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DETECTION AND TRACKING OF POWER PILFERAGE

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ABSTRACT

This generation's greatest windfall electricity is integrated into the human lifestyle to an extent where without electricity humans are oblivious. The stumbling block of existing technology is effective transmission and distribution but power pilferage is the major hindrance in this facet. Pilferage is the major concern among developing nations even though government agencies commission myriad regulations for pleasant usage of electricity. Ample numbers of frauds with different techniques were recorded amidst the regulations. This paper proposes the power theft tracking module as the step towards curbing the ill practices. The proposed system adopts GSM 900 technology. The aforementioned technology will send SMS with the minimal delay which helps in achieving the goal.

Keywords: *Electricity, GSM 900, Intelligent system, Non-technical losses, Power pilferage.*

I. INTRODUCTION

"Can there be light in the dark?". Electricity is the answer to this question that was raised decades ago. The invention of the bulb gave birth to thousands of innovations and much advancement in our day and age. But the one common factor that stayed all along- Electricity.

With every invention there comes a problem which needs to be addressed. In case of electricity, we have technical, non-technical loses (NTL) [1]. Technical problems do not concern the general public who are the ones responsible for the latter. The NTL that is more prevalent and which needs to be dealt with electricity is power pilferage.Skillful personnel are needed in order to detect and track the much disturbing power pilferage [2].

Rules are framed and formulated by the government to overcome power fraud [3]. This consecutively resulted in periodic monitoring of installed energy meters and involvement of mammoth workforce. People tend to overlook and not abide by the rules. Even in this space era, stealing power is still a matter of concern.

There are many fraudulent ways of power theft namely: interfering with the energy meters, bills that are unpaid and irregular, and power line tapping [4]. The reasons that lead to this fraud include the feebleway of living, ignorance towards criminal charges, uneducated background conditions [5].

In countries like India, where agriculture plays a pivotal role, these kinds of power theft situations will have a deep impact on the economy [6]. Transmission and distribution involving such issues is noteworthy and has to be taken care of. A survey by the Northeast group indicates the economic loss incurred by the world due to power theft is US$ 89.3 Billion with India being the highest loser in its exchequer worth US$ 16.2 Billion [7]. This paper aims to deal with this issue and offer a relevant solution with the usage of Micro-Controller AT89S52 and a GSM module.

GSM is preferred over other devices like Zigbee or a Wi-Fi router owing to its assets like less manufacturing and maintenance cost, better connectivity [8].

Next section deals with Problem statement, subsequent sections are Hardware Implementation with the pictorial representation of the prototype. Implementation results are given in section IV. Conclusion and future work are discussed in section V.

II. BACKGROUND

Table1 gives us the details regarding the amount of power generated and deficit where most of which is through power theft [9]. Though there are multiple ways to steal power, tapping is the method that we usually come across. Tapping accounts for 80% of the theft across the globe[10]. On an average, 20-30% of power loss was recorded across a year by electricity board [11]. The motto behind this paper is to audit any power taken in prior to the energy meter which is treated as power pilferage and this is a conscious attempt to lower the electricity bills paid. On detecting this, it will lead to the identification of the energy meter by sending an SMS to the authorities concerned [12].

Table 1 :
Energy availability index

Year	Energy		
	Availability	Surplus(+)/Deficit(-)	
	In MU	In MU	In %
2012-13	908652	-86905	-8.7
2013-14	959829	-42428	-4.2
2014-15	1030785	-38138	-4.2
2015-16	1090850	-23558	-2.1
2016-17	1135334	-7595	-0.7
2017-18	908650	-6473	-0.7

Fig.1 gives the global details of the installed power capacity and the overall loss respectively[13]. This clearly shows that India has the highest power theft rate even though it is high in power generation[14]. Andhra Pradesh has the highest theft percentage of about 25% in 2017 according to the Times of India report.

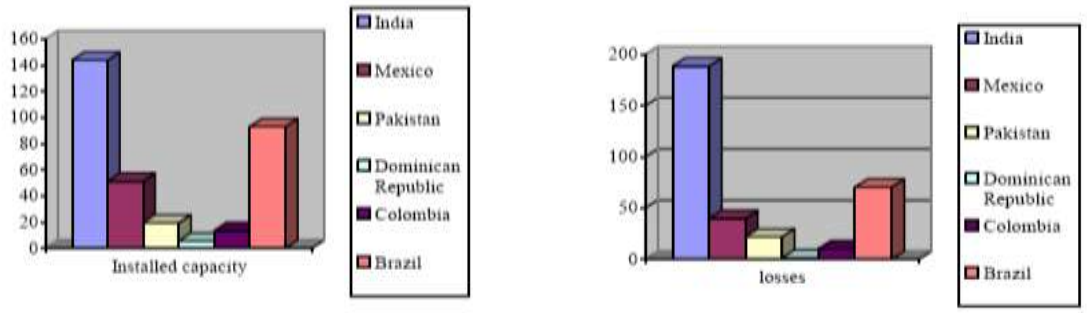

Fig.1 : Power availability demographics and power loss demographics

III. EXPERIMENTAL SETUP

A current transformer (CT) is used where a signal is fed through an optoisolator to identify the difference between the input and output power. Here we use two lamp holders, where one is connected before the energy meter (which is considered as the theft load) and the other connected after (which is considered as the actual load). On inserting a 100W lamp before the energy meter, the Micro-Controller begins to sense the changes in the power that is being supplied to the actual load. Immediately a message indicating the power theft is displayed on the LCD. Also, the information from the Micro-Controller through the level shifter IC and RS232 will be delivered as an SMS to the user's mobile number that is automatically saved onto the Micro-Controller by means of a call made earlier[15].

The following Fig.2 shows us the above operation

Fig.2 : Experimental setup

IV. RESULTS & DISCUSSION

The Fig.3 shown below informs whereabouts of power pilferage with specific meter address. The above information is sent to the service agency phone number with minimal delay in the SMS reception successively an action will be appropriated by the authority.

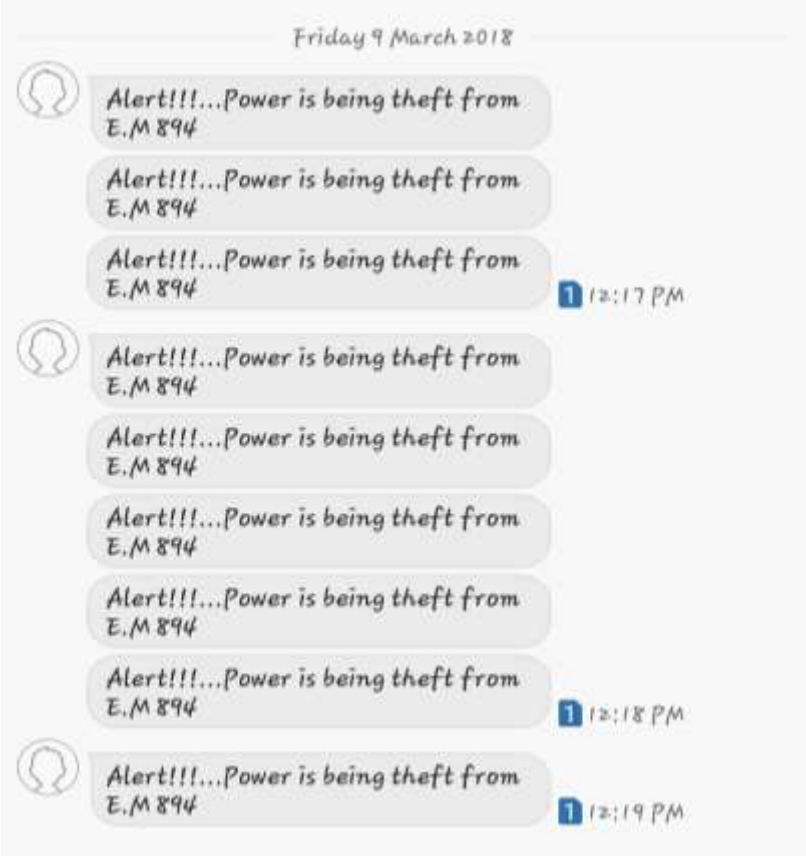

Fig.3 : SMS notification snapshot

V. CONCLUSION & FUTURE WORK

The proposed system is cost-efficient and scalable. The assembly of the proposed system is on the go and is devised to detect the meter tampering automatically and is easy to interface with other methods of detecting the fraud after advancements. The theft is reported by a real-time SMS to curb the power pilferage with less delay in the segment making it effective [16].It is advisable for the government agencies to integrate a system that can check whether the module is not un-mounted or stolen so that the primary intention of this module is not affected.

The future prospects of our project will implement a system which tracks power grid in a gated community with very cheaper costs and efficient tracking[17]. The above system uses ZigBee communication. The above system can also be improved to work in different conditions of wrongdoings using ARM processor interfaced

with automatic meter reading (AMR)[18]. The emerging trends in the usage of smart devices in developing countries promote the usage of above system.

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