

# SMART ELECTRICITY METER FOR AUTOMATIC BILL GENERATION USING GSM MODULE

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**Abstract** - This project aims to relax the work effort of humans by developing a Smart electric power meter. The current bill generation scenario is very tiring and time-consuming as it is done physically. In this world where technologies are emerging very rapidly the electric power reading meter has also been digitally modified but is not fully automated, it still requires human efforts. There were errors and drawbacks in the earlier electricity meter which needed frequent repairing and maintenance. The analog meter sometimes gives malfunctioned or inexact unit reading. The digital electricity meter has more accuracy than the earlier electricity meter but it still requires human efforts to note the reading and generate the bill. In this project, we have introduced GSM Modem and Relay to exterminate the flaws of the previous analog meter and transform it into a completely automated electricity meter. The new bill generation method automatically fetches the meter reading from the meter and directly convey it to the electricity department using GSM Modem and respective bills are generated and sent to consumers. The authorized department can ON and OFF the power supply of the consumer's meter using relay circuitry. This technique permits remote access of the electricity meter and can be tracked routinely without physically visiting the meter location.

**Key Words:** GSM, Microcontroller, Energy Meter.

## 1. INTRODUCTION

The current method of meter reading is done manually. Where the Electricity department sends employees to take meter reading photo to the customer's house every month then he has to add the reading in the computer according to consumer's meter number then the bill is generated. If the customer's home is locked so it is not possible to take the meter reading photo and then the person has to repeat the process again till he doesn't get the meter reading. There are many such cases that the customer doesn't pay the bill on time so the electricity department sends some electricians to cut down the power supply of the customer.

So this process is very time consuming and more human efforts is required as well as its very expensive.

## 2. SCOPE OF THE SURVEY

The proposed project provides a convenient and efficient method to avoid this problem. The electricity department and the user can get the readings of the energy meter of consumers via GSM. The loads can also be controlled by the user of this system via GSM using this project. A Controller input is effectively inter GSM Based to a digital energy meter that takes the reading from the energy meter and displays the same on an LCD.

The reading of the energy meter is also sent to the control room by an GSM. This GSM can also receive commands from the Software to control the owner's electrical loads. On receiving command, it can switch ON/OFF the loads. This system can be operated by Mobile Phones as well as Laptop.

## 3. PROPOSED SYSTEM

In today's modern and digital world, if the Electricity Meter is made digital, then it will help us to know the exact amount of electricity used in units as well as Rupees. The above fact is considered in our project. The exact amount of electricity used will be displayed digitally by the LCD Screen. The bill generation process would be done digitally by sending the #READ 1\* command to register mobile number in the GSM Module which will be placed in the Meter. The system will respond with the meter reading through sending message. Whenever the customer doesn't pay the bill we could cut-off the power by sending #OFF 1\* command to the GSM Module. If the customers pay the bill we can again turn on the power supply by sending #ON 1\* command. This system can be operated using Phone and Laptop. We need to just send the above command when we are operating it through phone. While operating with the Laptop we need to execute AT Commands through COM check software.



The Keil 8051 Development Tools are designed to solve the complex problems facing embedded software developers. When starting a new project, simply select the microcontroller you use from the Device Database and the  $\mu$ Vision IDE sets all compiler, assembler, linker, and memory options for you.

**5.1.b OrCAD**

OrCAD is a proprietary software tool suite used primarily for electronic design automation (EDA). The software is used mainly by electronic design engineers and electronic technicians to create electronic schematics and electronic prints for manufacturing printed circuit boards.

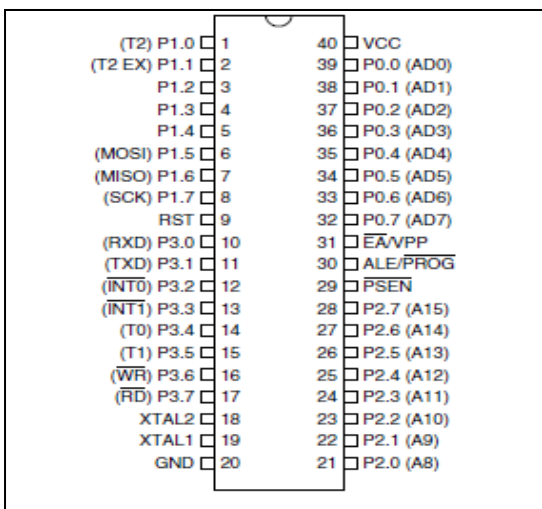
The name OrCAD is a portmanteau, reflecting the company and its software's origins: Oregon + CAD. OrCAD PCB Designer is a printed circuit board designer application, and part of the OrCAD circuit design suite. PCB Designer includes various automation features for PCB design, board-level analysis and design rule checks (DRC).

The PCB design may be accomplished by manually tracing PCB tracks, or using the Auto-Router provided. Such designs may include curved PCB tracks, geometric shapes, and ground planes.

PCB Designer integrates with OrCAD Capture, using the component information system (CIS) to store information about a certain circuit symbol and its matching PCB footprint.

**5.2 HARDWARE REQUIREMENTS**

**5.2.1 Microcontroller IC AT89S52**



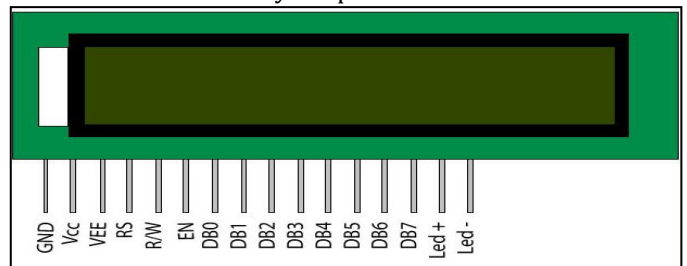
**Fig 5.2.1: Pin diagram of microcontroller AT89S52**

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured

using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

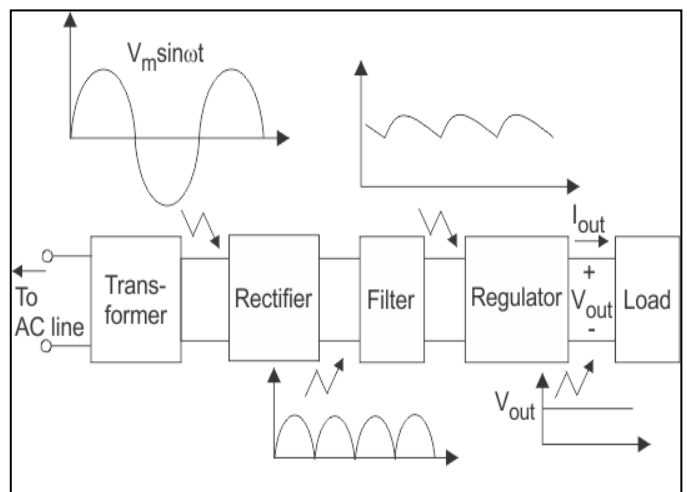
**5.2.2 LIQUID CRYSTAL DISPLAY (LCD)**

LCD is used in a project to visualize the output of the application. We have used 16x2 LCD which indicates 16 columns and 2 rows. So, we can write 16 characters in each line. So, total 32 characters we can display on 16x2 LCD. LCD can also be used in a project to check the output of different modules interfaced with the microcontroller. Thus LCD plays a vital role in a project to see the output and to debug the system module wise in case of system failure in order to rectify the problem.



**Fig 5.2.2: LCD**

**5.2.3 POWER SUPPLY**



**Fig 5.2.3: Block diagram of Power Supply**

The electrical power is almost exclusively generated, transmitted and distributed in the form of ac because of economical consideration but for operation of most of the electronic devices and circuits, dc supply is required. Dry cells and batteries can be used for this purpose. No doubt,

they have the advantages of being portable and ripple free but their voltages are low, they need frequent replacement and are expensive in comparison to conventional dc power supplies.

### 5.2.4 GSM Modem

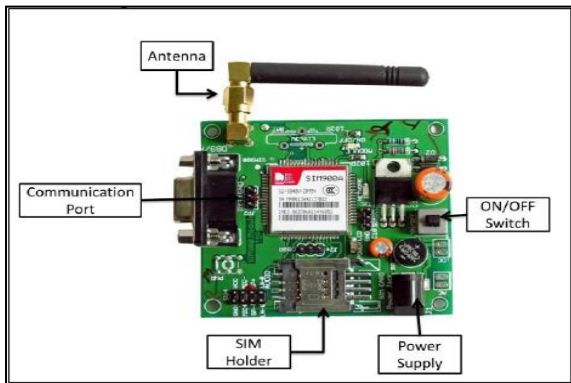


Fig 5.2.4: GSM Modem

A GSM modem is a specialized type wireless modem that works with a GSM wireless network. It accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. A GSM modem can be an external device or a PC Card / PCMCIA Card. An external GSM modem is connected to a computer through a serial cable or a USB cable. When a GSM modem is connected to a computer, this allows the computer to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS message.

### 5.2.5 RELAY

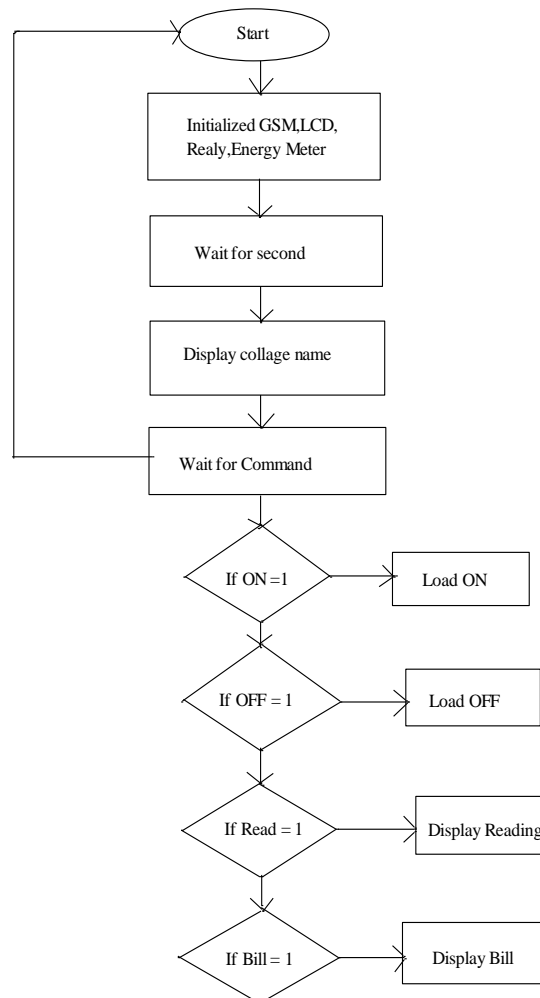


Fig 5.2.5 Relay

The Single Pole Double Throw SPDT relay is quite useful in certain applications because of its internal configuration. It has one common terminal and 2 contacts in 2 different configurations: one can be Normally Closed and the other one is opened or it can be Normally Open and the other one closed. So basically you can see the SPDT relay as a way of switching between 2 circuits: when there is no voltage applied to the coil one circuit "receives" current,

the other one doesn't and when the coil gets energized the opposite is happening.

### 6. FLOW CHART



### 7. CONCLUSION

Thus, on the basic of literature survey and analyzing the existing system, we come to the conclusion that the proposed system will not only aid the Electricity Distribution agencies but also help to digitalize the system. The developed GSM based energy meter reading and billing is beneficial for both energy service providing utility and consumers. This system overcomes drawbacks of conventional meter reading system and provides additional services such as power cut alert and tampering alert. Developed system also gives information about daily, monthly and yearly power usage. Details regarding daily power consumption will help consumer to manage their power usage. This developed system is reliable and

secure as only authorized person can access the system. The Proposed System will be a small contribution toward the Digital INDIA.

#### ACKNOWLEDGEMENT

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