

SMART METER IN EMBEDDED WEBSERVER ENERGY MANAGEMENT



¹Sruthy T.M. and ²P.M. Rubesh Anand

¹PG final year, ²Associate professor

Department of Electronics and Communication Engineering

Hindustan University, Chennai

Email: ¹sruthymanoharan89@gmail.com

²rubesh.anand@gmail.com

ABSTRACT- In this paper an energy management of embedded web server is used. A low cost real time arm based energy management is used. Smart metering approach called a combination of all sensors for calculating the measurements in power quality application.web server using for the power consumption, statistics of power quality and is able to interface the load displacement. It measures the main power system quantities and used for managing the whole power plant. Data compression algorithm is used for the power quality measurements and for speeding up the process prevention of data loss towards the efficiency of data sending is done in this work. Energy management where the excess of electricity usage occurs it disconnects from the supply and energy management occurs.

Keywords: power management, web server.

I.INTRODUCTION

The major idea of the project deals with an energy management embedded web server concept It includes the development of technologies suitable for measurement, control and management of the flow of electricity, gas and hot water aiming to an integrated management of the energy system.

Smart metering approach is introduced for the energy management it consists of the installation of an intelligent meter in residential customers and a process of regular reading, analysis of the data and feedback of energy consumption data of the customer.

An integrated embedded Web server (EWS) based power quality (PQ) recorder is designed in this paper to achieve the goal of PQ remote monitoring and recording. A EWS is a Web server that runs on an embedded system and is possible to provide a powerful Web-based management and control interface with tiny

volume. Therefore, it will be very suitable for PQ remote monitoring recording.web server is used for statics power consumption, power quality and is able to interface device for load displacements.

An energy management concept is introduced in the system by the use of load control circuit. If there is any disturbance in the energy management or the power quality measurement the control circuit makes active thus the disconnection from the circuit and wastage of energy should not occur.

Data compression algorithm is used for the power quality measurements for speeding up and accurate measurements. The algorithm is suitable for electric load applications time synchronized algorithm, useful for the identification of source of disturbance and cause of disturbance which helps to nullify the harmonics or deviations.

A combination of smart meter and data communication capability allow for remote access and easy access of device information. Web portal concept is presented where customers will be able to see how much they paid for electricity last year, the amount of energy consumed in the same day. Comparing the usual energy meters this smart meter will record the total harmonic are considered. Chances of power noises because of power factor and active power is not maintained in the energy meters but in case of smart meter we can rectify the drawbacks and with the aid of control circuit energy management concept is valid if there is any deviations.

II.RELATED WORK

There are several energy management system deals with the smart metering concept and various algorithm put forward for the power quality measurements.

The concept dealing till now in this work for the energy management system is based on the

Energy meters. Energy management system by the usual implementation of energy meters are nowadays widely implementer in residence applications and industrial purpose. In this concept voltage and total harmonics are not considered. Only the consumption of current is shown by the meter, these are stand-alone meters. The harmonics are not included in the measurements chances of power noise and because of power factor and active power are not maintained during the measurements. Web portal concept has not introduced for communication network to display and for getting the parameters. The life time of measuring and load devices are limited because of the harmonics and variation in frequency

III. PROPOSED SYSTEM

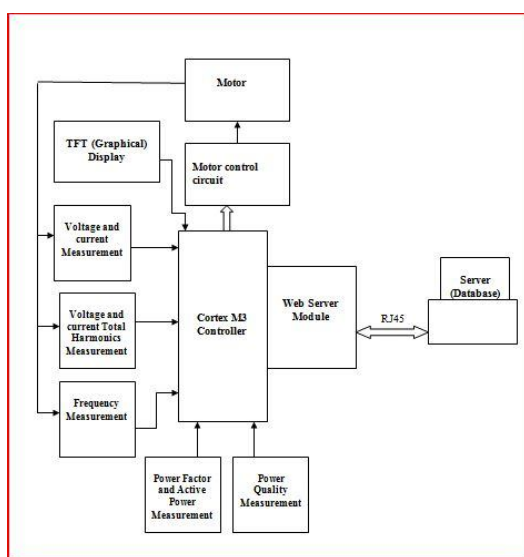


Fig1. Functional diagram of proposed system

Proposed smart meter has the following features a new concept called smart metering is implemented in the work. It reads the consumption of electric energy in real time. The possibility to access the data both remotely and locally and able to show the flow of energy. Power factor measurements is considered. It is possible also send data via Ethernet to web server. Present a web portal where consumers will be able to show the consumption of electricity they paid last year the amount of energy consumed on the same day. Multi system communication and data acquisition is made possible. Data compression algorithm used for speeding up and accurate measurements, time synchronized algorithm used to find the harmonics.

A. WORKING MECHANISM

Energy management concept using cortex processor is used in this project. Power supply is given to the motor (load) and thus the sensors accordingly calculate the parameters. Voltage sensor calculates the voltage measurements step down transformer is used; current measurements we go for current sensors for frequency measurements counters are used. Harmonics is calculated by zero crossing detectors, all devices are connected to the cortex processor and the TFT display connected to the device will show the calculations.

If there is any variation in the predetermined parameters the display itself shows the variations and the load circuit connected to the processor controls the circuit and disconnects the load thus energy saving takes place. The processor connected to an embedded web server and thus to data base through Ethernet where the customers can access the data at anywhere.

B. HARDWARE DETAILS

Measuring units

Voltage measurements we are dealing with step down transformer current measurements current sensor is used. Frequency measurements we go with counters using zero crossing detection method. When measuring the frequency of a signal usually the number of cycles of a reference signal is measured over one or more period of the signal being measured. Measuring multiples periods help to reduce errors caused by phase noise by making the perturbations in zero crossing small relative to the total period of the measurements. Electrical load is an output terminal (or its input impedance is the load. Load affects the performance of circuits that output voltage or currents such as sensors, voltage sources and amplifiers. Motor control circuit combination of switches for a selecting a desired output level converting the multi-bit serial data signal into multi bit parallel data signals, A frequency shift key connected to a resonant circuit generating a controllable high frequency signal coupled to a power line to transmit the binary serial data onto the power line. TFT display is the best way to add colourful and bright display to any applications. The display comes with the connectivity board that can be interfaced to the target controller. Cortex m3 controller we are using LPC1768 is used. Low power consumption and high level of integration is used for the embedded application. Full duplex communication and data base using ssp controller.

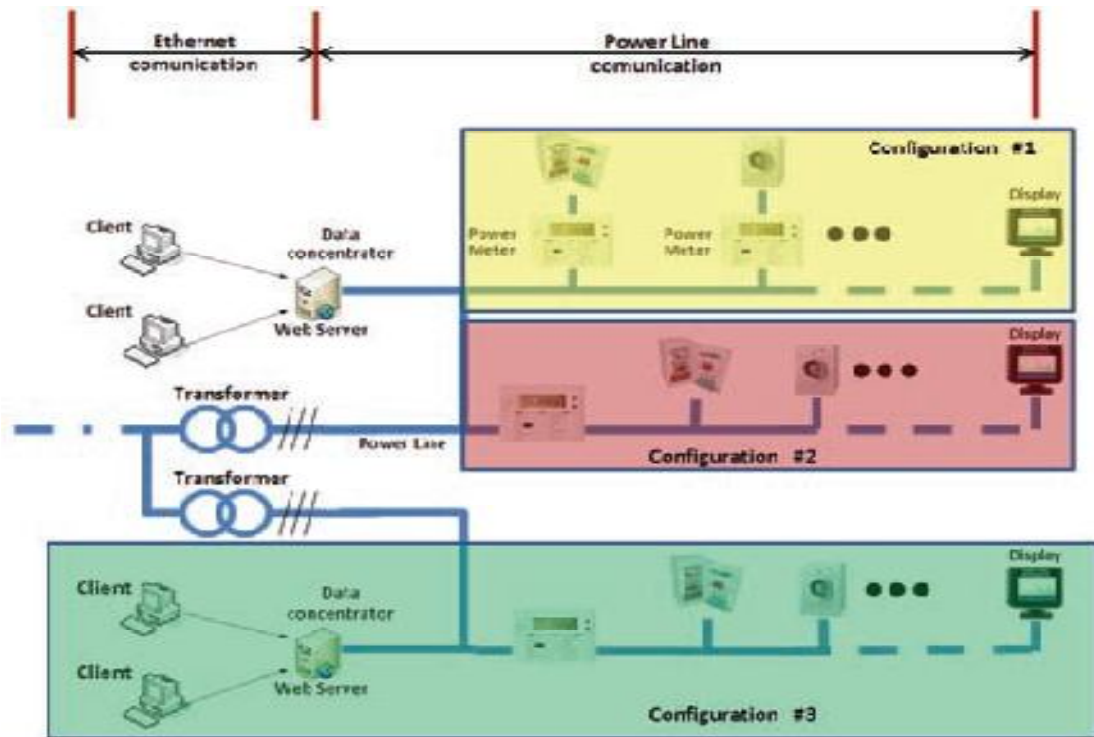


Fig2.Configuration types of smart metering system

The entire device together called as smart metering approach for the project. Schematic diagram of developed smart meter is shown above. Each household has information display for showing the measurements. Smart meter is used for acquiring and storing the information regarding the power consumption. Power line is used for the communication of all the devices connected to the network. If there is any difficulty while communicating the data with the device or the distance between the data aggregator and smart meter is large PLC repeater is added in the system. Also a Web Server (installed in data aggregator) can provide internet communication to provide power consumption statistics for a single household or for a group of household. It has high system performance with the low power consumption. We propose a power meter which is used for measuring the active and reactive power measurements. Power quality consumption voltage and current total harmonics distortion energy consumption is the challenging features for the smart metering concept. Display installed in home shows the daily consumption and the user can able to know the usage. Thus the power consumption energy management and the costs for the customer and energy saving. Comparing the result we can identify the consumption of electricity used in the last year and the peak consumption of electricity.

C .SOFTWARE DETAILS

1. Web server management

TCP/IP protocol suite is used in this web server HTTP protocol. Client server based transmission like sending the data and receiving the response. Embedded web server is using TCP/IP protocol. It has minimum CPU utilization. HTTP protocol implemented software. Extraction of information and collection of statistics by web server for each household is done by the data aggregator. Analysing of house hold energy consumption by connecting a client to the server.

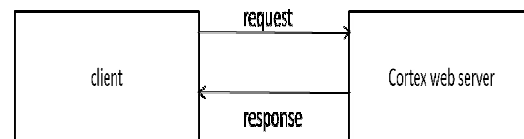


Fig 4.Web server working process

Users in the client browser make a request to the web server, response is given by the web server in accordance with the request and finally the server will transfer the file directly to the browser.

2. Data compression Algorithm

The algorithm is used for sending the data's to RJ45. Data compression technology provides unlimited capacity for power quality data storage. This means that you are no longer required to set constraints on system data, rendering the risk in data selection based on set thresholds and values triggers obsolete. There is no data loss by comparing the system how the efficiency is performed and calculate the performance efficiency while dealing with the energy management.

and Classification of Disturbances”, *IEEE Instrumentation and Measurement Technology, Conference. Warsaw, Poland, May, 2007.*

- [7] Daniel Amitai Elspec “Optimizing power quality data analysis using data” Compression technology” *Journal of Marine Science and Technology, Vol. 11, No. 1, pp. 39-47 (2003)*

IV. CONCLUSION

Energy Management System and embedded web server using specific algorithm called data compression is used. Not only measurements regarding the amount of electricity used, but also allow the customer to control the maximum consumption using internet communication. In this way the combination of such a smart meter with an appropriate communication infrastructure could Provide remote access and facilitate planning. Data compression preventing the data loss which compares the efficiency or performance of the algorithm in the work comparing the measurements

V. REFERENCES

- [1] Carmine Landey, Pietro Merola, Giacomo Laniello “Arm based energy management system using smart meter and web server”, *Instrumentation and measurement Technology, IEEE 2011.*
- [2] T. Seop Choi, K. Rok Ko, S. Chan Park, Sik Jang, Y. Tae Yoon, “Analysis of Energy Savings using Smart Metering System and IHD (In-Home-Display), *IEEE T&D ASIA 2009.*
- [3] Mo Guan; Minghai GU, “Design and implementation of an Embedded Web Server Based on ARM”, *Software Engineering and Service Sciences (ICSESS), 2010 IEEE International Conference on Digital Object Identifier; 16-18 July 2010.*
- [4] Y. Sung Son, K. Deok Moon, “Home Energy Management System Based on Power Line Communication” *978-1-4244-4316-1/10, IEEE 2010.*
- [5] R. van Gerwen, S. Jaarsma, R. Wilhit “Smart Metering”.
- [6] V. Matz, T. Radil, P.M. Ramos, A.C. Serra, “Automated Power Quality Monitoring System for On-line Detection