

# Power Theft Detection in Customer Consumption Using Smart Way

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**Abstract** - In this project, we show that how it is possible to give automatic information to head office about electricity theft. For this magnetic sensor is used to sense magnet which is placed on the meter. The piezo element is used to sense a vibration of a meter. With the electric industry undergoing change, increased attention is being focused on power supply reliability and power quality. Power providers and users alike are concerned about reliable power, whether the focus is on interruptions and disturbances or extended outages. Monitoring can provide information about power flow and demand and help to identify the cause of power system disturbances. The work of this paper is to monitor the power consumed by a model organization such as household consumers from a centrally located point. Monitoring the power means calculating the power consumed exactly by the user at a given time. The power consumed by the user is measured and communicated to the controlling substation whenever needed by the person at the substation. The feedback from the user helps in identifying usages between authorized and unauthorized users which helps in controlling the power theft, one of the major challenges in current scenarios. Communication between user/household and substation can be of wired and wireless

**Key Words:** GSM modem, Digital energy meter, sensor, Piezo element

## 1. INTRODUCTION

Electricity theft is a very common problem in countries like India, where the population is very high and the users of electricity are ultimately tremendous. In India, every year there is a very increasing number of electricity thefts across domestic electricity connections as well as industrial electricity supply, which results in loss of electricity companies energy and because of which we are facing the frequent problems of load shading in urban as well as a rural area so as to overcome the need of electricity for the whole country. Also, the ways using which theft can be done are also innumerable so we can never keep track of how a theft has occurred, and this issue is needed to be solved as early as possible. In this paper, we propose an electricity theft detection system to detect the theft which is made by the most common way of doing the theft and that is bypassing the energy meter using a piece of wire, people simply bypass the electricity meter which is counting the current units by placing a wire before and after the meter reading unit.

The proposed system will be hidden in such meters and as soon as an attempt is made for the theft, it will send an SMS to control unit of electricity board. In this paper input and

output current of a particular pole is compared by using a current transformer. If there is any negative value means it is indicated that the particular pole has drawn more current as theft. Here one current transformer is placed on the input side of the post line. Other current transformers are placed at the distribution points of the house lines. The output of current transformer values is given as input to PIC microcontroller. PIC microcontroller converts these analog inputs into digital using inbuilt ADC converter. Then PIC compares the input current and the sum of output currents. If a compared result has any negative value then this particular post is detected as theft point. This compared value is transmitted to electricity board through RF transmitter. RF receiver is placed in electricity board office. This RF receiver receives this value and given as input to the PIC. PIC displays this value in LCD display. The information will then be quickly processed by the microcontroller and an SMS will be sent to the GSM technology.

## 2. LITERATURE REVIEW

In et al [1] Nilesh Mohite, [2016] designed such a system which will try to reduce the illegal use of electricity and also reduce the chances of theft. That will automatically collect the reading and also detect the theft. This model reduces manual manipulation work and try to achieve theft control.

In et al [2] Amin S. Mahmoud, [2005] deals with automatic meter reading and theft control system in the energy meter. This model reduces the manual manipulation work and theft control.

In et al [3] S.Anusha, [2014] had done the project model to reduce the manual manipulation work and theft. Use of GSM in system provides a numerous advantages of wireless network system. The government saves money by the control of theft in energy meter and also more beneficial for customer side and the government side. The metering IC ensures the accurate and reliable measurement of power consumed. Cost wise low when compared to other energy meter without automatic meter reading and theft control.

In et al [4] G. L. Prashanthi, K. V. Prasad, researched to record the power consumed by a model organization such as 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. Communication between the household 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

In et al [5] H.G.Rodney, presents a design and development of the Automatic meter reading system. AMR system is a boom for remote monitoring and control domestic system. AMR system is a boom for remote monitoring and control domestic energy meter.

In et al [6] Mr. M.V.N.R.P. Kumar, [2015] electrical power Line Theft Detection International Journal of Research in Advent Technology, Vol.3, No.5,May 2015

### 3. PROPOSED SYSTEM

In this proposed system there are Three different way to find out electric theft by using GSM technology first bypassing the energy meter second magnet has to patch on energy meter and third the disturb the energy meter those are known to where theft has to be done and the last one is input and output current of a particular pole is compared by using current transformer if any there is any negative value means it is indicated that the particular pole has drawn more current as theft. this all process between meter reading to the customer and government with the required cost. this process will happen when needed that means if SMS is received from authorized server mobile transmission between customer and government.

GSM module sends a message to the respective control room. the message will be displayed on their tabs. The message gives the information power theft. here we use PIC16F877A microcontroller which controls the whole operation of the project. It takes input from a sensor and gives output to GSM module through the relay. here we use four method to send the message of related to power theft through GSM.

### 4. COMPONENTS

#### 4.1 PIC16F877A MICROCONTROLLER

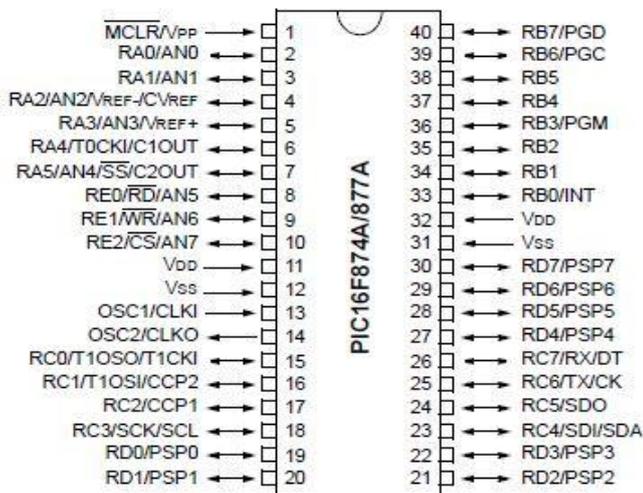


Fig -1: Pin Diagram of PIC16F87A Microcontroller

PIC16F877A was used in a microcontroller circuit for processing unit. PIC microcontroller is used as a central processor because its capability to operate without other external components due to all necessary peripherals is already built into it. thus it reduces time and space required to construct the device. This PIC works on a 5V DC power supply, with a crystal oscillator and 2 units of 22pF capacitors. PIC microcontroller contains inbuilt ADC so there is no need for external converters. The sensors can be directly interfaced with PIC. The IR sensor is directly interfaced with the PIC. The PIC microcontroller PIC16F877A is one of the most renowned microcontrollers in the industry. This controller is very convenient to use, the coding or programming of this controller is also easier. One of the main advantages is that it can be write-erase as many times as possible because it uses FLASH memory technology. It has a total number of 40 pins and there are 33 pins for input and output. PIC16F877A is used in many pic microcontroller projects. PIC16F877A also have many applications in digital electronics circuits.

It features all the components which modern microcontrollers normally have. For its low price, a wide range of application, high quality and easy availability, it is an ideal solution in applications such the control of different processes in industry, machine control devices, measurement of different values etc.

#### 4.2 GSM TRANSCEIVER SIM 900

The AD9361 is a high performance, highly integrated radio frequency (RF) Agile Transceiver designed for use in 3G and 4G base station applications. Its programmability and wideband capability make it ideal for a broad range of transceiver applications. The device combines an RF front end with a flexible mixed-signal baseband section and integrated frequency synthesizers, simplifying design-in by providing a configurable digital interface to a processor. The AD9361 operates in the 70 MHz to 6.0 GHz range, covering most licensed and unlicensed bands. Channel bandwidths from less than 200 kHz to 56 MHz are supported.



Fig -2: GSM Transceiver SIM900

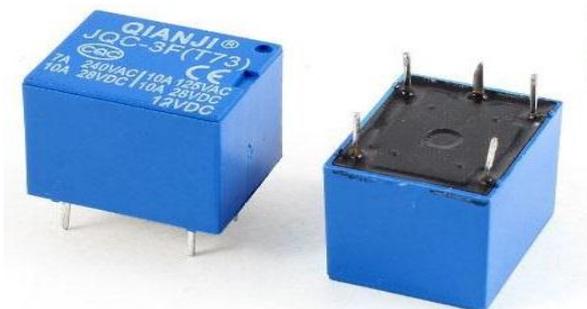
The two independent direct conversion receivers have state-of-the-art noise figure and linearity. Each receive (RX) subsystem includes independent automatic gain control (AGC), dc offset correction, quadrature correction, and digital filtering, thereby eliminating the need for these functions in the digital baseband. The AD9361 also has flexible manual gain modes that can be externally controlled. Two high dynamic range ADC per channel digitize the received I and Q signals and pass them through configurable decimation filters and 128-tap finite impulse response (FIR) filters to produce a 12-bit output signal at the appropriate sample rate.

The transmitters use a direct conversion architecture that achieves high modulation accuracy with ultra low noise. This transmitter design produces a best in class TX EVM of < -40 dB, allowing significant system margin for the external PA selection. The onboard transmit (TX) power monitor can be used as a power detector, enabling highly accurate TX power measurements. The fully integrated phase-locked loops (PLL) provide low power fractional-N frequency synthesis for all receive and transmit channels. Channel isolation, demanded by frequency division duplex (FDD) systems, is integrated into the design. All VCO and loop filter components are integrated. The core of the AD9361 can be powered directly from a 1.3V regulator. The IC is controlled via a standard 4-wire serial port and four real-time I/O control pins. The AD9361 is packaged in a 10 mm 10 mm, 144-ball chip scale package ball grid array (CSPBGA).

SIM300 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900MHz, DCS 1800 MHz and PCS 1900MHz. SIM300 provides GPRS multi-slot class 10 capability and support the GPRS coding schemes CS-1, CS-2, CS-3, and CS-4.

**4.3 RELAY**

SPST stands for single pole single throw and DPDT stands for double pole double throw. An SPST switch is a simple on/ off type switch and can be used for coil splitting and as a kill switch for the guitar. These terms have given rise to abbreviations for the types of a switch which are used in the electronics industry such as "single-pole, single-throw" (SPST) (the simplest type, "on or off") or "single-pole, double-throw" (SPDT), connecting either of two terminals to the common terminal.



**Fig -3: Relay**

**5. RESULTS**

This Power theft detection results in three ways i.e. Power theft detected at pole no, power theft detected by using a magnet, someone trying to open meter. These Resulting messages are displayed on mobiles by using GSM Transceiver module. This all performing task has to also view on a display.

**5.1 OBSERVATION TABLE:**

**1) THEFT DETECTION TABLE BETWEEN POLES:**

Sr. No.	Given Load	Total load Detected	Output
1	250 W	200 W	Message Not send to MSEB Officer
2	250 W	300 W	Message send to MSEB Officer That Theft Detected

**2) FOR HOME APPLIANCE:**

Sr.No.	Given Load	Total load Detected	Output
1	200 W	100 W	Meter On
2	200 W	230 W	Meter OFF



**Fig -4: SETUP**



**Fig -5 POWER THEFT MODE**



Fig -6 HOME MODE SELECT

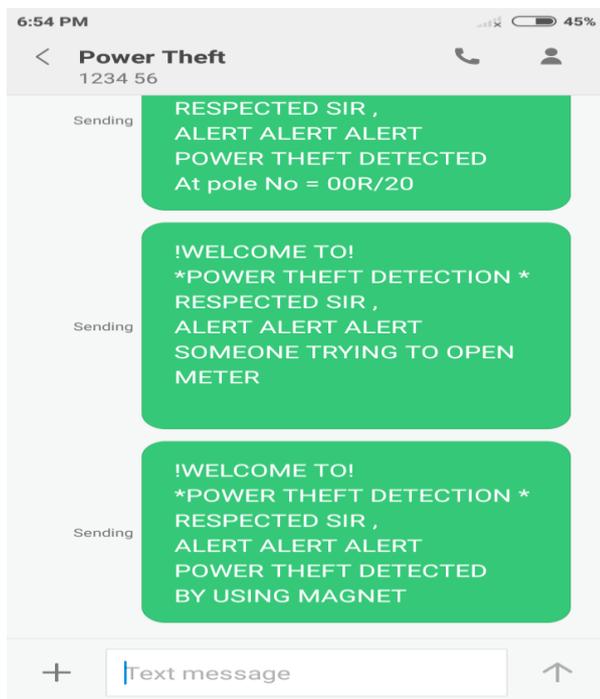


Fig -7 THEFT SMS

## 6. CONCLUSION

The Wireless electricity theft detection and monitoring has been designed and developed with proper integration of both the hardware and the software. Relays are interfaced with the microcontroller and this interface is synchronized with the whole process of the theft detection and monitoring. For this project, the knowledge of electrical and electronics application had been proven.

## 7. FUTURE SCOPE

The project model reduces the manual manipulation work and theft. Use GSM in our system provides the numerous advantages of a wireless network system. The government saves the money by the control of theft in energy and also beneficial for customer side and the government side. The metering IC ensures the accurate and reliable measurement of power consumed. Cost wise low

when compared to other energy meters without automatic meter reading and theft control. The project better suits for displaying information in long distance and the information can be sent, alter any time according to user requirement.

Now a day in rural as well as urban area some people direct hooking on transmission line so they can avoid by using distractive electrical voltage As well as a current which directly affect on our home appliances they cannot work in proper way. So this is beneficial for energy distribution company they Reduces the illegal power theft.

## REFERENCES

- [1] Siddarameswara H.N. "GSM based electricity theft identification in houses and in industry sector", ICEE-21st June 2014, ISBN-978-93-81693-6603-03
- [2] P. Rakesh Malhotra et al. / IJET "automatic meter reading and theft control system by using GSM", 2013.
- [3] Abhinandan Jain, Dilip Kumar, Jyoti Kedia, "Design and Development of GSM-based Energy Meter", in IJERT, 2012.
- [4] S. Arun; Dr, sidappa Naidu, "Design and implementation of an automatic meter reading system using GSM, ZIGBEE through GPRS" in the international journal of advanced research in computer science engineering, 2012.
- [5] Bharath, P.; Ananth, N.; Vijetha, S.; Prakash, K.V.J.; "Wireless automated digital energy meter". In sustainable energy technologies, ICSET 2008.
- [6] Abdollahi, A. Dehghani, M. Zamanzadeh, "SMS based Reconfigurable automatic meter reading system" in control applications, 2007.
- [7] A. R. Devidas, M. V. Ramesh, "Wireless Smart Grid Design for Monitoring and Optimizing Electric Transmission in India," IEEE 2010 Fourth International Conference on Sensor Technologies and Applications.
- [8] Amin S. Mehmood, T. Choudhry, M.A. Hanif, "A Reviewing the Technical Issues for the Effective Construction of Automatic Meter Reading System" in International Conference on Microelectronics, 2005 IEEE.