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Embedded Power and Energy Management System Based On WSN

[#1]Bhonde Shubhangi, [#2]Bhos Swati, [#3]Chavan Sunita, [#4]Prof. S.S.Dubal

[1]shubhabhonde@gmail.com
[2]chavansunita1992@gmail.com

[#123]Department of Electronics and Telecommunication Engineering
[#4]Prof. Department of Electronics and Telecommunication Engineering
JSPM's, BSIOTR, Wagholi, Pune.

ABSTRACT

This paper describes the Intelligent Energy and Power Management System (IEPMS) to manage power distribution and power consumption in home space. The thought of dynamic assignment of priorities for all the patron is delineate during this paper. Slicing of interrupt timings conjointly mentioned which might be wont to improve the performance and additionally we are able to show the Units of Power consumed and quantity on alphanumeric display and also we are able to send the quantity to the patron mobile mistreatment GSM module .The total system is dominant from home server and therefore the system has developed through ARM processor and wireless communication networks. in keeping with the management commands of the house server , the IEPM system may be controlled mechanically by dynamic the masses. The un- interrupted power provide of the patron is achieved through the projected design and it provides a lot of economical energy management. The implementation of these energy saving technologies needs meticulous measurement of consumptions, because effective measurement is equal to pompous performance of the coherent technologies. For this reason only the demand increasing form this energy and power measuring instruments. The growth of technology leads the usage power increased more in the home area [1].. The home server is linked with the home section by means of Wireless sensor network (WSN).Wireless sensor network is instituted of a large amount of miniatures self-organizing wireless sensor nodes.

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I. INTRODUCTION

The world's growing population and a growing global thirst for energy stands to increases the situation, culminating in a perfect storm of economic, social and environmental pressures on rare energy resources. In nearly every country, researchers expect existing energy production capabilities will fail to meet future demand without new sources of energy, including new power plant construction. However, these supply side solutions ignore another attractive alternative which is to slow down or decrease energy consumption through the use of technology to dramatically increase energy efficiency. For demonstration purpose, the 4 devices (high power and low power) will be used which would be controlled by using ZigBee wireless sensor network .The software used here is Keil (version 4) with Embedded C language (thumb instructions) Our main aim of the project is Power Management. It allows us to manage power consumption during load shedding hours, hence we can avoid blackouts. Our project helps in conservation of power as well as proper distribution of power. Our project provides an over view of wireless sensor network for power management. It deals with allocation, distribution and consumption of power. Substation will allocate specific amount of power to be consumed by the consumer. Consumer will use allocated power efficiently. This communication is done using wireless network. The total system is dominant from home server and therefore the system has developed through ARM processor and wireless communication networks keeping with the management commands of the house server , the IEPM system may be controlled mechanically by dynamic the masses. The un-interrupted power provide of the patron is achieved through the projected design and it provides a lot of economical energy management. For this purpose we briefly discuss the existing power management in smart homes/building, following with a review of advantages of adopting WSN technology for power management. Then it focuses on

challenging factors influencing the design & development of WSN based power management and also on solutions for power management.

II. LITERATURE SURVEY

1 N.Madhu1, G.BhaskarPhani Ram2, J.Krishna Chaitanya3, K.Harikrishna4 PG Student [ES], Dept. of ECE, Vardhaman College of Engineering, Hyderabad, Telangana, India1 (International Journal of Advanced Research in Electrical,Electronics and Instrumentation Engineering, August 2014)

This paper describes the Intelligent Energy and Power Management System (IEPMS) to manage power distribution and power consumption in home space. The thought of dynamic assignment of priorities for all the patronis delineate during this paper. Slicing of interrupt timings conjointly mentioned which might be wont to improve the performance and additionally we are able to show the Units of Power consumed and quantity on alphanumeric display and also we are able to send the quantity to the patron mobile mistreatment GSM module .The total system is dominant from home server and therefore the system has developed through ARM processor and wireless communication networks keeping with the management commands of the house server , the IEPM system may be controlled mechanically by dynamic the masses. The un-interrupted power provide of the patron is achieved through the projected design and it provides a lot of economical energy management.

This paper deals with the development of an analogelectronic wattmeter based on a high-accuracy electronic four-quadrant multiplier and appropriate amplifying and averagingcircuits. The proposed instrument presents a simple design andis constructed using commercially available components. Itsmain advantage is that it can be integrated with the signalconditioning circuit, obtaining low cost, high resolution, andreduced dimensions. It can measure in circuits with very lowpower factors and nonsinusoidal waveforms. The implementedprototype is a portable laboratory instrument, integrated with adigital system capable of processing the signals, and displayingthe main parameters of both electric power and energy. It hasbeen designed to easily integrate the main blocks in that eitherindustrial or civil equipment requiring the power measurementfor monitoring or control purposes. A Fluke 6100A powerstandard is used to calibrate the wattmeter over a wide rangeof current magnitudes and widths and at power factors down to0.02; several results are reported and discussed.Analog multipliers, energy measurement, harmonic distortion, power measurement, power quality

2.SonalG.Phuke, Prof.Mrs.K.N.KasatPG student, Prof.Ram Meghe CollegeOf Engg&Management,BadneraAmrawati (M.S),India (International journal of innovative research in engg,Vol 2,Issue 2,2015)

This paper provides a survey on implementing wireless sensor network(WSN) technology based on smart monitoring & controlling mechanism of household electrical appliances in different ways. For this purpose we briefly discuss the existing power management in smart homes/building, following with a review of advantages of adopting WSN technology for power management. Then it focuses on challenging factors influencing the design & development of WSN based power management and also on solutions for power management. It also Provides improvements for further research.

Industrial automations which are mostly depend upon the power systems & which requires distance controlled & regulated systems. The author monitored power related parameters & enabled remote switching devices for proper power management systems using Zigbee. Recently, the data from the sensor nodes are monitored & logged using packet sniffer.

Researches proposed automatic detection of human & energy saving room architecture to reduce standby power consumption and to make the room easily controllable with an IR remote control of a home appliance. To realize the proposed room architecture , researches design the Zigbee communications. Zigbee wireless protocol is used for communication between base station & the sensor node for wireless data acquisition. The wireless sensor node which is mounted over the collector plate includes the necessary sensors. Lifetime of sensor nodes depend greatly on the power consumption in each sensor node. Energy constraint in wireless sensor networks affects the whole network lifetime and connectivity.

Energy consumption is the most important factor to determine the life of a sensor network because usually sensor nodes are driven by battery and have very low energy resources.

III. PROPOSED SYSTEM

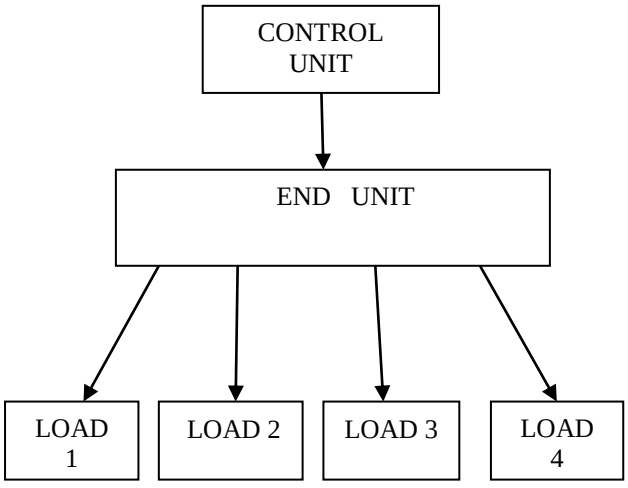

Fig 1. Power Management System General Block Diagram

The block diagram of the system is shown below. Here controller will wirelessly communicate with end devices to control them. The power threshold will be set by the controller. The end device will compare this threshold with the power being consumed by the device connected through it and will take the appropriate action.

As shown in the figure the input the hardware is divided into two parts.

1. Control Unit

2. End Unit

1 Control Unit

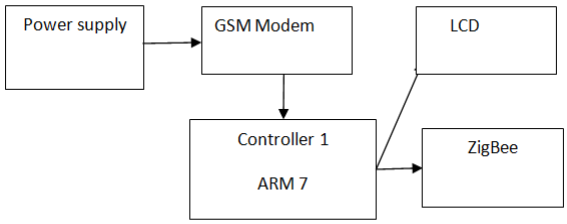

Fig 2. Control Unit Block Diagram

The Fig.2 describes the architecture of the proposed IEPMS Architecture. The proposed architecture uses an ARM processor as a core and the power management priority settings will be programmed. Current sensor and the voltage sensor will calculate the power factor and it will be given to the processor continuously. These information will be processed by the processor and it will calculate the amount for that consumed power. For easy understanding this information will be display on the device itself.This unit will also have a priority based load sharing in order to manage the power usage. This priority level will be turned on or turned off according to the interrupts generated by the home server section. So that an automatic power consumption method will be implemented in the home section [2].The IEPMS is connected to the wireless communication section. Here, Zigbee is used as a network technology. Zigbee is a transceiver it can be attached to the processor section and to the home server section.

2.End Unit

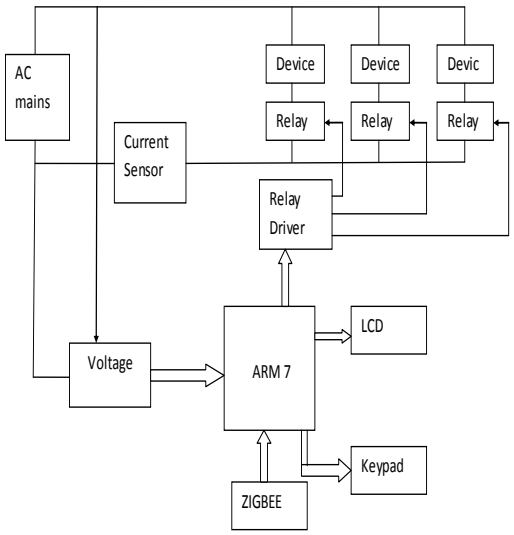

Fig 3.End Unit Block Diagram

1. ARM7: To read the status from each component and to actuate the controlling devices.

2. LCD Display: LCD (Liquid Crystal Display) screen is an electronic display. These modules are preferred over seven segments and other multi segment LEDs

3. Relay: To switch the AC or High voltage DC devices.

4. GSM modem: To send the message about status.

5 .ZigBee:It is used for wireless communication to communicate with the end unit.

6.Power Measurement IC: IC calculates the power used by the device which is to be controlled.

IV. RESULT

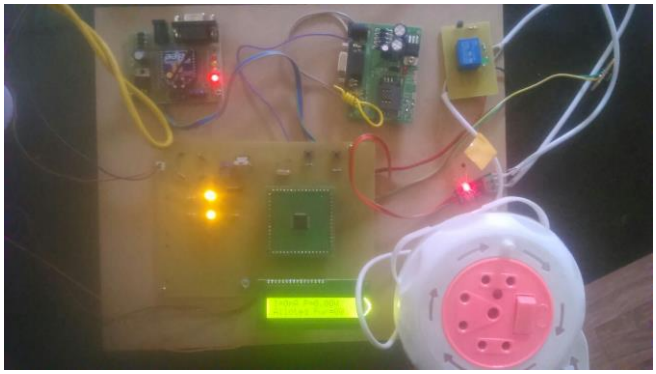

Fig 4. Final Setup of proposed system

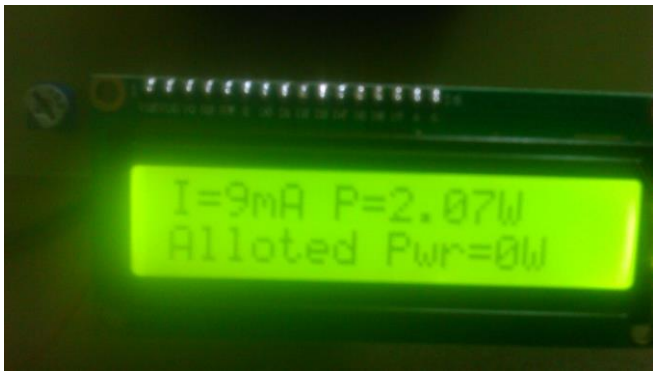

Fig 5. LCD Output

V. ADVANTAGES AND APPLICATION

Advantages

- During the period of load sheading, power gets equally distributed.
- We can manually turn on/off the high or low power devices according to our requirement during emergencies.
- Due to use of ARM all advantages over 89c51,PIC,AVR microcontroller are achieved.
- As ZigBee is interfaced with ARM, data transfer between control unit and end unit is very easy.
- Due to our project energy get saved.
- The amount of power which is to be managed will be displayed on LCD.

- Use of ZigBee meets with higher transmission bandwidth low power consumption and non interfacewith RF.
- It is easily installable and highly reliable system.

Applications

1.Our project has wide applications in commercial, domestic and industrial fields.

2.Our project can be implemented in the areas where there is problem of load sheading.

3.The system can be implemented in industries which are facing the problems of power managements.

4.Our system can be used to control 'N' numbers of devices (Low power and High power as our requirement).
5.The system is applicable for long distance management of power.

6..The system can be used to manage maximum power of about 1000MW in industrial areas.

IV. CONCLUSION

The system uses power measurement IC for power measurement but this IC can also calculate power factor which can be maintained closer to unity by switching capacitive bank for power saving. The system uses ZigBee module for communication purposes, the maximum range to which it can transmit is about 50m but with the help of RF modules the distances of communication can be increased.The ZigBee module used are very low power consuming devices. Also they can be used over longer distances by installing intermediate routers in the path.We can also make use of Ethernet along with GSM for remote programming of control unit.The system can be used in smart energy meter which will help in reducing electricity bills by improving power factor.We can send bills through GSM.

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[3] N.Madhu1, G.Bhaskar Phani Ram2, J.Krishna Chaitanya3, K.Harikrishna4PG Student [ES], Dept. of ECE, Vardhaman College of Engineering, Hyderabad, Telangana, India1 (International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering,August 2014)

[4]SonalG.Phuke, Prof.Mrs.K.N.Kasat PG student, Prof. Ram Meghe College Of Engg & Management,Badnera-Amrawati(M.S),India(International journal of innovative research in engg,Vol 2,Issue 2,2015)

