

# AUTOMATIC METER READING SYSTEM BASED ON AT89S52 MICROCONTROLLER

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**Abstract**— The Power Supply section supplies all other components with required Power of 5v. The AT89S52 microcontroller module takes the data from the energy meter and performs the necessary control operations like breaking the circuit through Relay control unit and the required information to the mobile phone via the communication module GSM. The MAX-232 which was inbuilt in the AT89S52 is used as a serial communication interface for the GSM modem for transmitting the data from the controller to the mobile phone. In the Load bank section a 60W incandescent bulb is used as a load for the purpose of energy consumption of the user. The user can obtain the status of the energy consumption and the billed amount by sending the corresponding commands from the mobile phone to the GSM modem. Then it sends the commands to the microcontroller section and the required information is sent to the user mobile through the GSM modem. If the consumer fails to pay the billed amount in time, the disconnection and reconnection can be done by sending their corresponding commands to the controller.

**Keywords**— Energy meter, AT89S52 Microcontroller, GSM, Relay module.

## I. INTRODUCTION

Wireless meter reading system is designed to continuously monitor the meter reading and to send the meter readings to consumer mobile through GSM. The rapid developments in the Wireless communication technology by the use of microcontrollers, there are many improvements in automating various industrial aspects for reducing manual efforts. The traditional manual Meter Reading was not suitable for longer operating purposes as it spends much human and material resource. It brings additional problems in calculation of readings and billing manually. Now-a-days the number of Electricity consumers is increasing in great extent. It became a hard task in handling and maintaining the power as per the growing requirements. Presently maintenance of the power is also an important task as the human operator goes to the consumer's house and produces the bill as per the meter reading. If the consumer is not available, the billing process will be pending and human operator again needs to revisit. Going to each and every consumer's house and generating the bill is a laborious task and requires lot of time. It becomes very difficult especially in rainy season. If any consumer did not pay the bill, the operator needs to go to their houses to disconnect the power supply.

## II. SYSTEM ARCHITECTURE

The high level block diagram of the wireless meter reading system is shown in the fig 1. The Power Supply section supplies all other components with required Power of 5v. The AT89S52 microcontroller module takes the data from the energy meter and performs the necessary control operations like breaking the circuit through Relay control unit and the required information to the mobile phone via the communication module GSM. The MAX-232 which was inbuilt in the AT89S52 is used as a serial communication interface for the GSM modem for transmitting the data from the controller to the mobile phone. In the Load bank section a 60W incandescent bulb is used as a load for the purpose of energy consumption of the user. The user can obtain the status of the energy consumption and the billed amount by sending the corresponding commands from the mobile phone to the GSM modem. Then it sends the commands to the microcontroller section and the required information is sent to the user mobile through the GSM modem. If the consumer fails to pay the billed amount in time, the disconnection and reconnection can be done by sending their corresponding commands to the controller.

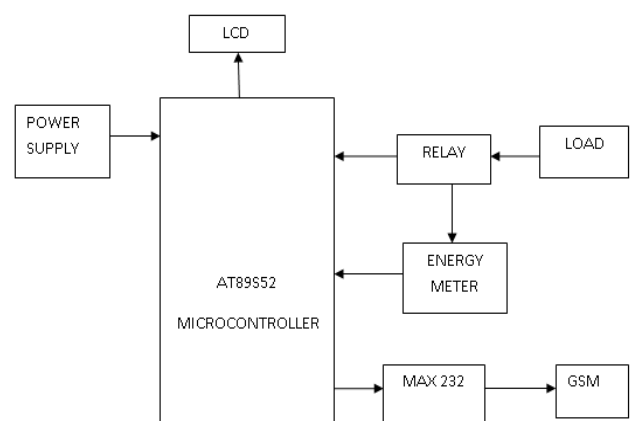


Fig.1 Block Diagram for wireless meter reading system

The user can obtain the status of the energy consumption and the billed amount by sending the corresponding commands from the mobile phone to the GSM modem. Then it sends the commands to the microcontroller section and the

required information is sent to the user mobile through the GSM modem. If the consumer fails to pay the billed amount in time, the disconnection and reconnection can be done by sending their corresponding commands to the controller.

### III. SYSTEM HARDWARE

The basic hardware components used in the Project are Power supply module, Energy meter, AT89S52 Microcontroller, LCD interface, GSM module and Relay module.

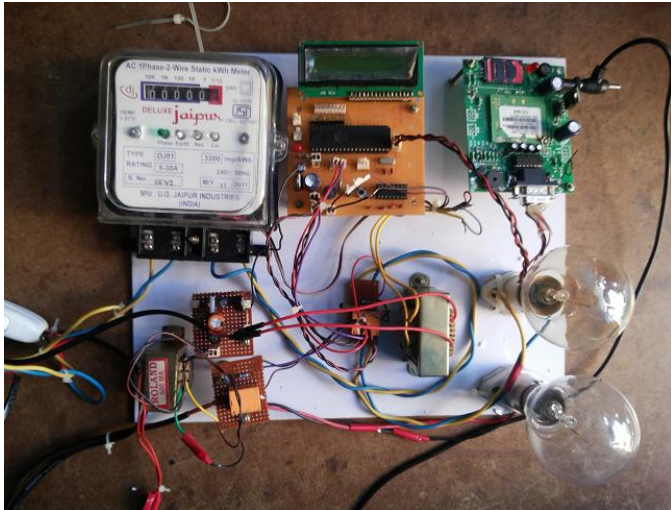


Fig.2 System Hardware for wireless meter reading system

#### A. Power supply module

The power supply circuit has to provide a 5v-regulated power to the micro controller for its operation. The dc power required is derived from a 230v AC supply mains.

#### B. Energy meter

Energy meter module is composed of ADE7757 which is energy metering IC with integrated oscillator and load and which produces the analog signal can be converted into digital signal and that digital signal in the form of pulses and ADE7757 outputs average real power information based on the load. These outputs are interfaced with the AT89S52 micro controller. One of the features in ADE7757 to enhance the capability of this work is having a power supply monitoring circuit on the VDD supply pin of the ADE7757. Due to this, proper device operation is achieved at power up and power down modes. High degree of immunity to false triggering from noisy supplies is attained due to built in hysteresis and filtering operations in power supply monitor of the ADE7757

#### C. AT89S52 Microcontroller

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. In

addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

#### D. LCD interface

In this project we are using a 16 X 2 alphanumeric LCD to display the necessary data. The LCD used on the transmitting side is a 16 character and 2 lines LCD, which is normally referred as 16 X 2 LCD.



Fig.3 LCD



Fig.4 LCD output at customer house



Fig.5 Load consumption send by the service provider

#### E. GSM module

The GSM module consists of a DB-9 connector for RS-232 communication, a SIM card holder for inserting the SIM to be used, an external antenna for healthy signal strength and an external power supply to power up the module. The GSM module is interfaced to the microcontroller via a MAX 232 IC so that serial communication can be established between the microcontroller and the GPS module.



Fig.6 SIMCOM 300 GSM Module



Fig.7 GSM Module interfacing to AT89S52 MC

#### F. Relay module

The relay coil operating voltage is 12v. The micro controller cannot drive the relay coil directly. For that reason, the relay driver IC ULN2803 is used.

#### IV. CONCLUSION

In the present work wireless meter reading system is designed to continuously monitor the meter reading and to send the meter readings to consumer mobile through GSM. Shut down the power supply remotely whenever the consumer fails to pay the bill. It avoids the human intervention in power management, provides efficient meter reading, avoid the billing error and reduce the maintenance cost. It displays the corresponding information on LCD at consumer end.

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