

GSM BASED SINGLE PHASE DIGITAL ENERGY METER

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ABSTRACT

This paper present “GSM BASED SINGLE PHASE DIGITAL ENERGY METER”, using PIC32MZ2048ECG064 microcontroller and MCP3909 energy metering IC. Basically, the single phase energy meter getting more and more advance due to advance electronic. So the automatic meter reading needs to be implemented. So the automatic meter reading concept is implemented in this paper. It uses mcp3909 and PIC microcontroller for energy calculation and GSM module is used to send meter reading automatically to service provider.

Keywords: *PIC32MZ2048ECG064 Microcontroller, MCP3909 Energy metering IC, WH, KWH A.C.*

I. INTRODUCTION

Electrical Energy is non removable part of human's daily activity. Now days every house have electricity connection, so energy monitoring of domestic consumers is become very critical in now days. The old method of meter reading by person coming from electricity board is very time taking activity to cover residential distributed area. Hence to achieve meter reading in minimum time Automatic Meter Reading (AMR) systems is introduced. This system collects all data from energy meter and sends message to service provider at every month. This project helps to manage consumer monitoring their energy use. Energy meter with a display outside their homes could provide up-to-date information one electricity consumption and in doing so help people to manage their energy use and reduce their energy bills. Meter readings collection is very time taking activity & also very inefficient because of meter reader has to physically be onsite to take the readings. This method of collection of meter readings becomes more costly when readings have to be collected from vast, and often scattered rural areas. Meter readers is very resistive to go to consumes premises & take all the reading & submit inaccurate estimated readings of electricity consumed. Here in this paper Wireless Energy Monitoring is introduced which will integrate the energy used at energy consumption end & record the reading continuously. Then data will be send to the remote server (PC) through the existing GSM network. Once the data is collected the records regarding that consumer is created by hyper terminal software.

II. PROPOSED WORK

The main objective of this project is to develop a single phase energy meter system which will be capable to

reduce manpower requirement for taking meter readings by going to individual's residence. For that purpose our aim is to build a single phase energy meter to which we can interface GSM module that can send a sms at every first date of month to intimate service provider units of usage and total amount of bill. Energy meter will also capable of recording and displaying energy in WH and KWH for single phase two wire A.C. The objectives of proposed work are as follows:

1. To develop an efficient and intelligent energy monitoring System for electricity board i.e. single phase energy meter.
2. To display instantaneous voltage and current on display.
3. To display energy in WH and KWH
4. To send consumed units and total amount of bill to service provider by text message.
5. To display the load connected in Watts.

III. METHODOLOGY

Figure 1 shows the block diagram of advanced metering system :

The advanced metering system includes current transformer unit and voltage transformer ,energy meter IC PIC controller ,RTC,GSM module & lcd display

Step1: The voltage and current transformer units feed the current and voltage signal from the supply and send to energy meter IC

Step2: The energy meter IC produces digital data after getting current and voltage signal from the CT and VT.

Step3: The pulse output is transferred to PIC for further calculation of unit additional and does the functions according to the program loaded in it

Step4: LCD display shows the total unit consumption, date, time and other parameters.

Step5: MAX232 establishes a relation for data transferring between PIC and GSM module.

Step6: GSM module sends to or receives data from supplier end.

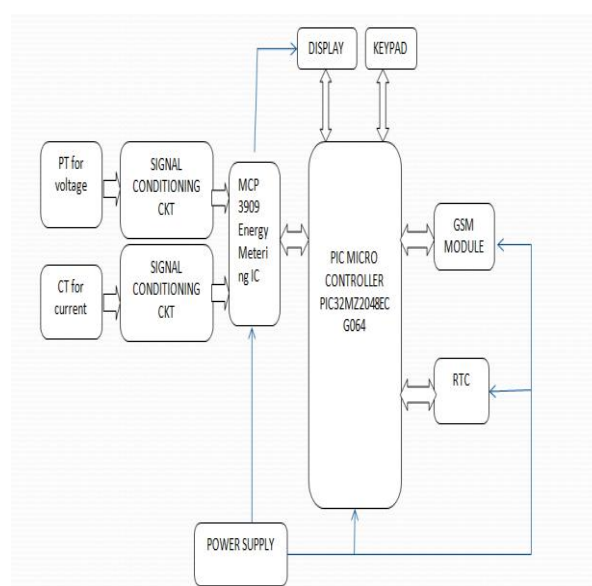


Fig 1: Block diagram of energy meter.

IV. ALGORITHM

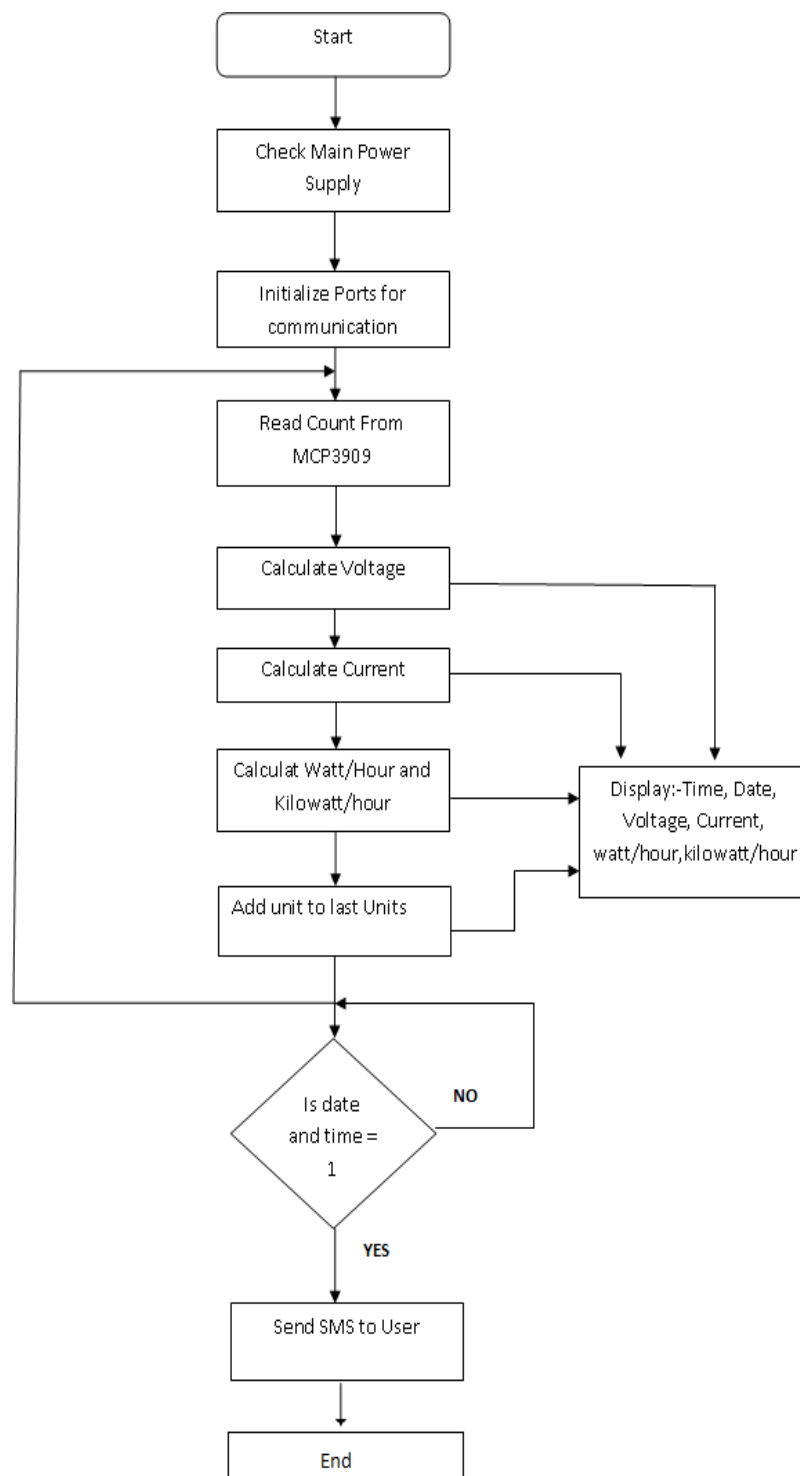
**Fig 2: Flow diagram**

Figure 2 shows flow diagram for energy calculation and other parameters. Program starts with checking of power supply, then it initialize all ports for communication. Further controller read count from MCP3909 IC.

From that count it will calculate voltage, current and power in WH and KWH. After calculating these parameters controller add these unit to last saved units. If date and time in energy meter is 1 then controller will forwards number of units to GSM for sending message to service provider.

4.1 Foreground process.

The initialization process involves the setup of the MCP 3909 in SPI mode, setting of reference for ADCs in MCP 3909, Clock System, LCD controller, set ports of microcontroller for SPI communication, timer and the Universal Serial Communication Interface (USCI) for UART functionality used for communication with GSM module. Checking of main power supply. Sampling is done at very high rate these samples are converted to digital data and send to controller for energy calculation.

4.2 Background process.

The MCP3909 devices contain three different serial modes with data presented in 2's complement coding.

- Multiplier Output
- Dual channel Output
- Filter Input

From this we use Dual Channel Output mode. These samples are further processed and accumulated in dedicated 48-bit registers. The background function deals mainly with timing critical events in software. Once sufficient samples have been accumulated then the foreground function is triggered to calculate the final values of VRMS, IRMS, power and energy

V. CONCLUSION

The design of Smart Energy meter using GSM technology can send number of units consumed by consumer to electricity board at 1st date of every month.. This reduces human labour and at the same time increases the efficiency in calculation of bills for used electricity. Smart energy meters will bring a solution of creating awareness on unnecessary wastage of power and will tend to reduce wastage of power. This module will reduce the burden of energy providing by establishing the connection easily and no theft of power will take place. This paper work exposes the purpose of energy monitoring and controlling by implementing prepaid system. It is hoped that this work helps the consumers for better energy management and its utility in the distribution system for economical ability of the Electrical Boards.

VI. ACKNOWLEDGEMENT

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1. A mini printer can be interfaced to get a printed bill or details of billing.
2. Remote recharging can be implemented through telephone line or wireless network.
3. Software can be modified to view the balance on request.
4. By using USB connection it can be interface with computer.

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