the client side which is connected to the ESP8266 Wi-Fi microchip

Which transfer the data in this paper we concentrate on power theft detection and when theft is detected then notify to electricity board? In this design client side consist of power supply, microcontroller, Hall sensors and ESP8266 Wi-Fi microchip. In fig 1we can see the block diagram of client side.

## IV. BLOCK DIAGRAM OF CLIENT SIDE
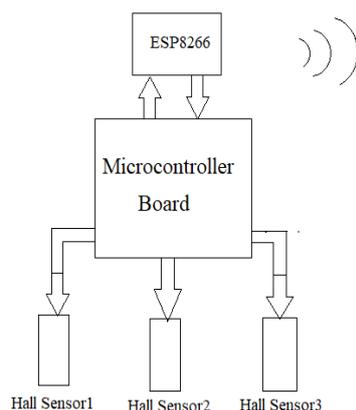
The detection is done by hall sensors. It can detect power theft and electric meter tampering. Whenever a meter tampering is done or direct load is connected before meter in the supply, the system senses it with the help of Hall sensors. Once it has detected the theft, it generates a log for theft type and timing with help of microcontroller and stores it on IOT platform for the backup and at the same time publishes this log info over internet website.

V. BLOCK DIAGRAM FOR SERVER SIDE
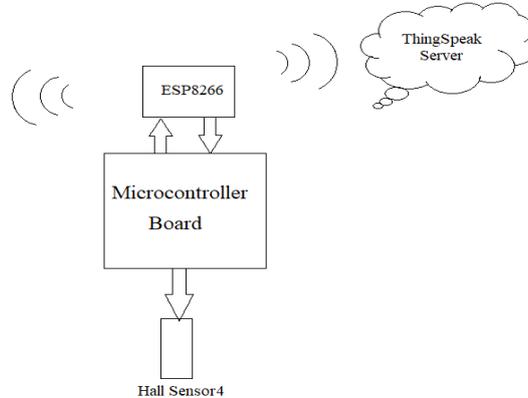
When theft is detected at the client side then microcontroller communicates with IOT. Then by using Wi-Fi microchip and IOT (thing Speak Server) platform it notify electricity board about power theft.

V. PROPOSED DESIGN
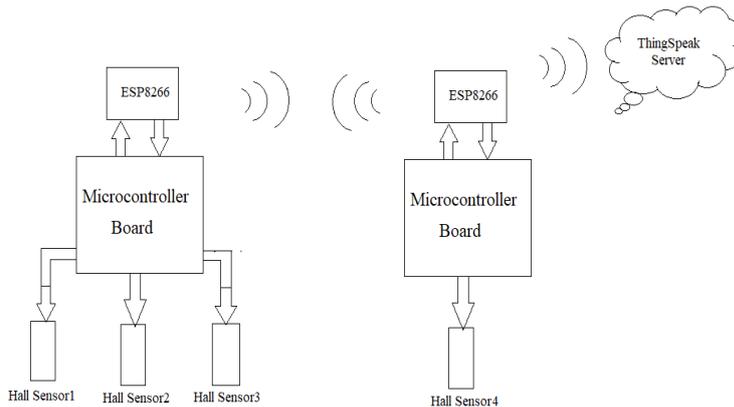
VII. CONCLUSION

In this project, we design the 'Electricity Theft Detection and Notification using IOT' which avoid the illegal use of electricity. It mainly focused on industrial purpose. The similar idea can be implemented for domestic areas for avoiding the illegal usage of electricity. This system is aimed at reducing the heavy power and revenue losses that occur due to power theft by the customers. By this design it can be concluded 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.

REFERENCES

[1] ZHOU Wei, ZHU Rue-de, WANG Jin-quant. GSM based monitoring and control system against electricity stealing. Electric Power Automation Equipment, 2004, Vol.24, No.2: pp.64-66.

[2]Louis J. Romeo, "Electronic Pilferage Detection Systems: A Survey", Library & ArchivalSecurity, Volume 3, Issue 3 & 4 January 1982, pages 1 – 22. [LJR 1982]

[3] HE Xiao-rong, DONG Ch. UN, LIU Shu-xi. The new Technology and application of singlephase electric Energy meter defense electricity stealing. Power Supply,2007, Vol.24, No.2:pp.70-71, 74.

[4] "Pilferage detection and smart metering practices and expectations in the Netherlands"P.Kadurek, Student member, IEEE, J. Blom, J. F. G. Cobben, W. L. Kling, Member, IEEE1

[5] G. L. Prashanthi, K. V. Prasad, researched to record the power consumed by a model organization such a household consumers from a commonly located point. Recording the power means measuring the power consumed exactly by the user at a given time.

[6] D. Dangar and S. K .Joshi, Electricity pilferage detection techniques for distribution system in GUVNL ,International journal of Engineering development and research, 2014, 11-18.

[7] R. Kalaivani, M. Gowthami , S .Savitha, N .Karthick.,S. Mohanvel, GSM Based Electricity Pilferage Identification in Distribution Systems, International Journal of Engineering trends and Technology, volume 8,2014,512-516.

[8] T. B. Smith, Electricity pilferage: a comparative analysis, Elsevier Journal Energy Policy,vol. 32, no. 18, 2004, 2067-2076.

[9] Nabil Mohammad and Anomadarshi Barua and Muhammad Abdullah Arafat, A SmartPrepaid Energy Metering System to Control Electricity Pilferage, International Conference on Power, Energy and Control (ICPEC),2013,562-565.

[10] A. J. Dick, Pilferage of electricity-how UK electricity companies detect and deter, inproceedings of European Convention on Security and Detection, may1995, 90-95. Energy Theft Detection Using "Iot"Ats' Sanjay Bhokare Group Of Institutes, Miraj Page 34

[11] A. Barua, N. Mohammad, A. I. Abbas, and M. A. Arafat, Single phase SMS prepaid digitalenergy meter, unpublished.

[12] A. Barua, N. Mohammad, M. A. Arafat, K. Khan, A. I. Abbas, and R. Chaudhary Threephase SMS prepaid digital energy meter, International Conference on Electrical and Computer Engineering, 2012, in press.

[13] Mr. Sudheer , K. Reddy, Mr. Musthafa.P, Mr. K Sakthidhasan Equipment for Anti - Electricity Stealing with Remote Monitoring, International journal of engineering research and applications, volume 1,241-245.

[14] Irfan Quazi1 , Sachin Kumar Gupta2 and Rajendra Prasad, Pre-paid Energy Meter based onAVR Microcontroller, International journal of Engineering research and applications, volume 1,issue 4,1879- 1884.

[15] S.S.S.R. Depuru, L. Wang, V. Devabhaktuni, and N. Gudi, Measures and setbacks forcontrolling electricity pilferage, in proceedings of North American Power Symposium, Sept. 2010,1-8.

[16] Fourie J.W and Calmeyer J.E, A statistical method to minimize electrical energy losses in a local electricity distribution network, in Proc. of the 7th IEEE AFRICON Conference Africa, Technology Innovation, Gaborone, Botswana, 2004.