Resincap Journal of Science and Engineering
Volume 2, Issue 3 March 2018
ISSN: 2456-9976

Power Theft Detection Using GSM Module

Ms. Komal Deore
B.E., Student
Dept. Of Electrical Engg.
MET BKC IOE
kdkomalkd@gmail.com

Ms. Prerna Gangurde
B.E., Student,
Dept. Of Electrical Engg.
MET BKC IOE
prernagangurde11@gmail.com

Mr. Pravin Shinde
B.E., Student,
Dept. Of Electrical Engg.
MET BKC IOE
pravin113347@gmail.com

Prof. Mayur Parmale
Assistant Prof.,
Dept. Of Electrical Engg.
MET BKC IOE
parmalemayur1993@gmail.com

ABSTRACT
Power theft is the biggest problem in developing countries which causes lot of loss of electricity boards. In countries like India, the situations are more often because to this there is no monitoring & control mechanism & information regarding the exact power departure. Taking advantage of the same, illegally power is stolen & used. Every year percentage of power stealing is increasing .We need to control & monitor & the exact power departure to overcome the theft, as this topic we intend to tie together some of the basic problems. In this abstract we propose an electricity theft detection system to detect the theft which is a made by the most common way of doing the theft & that is bypassing the meter using the piece of wire, people simply bypasses electricity meter which is counting the current unit by placing a wire before & after the meter reading unit. The proposed system will be hidden in such meter & as soon as an attempt is made for the theft, & it will send sms through GSM module to control unit of electricity board.

Keywords
Power factor correction, control techniques, Reactor, Power factor improvement, APFC Panels, Power Factor, Inductive, Fixed capacitors, CT. .

1. INTRODUCTION
Electricity is vital for our everyday life & a backbone for the industry. While technology is on the raising slopes, we should also note the increasing immoral activities. With a technical view power theft is a non-ignorable crime that is highly prevented & at the same time it directly affected the economy of a nation. Power consumption & losses have to be closely monitored so that the generated power is utilized in a most efficient manner. The system prevents the illegal usage of electricity. There are four main ways that electricity can be accessed illegally. Meter tampering can be done by inserting a reading on the meter. Billing irregularities is a manifestation of corruption in the utility company through bribes to utility officials.In this system current sensors are used, here one current sensor is placed in load side. Other current sensor are placed at the feeder line. The output of current sensor values is given as input to Arduino microcontroller convert analog inputs to digital. Then controller compares the input current and the same of output current. If compared result has any negative values then this particular post is detected as theft point. This compared value is transmitted to electricity board, this value display in LCD display. The information will then be quickly processed by the microcontroller and a SMS will be send through the GSM technology.

2. LITERATURE SURVEY
In the paper, they said that wireless electricity theft detection system using Zigbee technology present an efficient and less costly way to adulterate the wireless technique used in this research paper. This wireless system is used to overcome the theft of electricity via bypassing the energy meter and hence it also controls the revenue losses and utility of the electricity authorized agency. In this paper, they provide insight into the illegal use or abstraction of electricity in the Netherlands. The importance and the economic aspects of theft detection are presented and the current practices and experiences are discussed. This 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 network. In the paper, they described that Electrical power theft detection system is used to detect an unauthorized tapping on distribution lines. Implementation area of this system is a distribution network of electrical power supply system.
Existing System is notable to identify the exact location of tapping. This system actually finds out on which electrical line there is a tapping. This is a real time system. Wireless data transmission and receiving technique is used. This will protect distribution network from power theft done by tapping. In the recent past, several techniques were proposed for detecting the location of direct tapping on a feeder and identifying illegal consumers. On a parallel track, some non-technical measures, such as inspection of customers with suspicious load profiles and campaigning against illegal consumption, were also implemented to control electricity theft. Some of the techniques (proposed worldwide) are described in this section.

3. BLOCK DIAGRAM DESCRIPTION

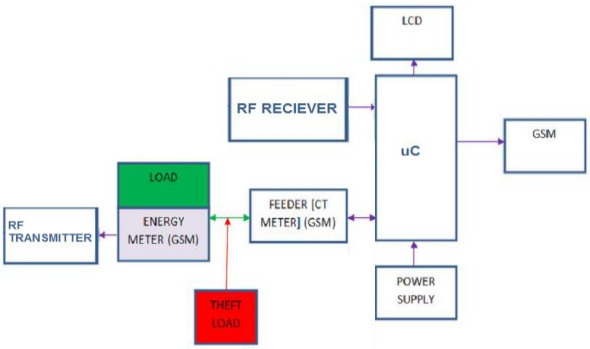

Figure.1-Block Diagram

3.1 ATmega48PA/88PA/168PA/328P

Architecture is more code efficient while achieving through puts up to ten times faster than conventional CISC microcontrollers ATmega48PA/88PA/168PA/328P provides the following features: 4/8/16/32K bytes of In-System Programmable Flash with Read-While-Write capabilities, 256/512/512/1K bytes EEPROM, 512/1K/1K/2K bytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible Timer/Counters with compare modes, internal and external interrupts, a serial programmable USART, a byte-oriented 2-wire Serial Interface, an SPI serial port, a 6-channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages), a programmable Watchdog Timer with internal Oscillator, and five software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, USART, 2-wire Serial Interface ,SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next interrupter hardware reset. In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC, to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low power consumption .The device is manufactured using Atmel's high density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional non-volatile memory programmer, or by an On-chip Boot program running on the AVR core. The Boot program can use any interface to download the application program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation.

3.2 GSM Sim 900A

Figure.2-GSM Sim 900A

GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine- SIM900A, works on frequencies 900/ 1800 MHz. The Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip (MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and internet etc.

3.3. Current Sensor [ACS712]

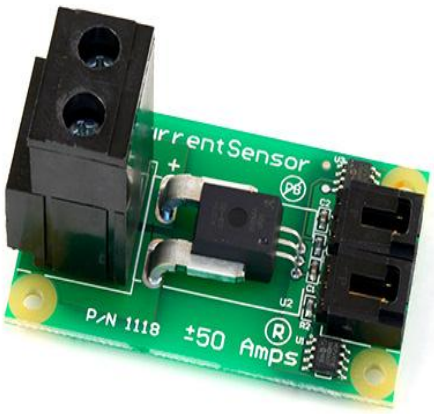

Figure.3- Current Sensor

The Allegro™ ACS712 provides economical and precise solutions for AC or DC current sensing in industrial, commercial, and communications systems. The device package allows for easy implementation by the customer. Typical applications include motor control, load detection and management, switch mode power supplies, and over current fault protection. The device is not intended for automotive applications. The device consists of a precise, low-offset, linear Hall circuit with a copper conduction path located near the surface of the die. Applied current flowing through this copper conduction path generates a magnetic field which the Hall IC converts into a proportional voltage. Device accuracy is optimized through the close proximity of the magnetic signal to the Hall transducer. A precise, proportional voltage is provided by the low-offset, chopper-stabilized BiCMOS Hall IC, which is programmed for accuracy after packaging. The output of the device has a positive slope (>VIOUT(Q)) when an increasing current flows through the primary copper conduction path (from pins 1 and 2, to pins 3 and 4), which is the path used for current sampling. The internal resistance of this conductive path is 1.2 mΩ typical, providing low power loss. The thickness of the copper conductor allows survival of the device at up to 5× over current conditions. The terminals of the conductive path are electrically isolated from the signal leads (pins5 through 8). This allows the ACS712 to be used in

application requiring electrical isolation without the use of opto-isolators or other costly isolation techniques.

3.4 Energy Meter

Energy meter is a device that calculates the cost of electricity consumed by a home, business, or electrically powered device. In this project our meter box made of current transformer, IR sensor and magnetic reed switch. According to the energy meter calculates the reading with the help of the current transformer. IR sensor and magnetic reed switch are used to detect the theft in energy meter Fig. shows the maximum demand of load.

4. FLOWCHART

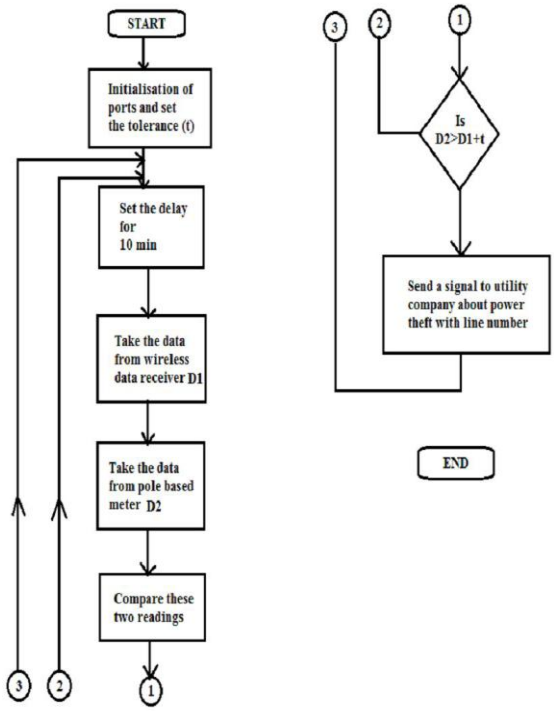

Figure. 4. Flowchart Description

To program a micro-controller to detect a power theft on one line following flowchart as shown in Fig 3 is used. First of all initialize ports of micro-controller as input or output as per required. Set the tolerance in program depending on the loss of line for which this system is installed. Set the delay time (say 10min) which is depending on after how much time interval system scan the line for theft detection. Take the data from wireless data receiver at preset time interval (10min). It represents power consumed by load over given time. Take the data from meter installed on pole at the same time. It will represent the power sent over that line for preset value (10min). If power sent on line is more than power consumed by that load over a given time considering tolerance the power theft is occurring on that line. Send the signal of power theft with the line number and its area to utility company. For this wireless transmission or power line communication can be used. If power theft is not occurring on that line then again take the data after say 10min. It's an endless program.

5. CONCLUSION

The project model reduces the manual manipulation work and theft .Use of GSM in our system provides the numerous advantages of wireless network systems. 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. The project better suits for displaying information in long distances, and the information can be send, alter any time according to user requirement.

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