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AUTOMATIC ENERGY METER READING

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Abstract— **Automatic energy meter reading, or AEMR, is the technology of automatically collecting consumption, diagnostic, and status data from energy metering devices (electric) and transferring that data to a central database for billing, troubleshooting, and analyzing. This technique mainly saves utility providers the expense of periodic trips to each physical location to read a meter using a microcontroller. Another advantage is that the billing can be based on near real time consumption rather than on estimates based on previous or predicted consumption. This timely information coupled with analysis, can help both utility providers and customers better control the use and production of electric energy, gas usage, or water consumption. AEMR technologies include handheld devices like mobile and network technologies based on telephony platforms (wired and wireless) or power line transmission.**

Keywords: - AEMR, regulated DC, microcontroller.

I. Introduction

Originally AEMR devices just collected meter readings electronically and matched them with accounts. As technology has advanced, additional data could then be captured, stored, and transmitted to the main computer, and often the metering devices could be controlled remotely. This can include events alarms such as tamper, leak detection, low battery, or reverse flow. Many AEMR devices can also capture interval data, and log meter events. The logged data can be used to collect or control time of use or rate of use data that can be used for water or energy usage profiling, time of use billing, demand forecasting, Demand response, rate of flow recording, Leak detection, flow monitoring, energy conservation enforcement, remote shutoff, etc. Advanced Metering Infrastructure, or AMI is the new term coined to represent the networking technology of fixed network meter systems that go beyond AEMR into remote utility management. The meters in an AMI system are often referred to as smart meters, since they often can use collected data based on programmed logic.

II. Hardware System Design

a. Block Diagram

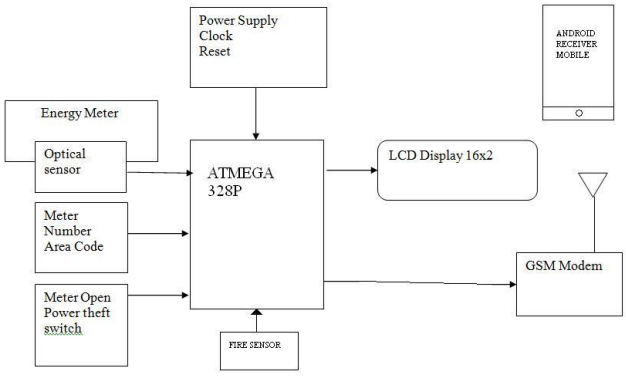

Fig 1:-Block Diagram of the AEMR

b. Microcontroller (Atmega 32):

It is the brain of the system. It is used to process different signals, commands received from different section of the system

c. Features of Atmega 32

High performance, low power 8 bit
microcontroller Advanced RISC architecture
131 powerful instructions
32*8 general purpose registers
Speed upto 16 MIPS at 16 MHz
32 kbytes of in-system self programmable
flash program memory
1024 Bytes of EEPROM
32 programable IO lines
Operating voltage : 2.7 to 5.5 Volts
Two 8 bit timer/counter with separate prescalars

d. GSM MODULE

Fig 2 :-GSM module

GSM 900 module is a set up used to transfer our bill from the meter the end user directly.
It is operated at a working frequency of 2 GHz and attached to the user side.

e. Optical sensors

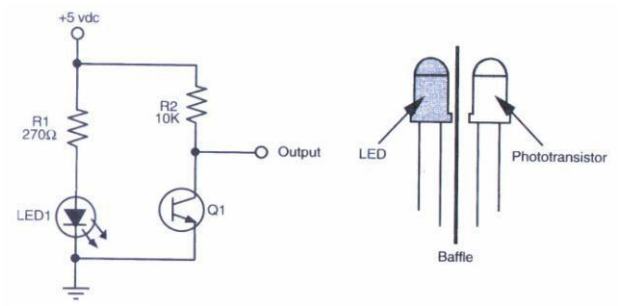

fig 3:-Basic circuit to use photo diode and photo diode with led

The photo depicts the schematics for a photo diode sensor which allows you to detect pulses as an input to update our readings which act as an input.

f. LCD DISPLAY

fig 4:- 2 * 16 LCD display

Liquid crystal Display (LCD) displays temperature of the measured element, which is calculated by the microcontroller. CMOS technology makes the device ideal for application in hand held, portable and other battery instruction with low power consumption.

III. WORKING

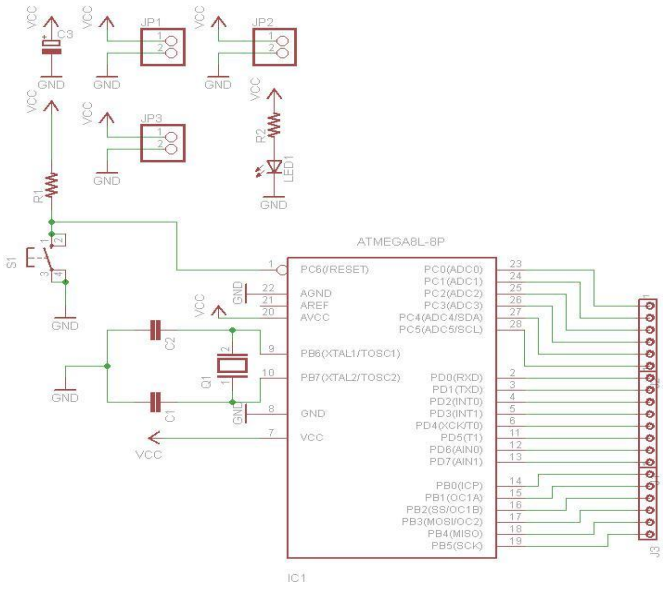

Fig 5:- circuit diagram

Input is taken from the meter in form of pulses with the help of photo diode (/photo transistor) and then applied to the interrupt pin of the microcontroller. Every time the interrupt occurs microcontroller increments it data and thus counts no of units consumed. Thus at the end of the month the value of counter is send to the user in form of message via GSM module fitted in our circuitry. Fixed Network AEMR is a method where a network is permanently installed to capture meter readings. This method can consist of a series of antennas, towers, collectors, repeaters, or other permanently installed infrastructure to collect transmissions of meter readings from AEMR capable meters and get the data to a central computer without a person in the field to collect it. There are several types of network topologies in use to get the meter data back to a central computer. A star network is the most common, where a meter transmits its data to a central collector or repeater. A repeater may be forwarded by RF signal or sometimes is converted to a wired network such as telephone or IP network to get the data back to a collector

. Some fixed network systems are also capable of being installed as a hybrid AEMR system where mobile and fixed network are intermixed by design. In a hybrid system, part of the system is read by fixed network, and parts may read by mobile or other technology, or both. Utilities with low density rural areas may not cost justify the fixed network infrastructure for parts of their service area, using it only for higher density zones or commercial accounts.In the event of a failure of the network due a natural disaster, sabotage, power failure, or other network interruption, the mobile reading system is available in their disaster recovery plan as an alternative means of data collection to the fixed network.

IV. Advantage

Advanced Metering systems can provide benefits for utilities, retail providers and customers. Benefits will be recognized by the utilities with increased efficiencies, outage detection, tamper notification and reduced labor cost as a result of automating reads, connections and disconnects. Retail Providers will be able to offer new innovative products in addition to customizing packages for their customers. In addition, with the meter data being readily available, more flexible billing cycles would be available to their customers instead of following the standard utility read cycles. With timely usage information available to the customer, benefits will be seen through opportunities to manage their energy consumption and change from one REP to another with actual meter data.
The benefits of smart metering are clear and proven.

- Accurate meter reading, no more estimates
- Improved billing
- Improved Security for premises
- Energy Management through profile data graphs
- Less financial burden correcting mistakes
- Less accrued expenditure
- Transparency of "cost to read" metering

- In built
  ADC

V. Result

Fig 6:-Automatic Energy Meter Reading system

Thus we conclude the meter reading goes to the user as sms which the user can check daily when required in his mobile. Also he will get an alert if the some one tries to open the box.

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