ISSN No:-2456-2165

Cognizance of Energy Consumption

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Abstract:- The technology of Electronic Metering has increased rapidly because of the increase in technological advancements and there is increased demand for efficient Automatic Energy Meter Reading (AEMR) system. This paper presents the design of a simple low-cost wireless GSM energy meter and it is associated with a hall effort sensor that monitors energy consumption. The proposed system replaces traditional meter reading methods and enables the user to identify how much watts are consumed per day. Also, users can monitor the meter readings regularly through a message to the smartphone at a different time interval. A Hall effect sensor and GSM module are integrated with the electronic energy meter of each entity to have remote access over the usage of electricity. A smartphone as a receiver at the other end, help user to calculate the watt.

I. INTRODUCTION

In India, much more is electricity is wasted in the form of switching off gadget's appliances like lights, artificial cooling devices when they are not in use as well as excessive charging of cell phone? A power supply is wasted in the form of standby when the electronic devices are not in use or when it is kept plugged in hence every month 5% is consumed as vampire power. Therefore, our idea "Cognizance of Energy consumption "will help out to intimate on regular time interval about the consumed energy.

1.*Proposed System:*

This article discusses the energy usage by cognizance method using the Arduino microcontroller. This system is used to give intimation to the customer about their usage of power in regular intervals.

2. Description

The energy usage by cognizance method can be done by using an electronic circuit using an Arduino NANO thus we used Arduino NANO for circuit control. This is designed to detect the usage of the power and send that information to the consumer. The Hall effect sensor will detect the current and it will send the data to the Arduino board then throw the GSM module it will reach the consumer.

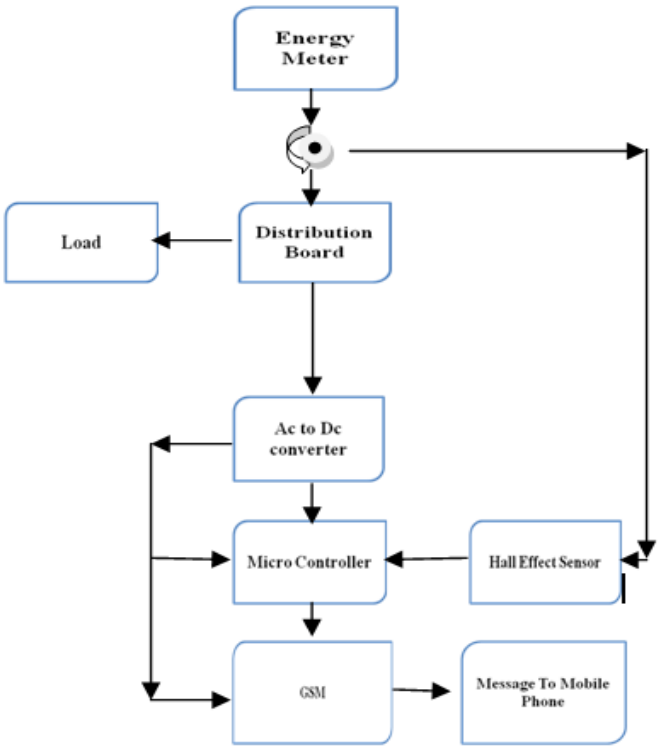

Fig 1. System Flow Chart

II. COMPONENTS USED

The components used are

1. Arduino nano
2. Hall effect sensor
3. GSM module
4. Connecting wire

2.1. Arduino nano:

Arduino NANO is an open-source platform Developed and launched by Arduino. It is a mount in Breadboard with Mini USB Port. There is no DC Power Jack in this Arduino

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NANO Board, so power can be supplied using USB Cable.

Fig 2. Photograph of Arduino NANO types

III. SPECIFICATIONS:

- Microcontroller: ATmega328
- Operating Voltage: 5V Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- Digital Input/Output Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins :6
- DC power source for I/O Pin :40 mA
- DC power source for 3.3V Pin :50 mA
- Flash Memory:32 KB of were 0.5 KB used by Bootloader
- SRAM :2 KB
- EEPROM :1 KB
- Clock Speed :16 MHz

General Pin functions:

- LED: Arduino board has a built-in LED and its digital pin is 13. When the pin receives HIGH value, the LED will on, when the pin receives LOW then it is off.
- VIN: The input voltage to the Arduino board uses external power sources of 5V. Voltage can be passed through this pin or access it through this pin.
- 5V: Pin outputs were regulated as 5V by the regulator on the board. Power transfer to the board can be done either as the DC power jack (7 - 20V), the USB connector (5V).
- incise of the power supply is supplied via the 5V or 3.3V pins bypasses the regulator and will lead to damage to the board.
- 3V: A 3.3volt supply will be generated by the onboard regulator. the maximum current we can draw from the board is 50 mA.
- GND: Ground pins.
- IOREF: This pin on the Arduino board provides the voltage reference with the microcontroller operates. A configured shield can read the IOREF pin voltage and it will reach the appropriate power source or enable voltage translators on the outputs to work with the 5V or 3.3V.
- Reset: Typically used to add a reset button to shields that block the one on the board. There are some special pins. Each of the 14 digital pins and 6 Analog pins on the Uno it can be used as an input or output, using pin Mode (), digital Write (), and digital Read () functions. They operate at 5 volts. Each pin will able to send and receive 20 mA power as an operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. In in case, if the maximum power of 40mA is received in any one of the pins it may be any Input/Output pin it will lead to severe damage to the microcontroller. The Uno has 6 analogue inputs, named from A0 to A5, each of which provides 10 bits of resolution. By default, the value measure from the ground is 5 volts, though it is possible to change the upper end of their range using the AREF pin and the analogue Reference () function. Also, some pins have specialized functions:
- Serial: pins 0 (RX) and 1 (TX). Thous pins were used to receive (RX) and transmit (TX) TTL serial data. These RX &TX pins are connected to the corresponding pins of the ATmega8U2.
- External Interrupts pins 2 and 3. These pins 2 & 3 can are used to trigger an interrupt on a low value, a rising or falling edge, or it can change in value.
- PWM (Pulse Width Modulation) 3, 5, 6, 9, 10, and 11 Can provide 8-bit PWM output with the analogies () function.
- SPI (Serial Peripheral Interface): 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). The pins in Arduino will support SPI communication using the SPI library.
- TWI (Two Wire Interface): A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.
- AREF (Analog Reference: Reference voltage for the analogue inputs.

3.1. Hall effect sensor:

A Hall effect sensor is a device whose major function is to measure the magnitude of a magnetic field. The output power sources (voltage) of the Hall effect sensor are directly proportional to the magnetic field strength through it. In the switching power supply Hall's current power plays a major role in current protection. Hall effect sensors consist of a magnetic core, a Hall effect device, and also signal conditioning circuitry. The sensor works when the current passing conductor is placed through a magnetically permeable core that concentrates the conductor's magnetic field.

Fig 3. Hall effort sensor

Model: HSTS08L

Circular lead output, hanging installation, cable output Detect Direct Current, Alternative Current and pulse current

Flame resistance：UL94-V0
Operating temperature：-10～+70℃
Storage temperature：-40～+85℃
Dielectric strength：2.5KV 50Hz 1min

ISSN No:-2456-2165

3.2. GSM module:

GSM module is a hardware device that helps in transferring data to mobile. GSM device are essentially identical to an ordinary mobile phone, including the need for a SIM to identify themselves to the network. A GSM module is used to make communication between a microcontroller and the GSM Network. Here, GSM stands for Global System for Mobile Communication, sthis was designed as a second-generation (2G) cellular phone technology. The main aim was to provide a system that with greater capacity to be achieved than the previous first-generation analogy systems. GSM will achieve this by using a digital TDMA (time division multiple access approaches). was developed for communication purposes using the time division multiple access (TDMA) technique as a digital system.

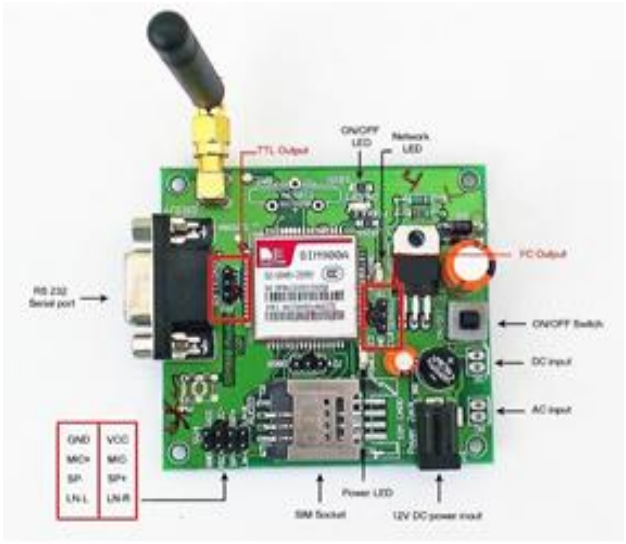

Fig 4. Gsm Module

3.3. Connecting wires:

Connecting wires play a impotant role by providing a path to an electrical current to travel from one point on a circuit to another. In computers, wires are embedded into circuit boards to carry pulses of electricity.

Fig.5: Connecting Wires

IV. WORKING:

Once, the energy meter receives the power supply it will be transmitted to the distribution board and it passes to the load in between the energy meter the distribution board over the transmission line a hall effect sensor is fixed it will transmit the data to the microcontroller, power supply for the microcontroller reduced and converted by ac to dc controller and also it supplies the power to gsm module The Microcontroller will calculate with the input feed by hall effect sensor as ampere and find the power. Using the power, the unit can be calculated. Using the GSM module, the output from Microcontroller will sent to Smartphone as an SMS notification. Due to this alert message clear view of energy consumption for domestic purposes can be determined.

Based on the user's need unit consumption for the month is feed in the program. Hall effect sensor It is magneto-sensitive device. Which able to read 0 -500amps.

P=VI Default voltage=230 Current (I) value from hall effect sensor will be taken, therefore the power (watts) will be calculated.

Kwahu=watts × time (hrs)/1000
1000 w/hr = 1 unit

Per day every 6 hrs an intimation will be receiving that how much energy

We consumed:
6 am to 12 pm = 6 hrs
12pm to 6 pm = 6 hrs
6pm to 12am = 6 hrs
12 am to 6 am= 6hrs

V. ADVANTAGES:

- To help with commercial and residential electricity uses.
- To reduces the pollution caused while power generation.
- You can closely track your usage and spend money on the payment of a bill.
- If the power consumption is reduced then we can minimize resource depletion.
- Highlights faulty appliances.
- Greater selection of tariff on offer.

VI. DISADVANTAGES:

- The alert message will be intimated, Users need to be monitor continuously.
- Older smart meters become "dumb" once you switch to a new smart meter
- Poor signal – Incuse of the poor signal the receiving of the message from the meter will be late.
- A smart meter will not alone reduce the bills of the customer.

VII. CONCLUSION

As this system helps in decreasing the usage of electricity and reduces the electric bill. Hence the power wastage in domestic region reduces due to the alert massage given by GSM to the mobile. Which directly relate with the effective use of the power which generated, hence this helps to extend the time period for the raw material like coal may come out of the endangered element list.

ISSN No:-2456-2165

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