

## Chapter-16

## Innovative Digital Energy Meter with Overload Indication and Power Theft Control

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Energy crisis is one of the major problems that the world faces today. The best remedy for energy crisis problem is not only the increase in energy production, but also the effective use of available energy. By properly monitoring the energy consumption and avoiding energy wastage, energy crisis can be reduced to a greater extent.

This work centers on developing and implementing the smart energy meter. The primary aspect of this work is the manufacture of an economical GSM - oriented smart energy meter which displays on LCD the traditional energy meter readings and, in addition, controls the power supply in specific homes. The developed smart meter (SM) offers monitoring and control of the individual consumer's power consumption and supply of electricity which was not possible in the current system.

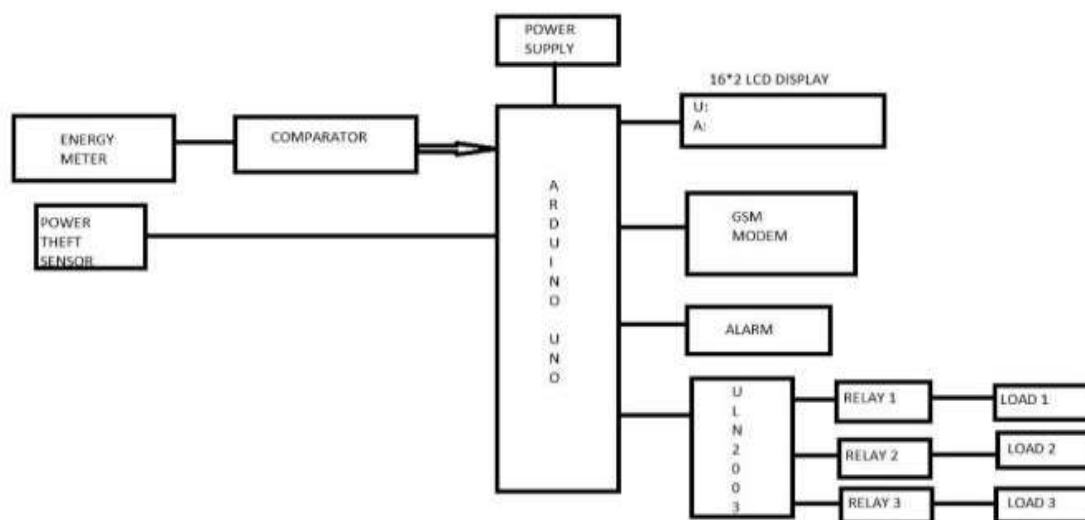


Fig.1: Block Diagram

After switching power on the Arduino and the GSM modem, turn on the relay and connects the energy meter to load via relay. The Arduino will get the supply of 5V DC supply. The Arduino acts as an interface and GSM acts as a communication interface between the user and energy meter.

First, we have to give all instructions and coding to Arduino. Then read the EEPROM and display the current data. The Arduino also checks the values of voltage and current. When all the loads are ON for some time that means the consumption is above the limit (Over loading), then a

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SMS will be displayed on the LCD display and also sent to the registered mobile number. Then automatically the loads will be turned off.

When the panel of the meter tries to open, then the sensors will detect the unauthorized moment, then a message will be displayed on the LCD display and also sent to the mobile number also. So, we can easily identify the power thefting.

6. Residential homes: This system can be installed in homes to monitor energy consumption and prevent power theft.
7. Commercial Buildings: Energy meters can be installed in commercial buildings to help businesses reduce their energy bills and ensure that they are not losing money due to power theft.

Overall, an innovative digital energy meter with overload indication and power theft control can be useful in any setting where energy consumption needs to be monitored and power theft needs to be prevented.



Fig 2: Overload control



Fig 3: Power theft control

Utilities in electricity system are destroying the amounts of revenue each year due to energy theft and over consumption of electricity. However, we need control over these two conditions. So, we developed this system for controlling overloading and power theft condition. The main concept of this system is to conserve the electrical energy.

The Arduino acts as interface between the user and the energy meter, All the codes are given to the micro controller and developed the program with embedded C technique. When the current consumption reaches the predetermined limit value, then it indicates the current consumption is more. When any unauthorized tapings are detected by the sensors then it will indicate the power thefting. So, we can control both the overloading and power thefting condition.

This system can also implement with NodeMcu which consists of inbuilt Wi-Fi. We can connect NodeMcu to internet without much effort compare to connecting UNO to internet NodeMcu development board is smaller in in size compared to Arduino UNO. And we can upgrade this system as a prepaid metering system also.