



Microcontroller Based Talking Energy Meter

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ABSTRACT: Among the most desirable feature of energy meter is simple circuit and ability to display the load power consumption in precise manner. Such these things can be achieved /fulfill by using a talking energy (kwh) meter having an advancement in energy meter which is become an attractive interface between user and meter. It has the potential to replace the conventionally used energy meter. Talking energy meter is a new type of energy meter having the ability to provide output in attractive manner. The purpose of this project is to build a KWH (Kilo Watt Hour) meter that can alert the users with voice messages. An Energy meter or KWH meter is a device that measures the amount of electrical energy supplied to or produced by a residence, business or machine. Electricity is a clean, convenient way to deliver energy. The electricity meter is how electricity providers measure billable services. The idea behind this project is to construct the Energy Meter that is useful for illiterates and the busy people who cannot concentrate on the energy meter readings because of their busy schedule. This system helps the users by alerting them about the peak loads (max energy consumption), power status (ON/OFF), billing status etc. The voice alerts could be in any local language. Hence this system can be used across the world.

Keywords: Kilo Watt Hour, Talking Energy Meter, Electricity, consumption, Over Load, Interfacing.

I. INTRODUCTION

The most common type of meter measures kilowatt-hours. When used in electricity retailing, the utilities record the values measured by these meters to generate an invoice for the electricity. They may also record other variables including the time when the electricity was used. This project includes advancement in Energy Meter that is useful for illiterates and the busy people who cannot concentrate on the energy meter readings because of their busy schedule. This system helps the users by alerting them about the peak loads (max energy consumption), power status (ON/OFF), billing status etc. The voice alerts could be in any local language. Hence this system can be used across the world. The typical voice alerts are "Over load", "Pay electricity bill", "Turn off the lights" etc.

This system also consists of a LCD display that continuously displays the energy meter readings in real-time. This consists of Real-time clock for calculating the average, max and minimum readings with respect to time. This information is display on a LCD display. This can be achieved by the use of microcontroller unit that continuously monitors and records the Energy Meter readings in its permanent (non-volatile EEPROM) memory location. Microcontroller also drives the voice module to play the voice messages based on the energy meter readings.

II. PROJECT OVERVIEW

An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main

devices used in embedded products are Microprocessors and Microcontrollers.

Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result.

The "Talking energy meter" using PIC16F877A microcontroller is an exclusive project which is used to help the deaf and dumb people to announce their requirements using voice module APR9600. The main aim of the project is to provide a user-friendly interaction for the deaf and dumb people with other persons.

A. Equipment used

1) Hard ware

- Micro controller (16F877A)
- Reset button
- Crystal oscillator
- Regulated power supply (RPS)
- LED indicator.
- APR9600 voice module.
- Energy meter
- Optocoupler
- LCD

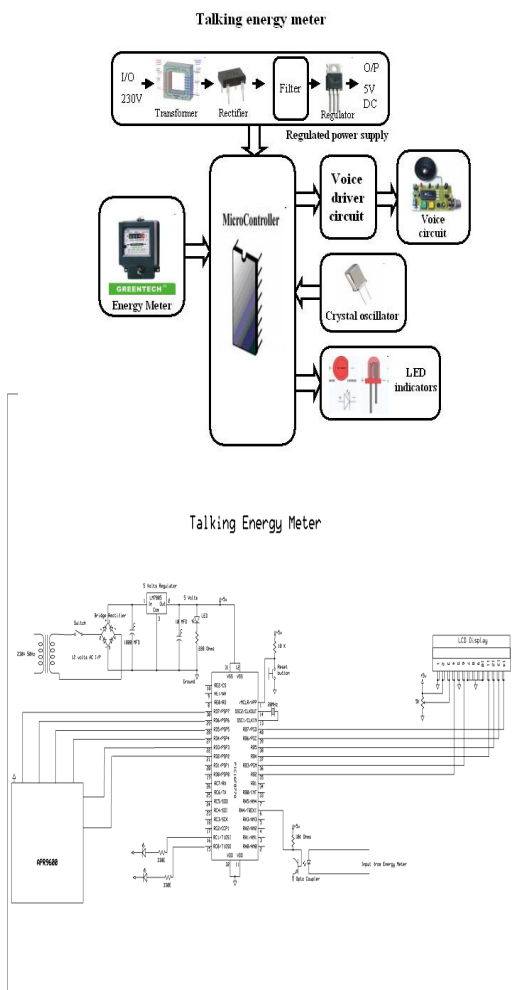
2) Soft ware

- Express PCB – for designing circuit
- PIC C compiler - for compilation part
- Proteus 7 (Embedded C) – for simulation part

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II. BLOCK DIAG.

Schematic diagram and interfacing of PIC16F72 microcontroller with each module and the block diag. of the project is shown here:



The above schematic diagram “Microcontroller based talking energy meter” explains the interfacing section of each component with micro controller and APR9600 voice module. Crystal oscillator connected to 13th and 14th pins of micro controller, regulated power supply is connected to micro controller and also the LED’s connecting to micro controller through resistors

III. WORKING

The energy meter is connected to the power supply .an auxiliary supply is given to the microcontroller section. The all additional feature of this project such as voice circuit, limited consumption etc. is totally dependent on microcontroller. The meter and microcontroller are connected to each other to complete the task.

In this meter a predefined limit is set for the load consumption and when the user comes at the set point it alerts to the user by voice signal. Also it disconnects the load when the load consumption exceeds the limit. The voice signal can be any of the language which is incorporated with the system. A LCD is connected with this system which continuously shows the current status of load consumption.

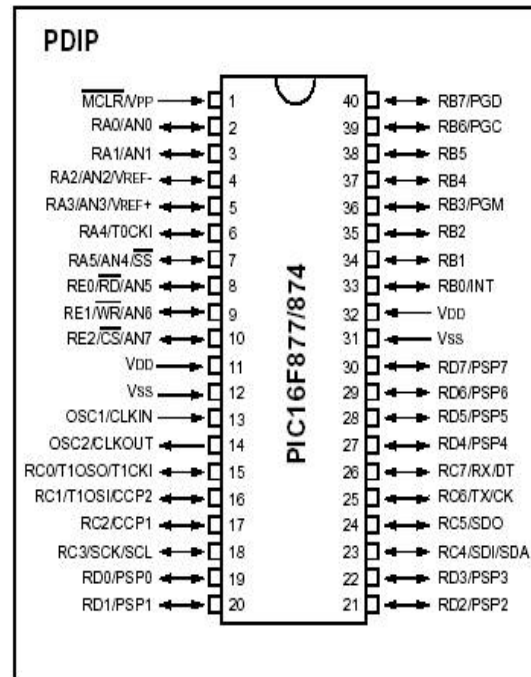
A. Microcontroller

The microcontroller used in this project is PIC16F72. One unit of PIC16F877A microcontroller can be programmed and erased so many times.

PIC16F877A already made with 368 bytes of Random Access Memory (RAM) inside it. Any temporary variable storage that we wrote in our program will be stored inside the RAM. Using this microcontroller you don’t need to buy any external RAM.

256 bytes of EEPROM are available also inside this microcontroller. Using EEPROM is very important because data stored inside EEPROM will be retained when power supply is turn off. RAM did not store data permanently. Data inside RAM is not retained when power supply is turn off.

The pin diag. of microcontroller is shown in fig. below



B. Advantage

- Voice based alerts.
- Efficient and low cost design.
- User friendly
- Low power consumption.
- Energy readings are stored in non volatile memory.

C. Disadvantages

- Interfacing energy meter to Micro Controller is sensitive.

D. Applications

This system can be practically implemented in real time where there is a limitation on energy utilization.

IV. RESULT

The project “Talking energy meter” was designed such that whenever the usage of energy exceeds the pre-set value which is mentioned in the program, it announces an alert message which was already predefined in the voice circuit.

V. CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

VI. FUTURE SCOPE

Our project “Talking energy meter” is mainly intended to get an alert through voice if the usage goes beyond a set usage level. This system used a voice circuit into which a predefined alert message is stored. The energy meter, voice circuit and load is interfaced to the micro controller. The micro controller is programmed in such a way that it always checks the energy meter readings. If the usage of energy exceeds the set level written in the program, it plays the alert message predefined in the voice circuit.

This project can be extended by introducing a GSM module which intimates the over energy usage to the owner. The energy values stored in memory can be retrieved and can help in plotting a power utilization graph in the PC.

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