GSM BASED AUTOMATIC ENERGY METER READING WITH LOAD CONTROL

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***ABSTRACT:** Electrical energy is very important form of energy source in present day to day life. It should be used very practical expediency for its proper utilization. But in India we have lot of position where we have a more than necessary of production of supply for the electricity; still many areas do not have the electrical supply for utilization. Distribution of electrical energy are also responsible for encouragement of utilization because we are still not able to correctly estimate our exact requirements of load by consumers and still power theft existing at a particular time. Consumers are also not satisfied with the service providing by the power companies. Most of Consumers have complaints regarding Energy meter errors in their monthly bills. Energy theft is a major problem for the Electricity board, by this Technology implementation the energy Theft completely eliminated. Through GSM metering we can get the Energy consumed every weekly.*

The purpose of this project is to Remote Network Monitoring and control of the Energy meter. The Electricity Department has the authority to read the meter readings whenever they need without a human being visiting each and every house. This type of energy meter reading is done by the microcontroller unit; the micro controller continuously monitors and records the Energy Meter readings in its non-volatile memory location in the micro controller unit. In this Project we are using of a GSM modem for remote monitoring and control of Energy Meter by sending a SMS to the unit.

Keywords: GSM- Global system for mobile

[1] INTRODUCTION:

ENERGY STATISTICS 2014 Energy is one of the most fundamental parts of our world. Achieving energy security in this strategic sense is of fundamental importance not only to India's economic growth but also for the human development objectives that aim at alleviation of poverty and unemployment and meeting the Millennium Development Goals (MDGs). Holistic planning for achieving these objectives requires quality energy statistics that is able to address the issues related to energy demand. "CSO (CENTRAL STATISTICS OFFICE) GOVERNMENT OF INDIA NEW DELHI".

Energy generated by the Coal account for nearly 40 percent, India's total energy consumption is nearly 27 percent for combustible renewable and waste. Natural gas 6 percent, hydroelectric power is nearly 2 percent, nuclear approximately 2 percent and other renewable less than 0.5 percent is as shown in fig (1.1). About 30 percent of India's total energy needs are met through imports.

The below graph shows the representation of total energy consumption in India survey performed by "**International Energy Agency".**
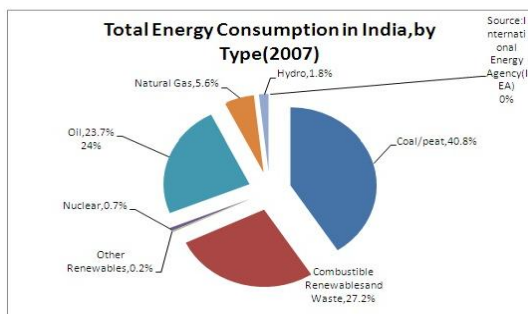
Source: International Energy Agency (IEA)
Fig 1.1: Total Energy Consumption in India, by Type

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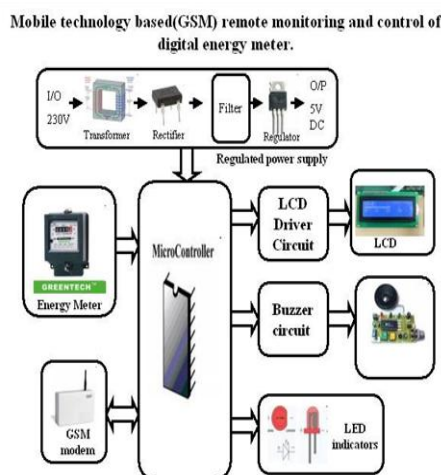
[2] BLOCK DIAGRAM OF THE CIRCUIT:

Figure: GSM based energy meter reading with load control

The block diagram of GSM based energy meter reading with load control is as shown above.

WORKING: The energy meter records the amount of energy consumed by the load. In the older day's electro mechanical type of energy meter are available and now a day's digital energy meter are available. The energy meter mainly works on the current increment in amount of current flow through circuit causes the disc to rotate, means that the rotational speed of disc is directly proportional to the amount of current flowing through circuit. Old type rotation effect of disc type meter causes the gear mechanism to work accordingly and in similar way power consumption by the load is recorded by the micro controller the blinking rate of LED integrated within the meter. Present type of energy meter also had a blinking led for the counting the pulses from this LED are fed to microcontroller for count operation i.e. these pulses are sent to the microcontroller and these readings are stored into external memory of the micro controller. External memory is an EEPROM.

This memory is able to store previous Energy consumed as well in case one needs to check present Energy consumed status.LCD is connected with microcontroller, microcontroller sends a message to LCD display unit so that we can view the status of GSM Modem. GSM communicate over wireless systems, GSM modem is connected to the microcontroller unit through MAX 232 IC.GSM modem communicates at RS232 standard voltage

levels while μC understands TTL logic levels so MAX 232 serves as voltage level converter. MAX 232 converts the Rs232 voltage levels into TTL voltage levels and MAX 232 converts the TTL voltage levels into RS232 voltage levels. Whenever a message is sent to the GSM modem, it communicates the message to the micro controller and micro controller is responded back as the preset mobile number through the program. The load is also controlled by sending the message to the GSM modem, it decodes the message and load is controlled by the electricity department if the customer fails to pay the bills. If the meter is tampered immediately the GSM modem sends SMS to the control station of the electricity department to avoid power theft.
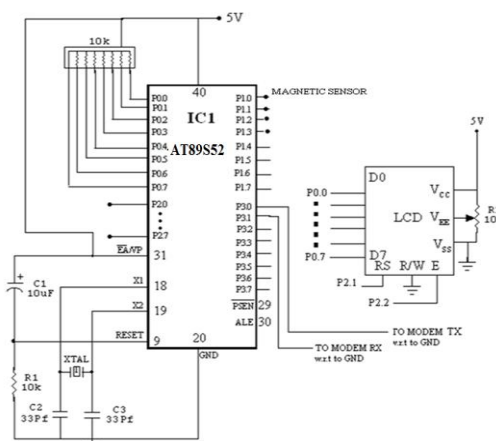
[3] CIRCUIT DIAGRAM:

Figure: GSM based energy meter reading with load control.

The working circuit is explained in detail at the block diagram.

[4] POWER SUPPLY FOR MICROCONTROLLER:

The circuit diagram of power supply is shown in the figure. The function of the each circuit components is explained below. The circuit consists of following circuit components.

1. Transformer

2. Rectifier

3. Filter and

4. Regulator

1. Transformer: In this project we are using 12V-0-12V. The output of the transformer is 12V AC which is connected to the diodes for rectification purposes.

2. Rectifier: It converts AC voltage signals into DC voltage signals. The output of rectifier circuit is not a pure DC sign wave signal, these signal having small amount of harmonics in it.

3. Filter: output of the rectifier containing harmonics present in the Line this is filter by the filter circuit, these circuit employs electrolytic capacitors.

4. Regulator: In this project we are using the three terminal Voltage regulators IC of 78XX is used for providing output DC voltages.
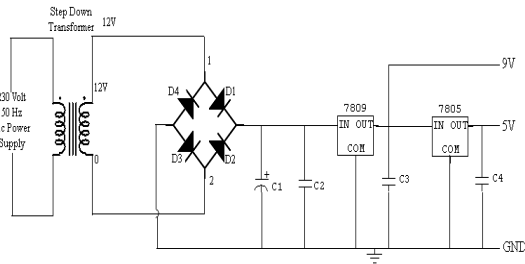
Figure: Power supply unit

[5] SOFTWARE USED:

1. KEIL COMPILER:

KEIL Micro Vision is an integrated development environment used to create software to be run on embedded systems. It allows software to be written either in assembly nor in C programming languages and for that software to be simulated on a computer before being loaded onto the microcontroller unit. We are using the c programming software.

μVision3 is an IDE (Integrated Development Environment) that helps write a program, it compile and run embedded programs. It encloses the following components:
- A project manager.
- A make facility.
- Tool configuration.
- Editor.
- A powerful debugger.

2. FLASH MAGIC:

Microcontrollers that feature both on chip flash memory and the ability to be reprogrammed using In-System Programming technology. Flash Magic operates in Windows software from the Embedded Systems Academy that allows easy access to all the ISP features provided by the devices. The software consists of following characteristics:

- Erasing the Flash memory Programming the Flash memory
- Reading Flash memory
- Reading the signature bytes
- Reading and writing the security bits
- Direct load of a new baud rate (high speed communications)
- Sending commands to location device in Boot loader mode.

[6] APPLICATIONS: Electricity board persons able to communicate with the energy meter through the GSM modem, Try to do the Energy theft in the meter it send an message to electricity board GSM unit, If Payment due disconnect of the supply at the consumer end through the energy meter, It reduce the man power, Consumer can get the Exact unit consumed by the meter.

[7] CONCLUSION:

In this project we are using GSM technology which broadly used worldwide and reliable in nature, the GSM technology can be used in remote areas also. As the network and communication technology goes on increases our project implementation will be more effective.

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