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Wireless GSM Based Energy Meter with AMR (Automatic Meter Reading) for Automated Billing

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ABSTRACT

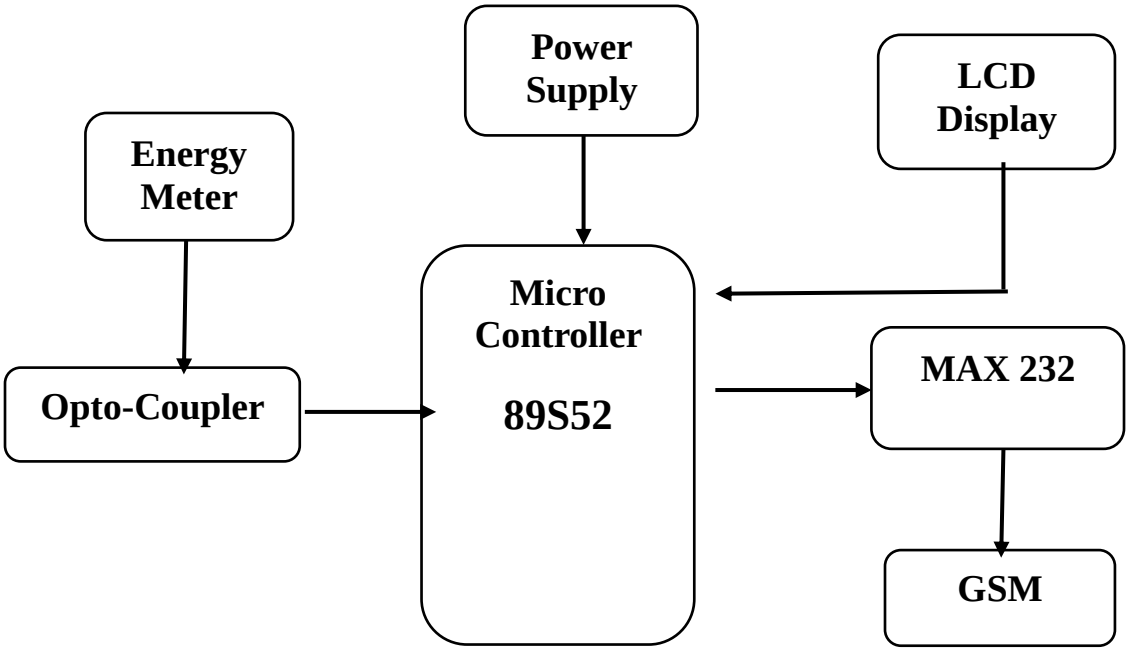
The technology of e-metering (Electronic Metering) has gone through rapid technological advancements and there is increased demand for a reliable and efficient Automatic Meter Reading (AMR) system. This project presents the design of a simple low cost wireless GSM energy meter and for automating billing and managing the collected data. Our system replaces traditional meter reading methods and enables remote access of existing energy meter by the energy provider and the consumer too. Also they can monitor the meter readings regularly without the person visiting each house.

Keywords:Microcontroller 89S52

I.INTRODUCTION

Electrical power has become indispensable to human survival and progress. Traditional meter reading by human operator is inefficient to meet the future residential development needs. So there is increased demand for automatic meter reading (AMR) system which collects meter readings electronically, and its application is expanding over industrial, commercial and utility environment. Electronics utility meters are an important steps towards automatic the utility metering process. Automatic utility meters have many new features that help to reduce the cost of utilities to the costumer and the cost of delivering utilities to the quality provider .The one set of rural electrification provides opportunities for new and more efficient metering technology to be implemented. Traditional electro-mechanical meters, still widely used, are prone to rift over temperature and time as a result of the analogue and mechanical nature of the components in these meters. Collection of meter reading is also in efficient, because a meter reader has to physically be onsite to take the reading.

II.BLOCKDIAGRAM



III.CIRCUIT COMPONENT

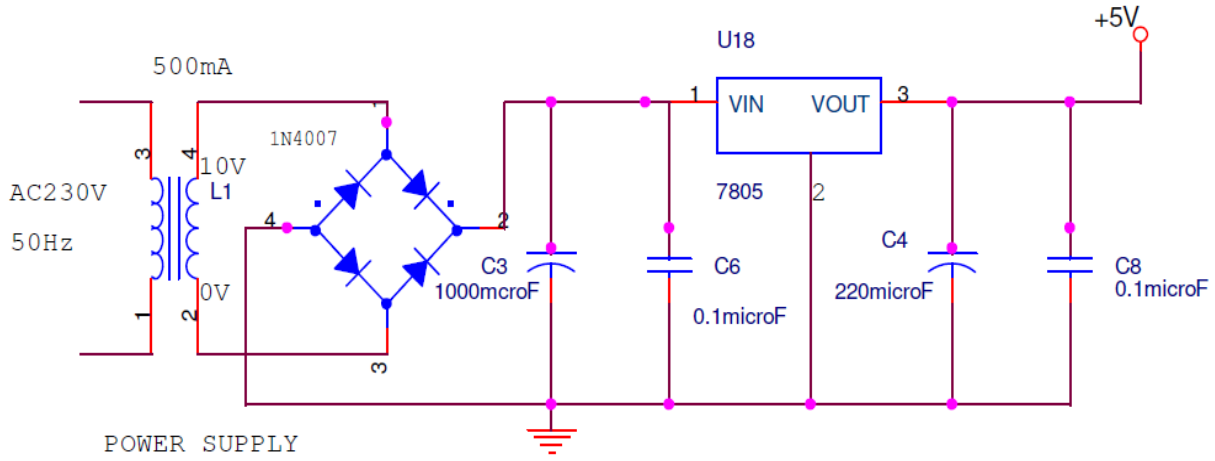
1. POWER SUPPLY:

1.1. TRANSFORMER:

Transformer steps down the voltage level from 230 to 5 volt AC. The microcontroller operates on 5V DC. For the operation of microcontroller the transformers step down the voltage level up to 5V.

1.2. RECTIFIER:

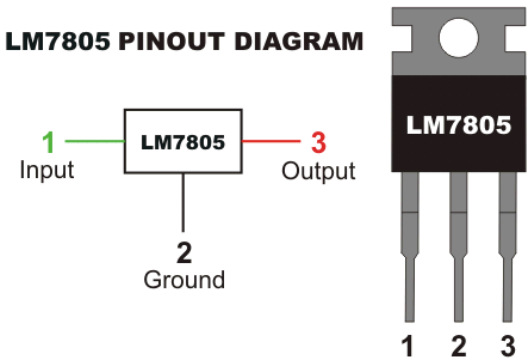
The rectifier converts the AC supply into DC. The rectifier used in this system is Bridge Rectifier which consists of four diodes.



1.3 FILTER:

Filter is an electronic circuit used along with rectifier in order to get pure ripple free DC voltage. In order to obtain DC waveform the rectifier is connected. Filter circuit uses passive component like capacitor. The capacitor input filter is used to reduce the ripple contents in output of rectifier obtain a pure DC voltage. Capacitor is filter capacitor which is connected across the load electrolytic capacitors that are normally used as filter capacitor.

1.4. VOLTAGE REGULATOR:

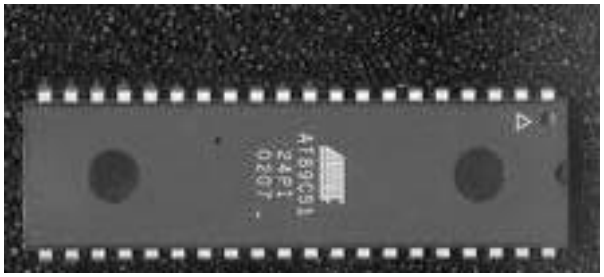


Voltage regulator regulates the voltage at which microcontroller can operate. Voltage regulator gives 5V output voltage. In this system BONENS 3296 voltage regulator is used.

IV.MICROCONTROLLER:

1. Fully static operation: 0 to 24 MHz's.
2. 32 Programmable I/O lines.
3. 256 x 8-Bit internal RAM.
4. 8 interrupt sources.
5. Programmable Serial channel. Low power Idle & Power Down mode.

6. Three level program memory lock.



V.LCD DISPLAY

LCD (Liquid Crystal Display) screen is such a display module and a 16x2 LCD module is very commonly used. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers.

VI. GSM MOUDLE

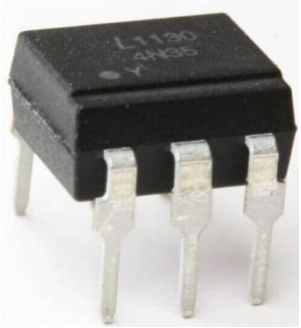
SIM800A, works on frequencies 900/ 1800 MHz the Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip (MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS.

VII.MAX 232

The MAX 232 device is a dual driver/receiver that including a capacitive voltage generator to supply TIA-EIA voltage levels from a single 5 V supply. Each receiver converts the inputs the TIA/EIA to 5V TTL levels.

VIII.OPTO-COUPLER

An optical coupler, also called opto-isolator, optocoupler, opto coupler, photo coupler or optical isolator, is a passive optical component that can combine or split transmission data (optical power) from optical fibers. It is an electronic device which is designed to transfer electrical signals by using light waves in order to provide coupling with electrical isolation between its input and output.



The main purpose of an optocoupler is to prevent rapidly changing voltages or high voltages on one side of a circuit from distorting transmissions or damaging components on the other side of the circuit. An optocoupler contains a light source often near an LED which converts electrical input signal into light, a closed optical channel and a photo sensor, which detects incoming light and either modulates electric current flowing from an external power supply or generates electric energy directly. The sensor can either be a photo resistor, a silicon-controlled rectifier, a photodiode, a phototransistor or a triac.

IX. CRYSTAL OSCILLATOR

An electronic circuit or electronic device that is used to generate periodically oscillating electronic signal is called as an electronic oscillator. The electronic signal produced by an oscillator is typically a sine wave or square wave. An electronic oscillator converts the direct current signal into an alternating current signal. The radio and television transmitters are broad casted using the signals generated by oscillators. The electronic beep sounds and video game sounds are generated by the oscillator signals. These oscillators generate signals using the principle of oscillation.

There are different types of oscillator electronic circuits such as Linear oscillators – Hartley oscillator, Phase-shift oscillator, Armstrong oscillator, Clapp oscillator, Colpitts oscillator, and so on, Relaxation oscillators – Royer oscillator, Ring oscillator, Multi vibrator, and so on, and Voltage Controlled Oscillator (VCO). In this

article, let us discuss in detail about Crystal oscillator like what is crystal oscillator, crystal oscillator circuit, working, and use of crystal oscillator in electronic circuits.

X.APPLICATION

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.

XI.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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