International Journal Of

Recent Scientific Research

ISSN: 0976-3031
Volume: 7(6) June -2016

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THE OFFICIAL PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH (IJRSR)
http://www.recentscientific.com/ recentscientific@gmail.com

ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 7, Issue, 6, pp. 11727-11732, June, 2016

International Journal of Recent Scientific Research

Research Article

WIRELESS BASED DOMESTIC PRICING AND METER READING SYSTEM FOR EB

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ARTICLE INFO

Article History:

Received 11th March, 2016
Received in revised form 14th April, 2016
Accepted 18th May, 2016
Published online 28th June, 2016

Key Words:

Quality-of-Service (QOS), Global System for Mobile Communication(gsm)

ABSTRACT

The Household data automatic reading is significant in the process of power system information. It is also an urgent problem that power industries want to solve because the accuracy and real time of meter data copy affect the power system information level, management decisions, and economic benefits. Recently there have been many reports concerning the automatic meter reading. In this paper a tiered pricing meter based on ZigBee is designed for implementing the ladder tariff policy, and at the same time, taking into account of a power company's measure of time-of-use price. As wireless ZigBee nodes, the meters can join the ZigBee wireless automatic meter system quickly, which greatly reduces operating costs and power consumption, improves the efficiency of meter reading system, and avoids the problems of construction of cable wiring system.

INTRODUCTION

The objective of this paper to monitoring and measuring the EB reading through remote place with the help of communication. Wireless network refers to any type of computer network that is wireless, and is commonalty associated with a telecommunication network whose interconnection between nodes is implemented without the use of wires. Wireless telecommunication networks are generally implemented with some type of remote information transmission system that uses electromagnetic waves, such as radio waves for carrier and this implementation usually take place at physical level or layer network. People use these phones daily to communicate with one another. Sending information overseas is through wireless network system using satellite and other signal to communicate across the world. Another important use for wireless network is as an inexpensive and rapid way to be connected to the internet in countries and region where the telecom infrastructure is poor or there is a lack resources, as in most developing countries. On those days, the Electricity bills are calculated by taking the meter reading of each and every hour by manually. For this purpose we need at least 50 to 70 man power per district. If any problem with supply then the user have to go and complaint to EB office regarding this issue and also wait for minimum time period of 2 to 5 hours for a getting a response. Instead of this current situation developing an module which is fully automated will be a great development in the current world. ZigBee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power, wireless sensor networks. The standard takes full advantage of the IEEE 802.15.4 physical radio specification and operates in unlicensed bands worldwide at the following frequencies: 2.400–2.484 GHz, 902-928 MHz and 868.0–868.6MHz. In the paper the EB bill data has been transmitted automatically to the EB office and that bill can be read by using PIC microcontroller with the use of IR sensor. The captured data is sent to the EB office and at the time current EB bill of the user is sent to their home with all the information. Customer will pay the payment with allocated time by using real time clock. If the user can fail to pay the bill, controller EB office can cut the supply through the relay module.

LITERATURE SURVEY

Albert ko *et al* (2008) discussed the unprecedented number and scales of natural and human-induced disasters in the past decade has urged the emergency search and rescue community around the world to seek for newer, more effective equipment to enhance their efficiency. Search and rescue technology to-

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date still rely on old technologies such as search dogs, camera mounted probes, and technology that has been in service for decades. Intelligent robots equipped with advanced sensors are attracting more and more attentions from researchers and rescuers. Andrew *et al* (2008) introduced the wireless technologies in consumer electronics, standard wireless technologies are envisioned for the deployment in industrial environments as well. Industrial applications involving mobile subsystems or just the desire to save cabling make wireless technologies attractive. Nevertheless, these applications often have stringent requirements on reliability and timing. Baris Yuksekkaya *et al* (2011) explained, the home automation today needs to make use of the latest technological components available. In this paper, we present the design and implementation of a home automation system where communication technologies GSM (Global System for Mobile Communication), Internet, and speech recognition have been used. All these techniques are successfully merged in a single wireless home automation system. This system offers a complete, low cost, powerful and user friendly way of real-time monitoring and remote control of a house.

Berhanu Regassa *et al* (2013) introduced the electric generating, distributing and marketing has been possible. The digital technology, the wireless communication, and the computer systems have dramatically changed the electric meter generation from traditional meter to automatic meter and now to smart meter. Jaeseok Yun *et al* (2009) suggested to present an empirical study of the long-term practicality of using human motion to generate operating power for body mounted consumer electronics and health sensors. We have collected a large continuous acceleration data set from eight experimental subjects going about their normal daily routine for three days each. Each subject is instrumented with a data collection apparatus that simultaneously logs 3-axis, 80 Hz acceleration data from six body locations. We use this data set to optimize a first principles physical model of the commonly used velocity damped resonant generator (VDRG) by selecting physical parameters such as resonant frequency and damping coefficient to maximize the harvested power. Kai Daniel *et al* (2009) introduced into the efficient sensor coverage of large industrial and incident areas, fast and flexible strategies for collecting sensor data through an autonomous, wirelessly connected swarm of (Micro) Unmanned Aerial Vehicles (MUAVs) are still an emerging Challenge. Deploying multiple MUAVs which stably carry sensing equipment in hostile environments yields cost efficiency and reducing the risk to human life. The use of an aerial ad hoc sensor network based on MUAV agents promises more timely and accurate information by fusing measurements from different types of sensors.

Lei Wang *et al* (2003) proposed a telemetry micro system, including multiple sensors, integrated instrumentation and a wireless interface has been implemented. We have employed a methodology akin to that for System-on-Chip microelectronics to design an integrated circuit instrument containing several "intellectual property" blocks that will enable convenient reuse of modules in future projects. The present system was optimized for low-power and included mixed-signal sensor circuits, a programmable digital system, a feedback clock control loop and RF circuits integrated on a5 mm 5 mm silicon chip using a 0.6 m, 3.3 V CMOS process. Long Le *et al* (2006) explained to consider the problem of quality-of-service (QOS) routing in multichip wireless networks, where data is transmitted from source node to a destination node via multiple hops. The key component of any QOS routing algorithm is the route discovery task, where a good route with sufficient radio resources needs to be found, and resource reservation needs to be performed in such a way that the end-to-end QOS requirements are satisfied. Muxiang Zhang *et al* (2003) suggested the authentication and key agreement protocol adopted by Universal Mobile Telecommunication System (UMTS), an emerging standard for third-generation (3G) wireless communications. The protocol, known as 3GPPAKA, is based on the security framework in GSM and provides significant enhancement to address and correct real and perceived weaknesses in GSM and other wireless communication systems. It show that the 3GPP AKA protocol is vulnerable to a variant of the so-called false base station attack. The vulnerability allows an adversary to redirect user traffic from one network to another. Anto bennet *et al* (2014) introduced the technological and human factors have contributed to increase the complexity of the network management problem, on one hand, have increased user expectations for flexible and easy-to-use environments; on the other hand, they have suggested entirely novel ways to face the management problem. Several research efforts recognize the need for integrated solutions to manage both network resources and services in open, global, and un trusted environments. Anto bennet *et al* (2016) discussed the primary idea behind deploying sensor networks is to utilize the distributed sensing capability provided by tiny, low powered, and low cost devices. Multiple sensing devices can bemused cooperatively and collaboratively to capture events or monitor space more effectively than a single sensing device. The realm of applications envisioned for sensor networks is diverse including military, aerospace, industrial, commercial, environmental, and health monitoring. Anto bennet *et al* (2014) proposed a data mule represents a mobile device that collects data in a sensor field by physically visiting the nodes in a sensor network. The data mule collects data when it is in the proximity of a sensor node. This can be an alternative to multichip forwarding of data when it can utilize node mobility in a sensor network. To be useful, a data mule approach needs to minimize data delivery latency.

Proposed System

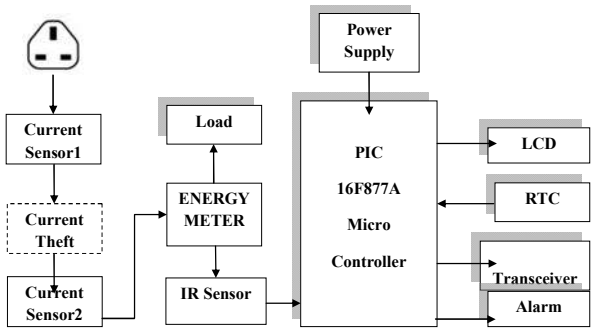

Fig 1 EB meter section

The supply is connected with the load through two current sensors along with the digital energy meter. The microcontroller reads the EB meter value through IR receiver. Then process the data and display in the LCD. In that reading

taken from EB meter then check up the peak or flat period with the help of RTC. The cost is also estimated depend upon the period of using, in the peak hours the cost will be high to avoid high power consumption in the peak hour shown in fig 1 & 2.

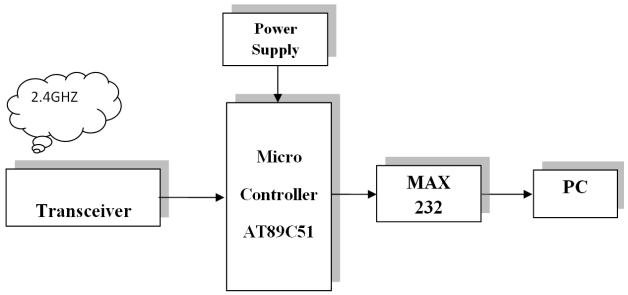

Fig 2 EB Office section.

Power supply

This section describes how to generate +5V DC power supply

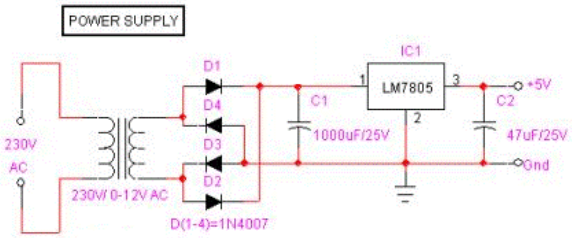

Fig 3 Power supply unit

Fig 4 Digital energy meter.

The power supply section is the fig 3 It should deliver constant output regulated power supply for successful working of the project. A 0-12V/1 mA transformer is used for this purpose. The primary of this transformer is connected in to main supply through on/off switch& fuse for protecting from overload and short circuit protection. The secondary is connected to the diodes to convert 12V AC to 12V DC voltage. And filtered by the capacitors, which is further regulated to +5v, by using IC 780

Digital energy meter

The energy meter is an electrical measuring device fig 4 which is used to record Electrical Energy Consumed over a specified period of time in terms of units.

Meter reading terminal software design

According to the hardware circuit design features, meter reading terminal software design flow chart is given and shown in Figure 3. First, the system initializes each module, and then reads the meter readings regularly, and stores them. When receiving the command, the meter sends in the current status along with the energy consumption. In case of uncertain events such as reverse voltage, tampering, etc the WAMRS will generate error signals by enabling pre-programmed flags. The system is usually in standby mode. The controller may read the contents of the status register to monitor data transfer status.

IR Sensors

This IR transmitter sends 38 kHz (frequency can be adjusted using R2). IR carriers at around 38 kHz carrier frequencies are widely used in TV remote controlling and ICs for receiving these signals are quite easily available. IR transmitter constructed by using IC555 timers and mode of operation under as table multivibrator shown in fig 5.

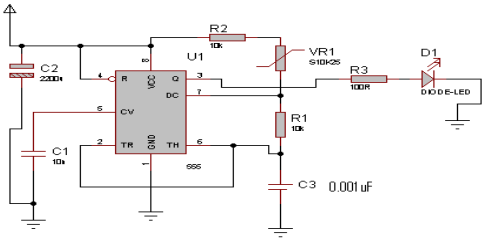

Fig5 IR transmitter.

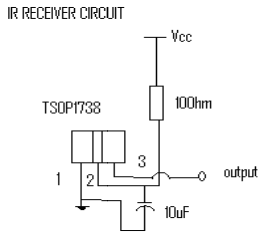

Fig 6 IR Receiver.

IR Receiver

This is a very small IR receiver based on the TSOP1738 receiver fig 6. This receiver has all the filtering and 38 KHz demodulation built into the unit. Simply point an IR remote at the receiver, a stream of 1s and 0s out of the data from IR transmitter and TSOP capable of receiver only 38KHz frequency because in surrounding so many devices transmitting IR signal at different frequency so we constructed receiver to receive at 38KHz frequency only and output of IR receiver given to microcontroller port three at P3.

Lcd Unit

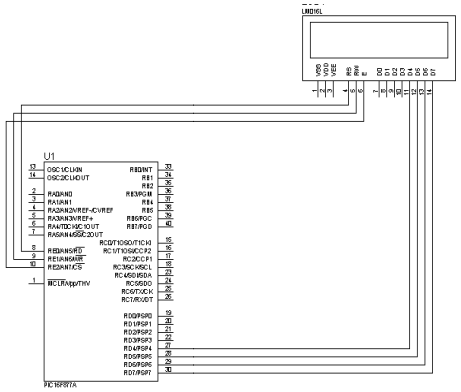

Fig 7 LCD interfacing

The LCD standard requires 3 control lines and 8 I/O lines for the data bus. Data pins d7:d0 shown in fig 7.

RTC

RTC (Real time clock) is the timer IC internally it calculate the time. It is connected by the I2C protocol with the PIC IC using the SDA and SCL pins. Using the device address the tie will be read from that the controller will identify the peak time or normal time of the energy usage.

ZIGBEE

It is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power, wireless sensor networks. The standard takes full advantage of the IEEE 802.15.4 physical radio specification and operates in unlicensed bands worldwide at the following frequencies: 2.400–2.484 GHz, 902-928 MHz and 868.0–868.6MHz.

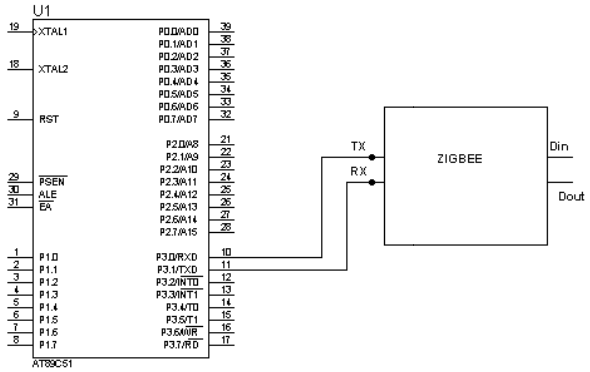

Fig 8 Interfacing.

The module acts as both transmitter and receiver. The Rx and Tx pins of are connected to Tx and Rx of 8051 microcontroller respectively. The data's from microcontroller is serially transmitted to module via UART port. Then transmits the data to another. The data's from transmitted from D out pin. The from other side receives the data via Din pin shown in fig 8.

MAX 232

The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply RS 232 voltage levels from a single 5v supply. Each receiver converts RS-232 to 5v TTL/CMOS levels. Each driver converts TLL/CMOS input levels into EIA-232 levels. The P3_0 (RX) and P3_1 (TX) pin of controller is connected to the max 232 driver and the TX and RX pin of max 232 is connected to the GSM modem or PC.

In PC the transmitting data is given to R2IN of MAX232 through transmitting pin of 9 pin D type connector which converts the RS232 level to 5v TTL/CMOS level. The R2OUT pin is connected to receiver pin of the microcontroller. Likewise the data is transmitted and received between the microcontroller and PC or other device vice versa shown in fig 9.

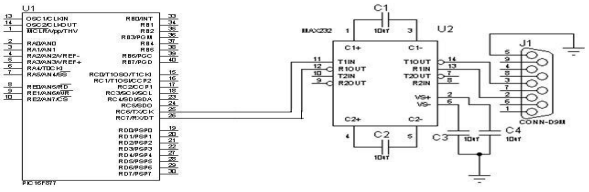

Fig 9 MAX232 interfacing diagram.

EXPERIMENTAL RESULTS

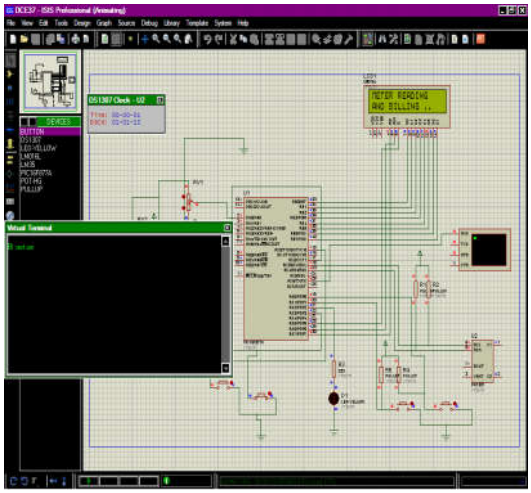

Fig 10 Circuit of Merter Reading System For Eb

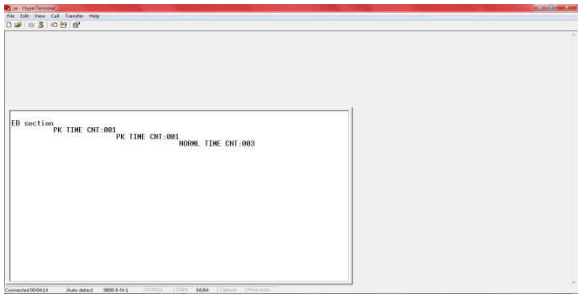

Fig 11 In normal peak time

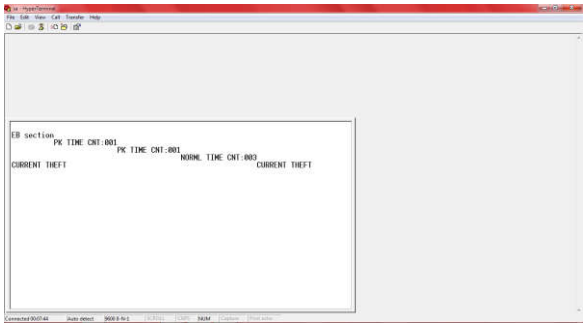

Fig 12 Current theft occurs:

In this system it has been able to monitor and measure the meter reading from the remote place. Here we are using RTC, LCD, Energy meter, which are all interfaced with the microcontroller. It has two sections, one is home EB meter section, and other is the EB Office. In the Home Section, The supply is connected with the load through two current sensors along with Digital Energy meter. The microcontroller reads the EB meter value through IR receiver. Then process the data and display it in the LCD. In that reading taken from EB meter then check up two parts Peak or flat period with the help of RTC. The cost is also estimated depend upon the period we are using, in the Peak hour the cost will be high to avoid high power consumption in the peak hour. The current sensor values are given to the microcontroller to detect, is there any theft occurred. It also provides a ladder type billing system. Ladder-type electricity price refers to an electric pricing model which sets the average residential consumption to a number of ladders or steps to calculate the cost price.

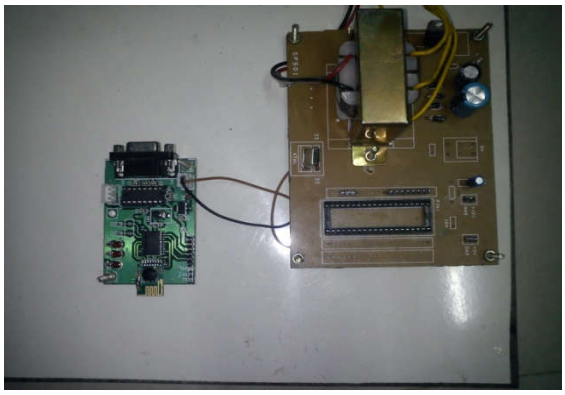

Fig 13 Out Put of Merter Reading System For Eb

It concludes that the first step is for the base power, which has less power consumption and lower electricity price; the second step is for higher consumption, which price is also higher; the third step is for the highest power and the price is the highest. The price increases by steps. At the end of every month the total cost to be paid are transferred to the authorized of EB office through Wireless communication and viewed in PC and collecting the database to the user. In GSM, The EB bills data's can be achieved in our mobile system and processing high speed without any loss. In future the EB bill of particular user may be send to bank and the amount is detected from their account automatically and after payment, the details will be send back to electricity board and also to the user. The ZigBee wireless automatic meter system quickly, which greater reduce operating costs and power consumption, improve the efficiency of meter reading system and avoids the problem of construction of cable wiring system shown in fig 10-13.

CONCLUSION

In the paper the EB bill data has been transmitted automatically to the EB office and that bill can be read by using PIC microcontroller with the use of IR sensor. The captured data is sent to the EB office, at the time current EB bill of the user is sent to their home with all the information. Customer will pay the payment with allocated time by using real time clock. If the user can not to pay the bill, EB office controller can cut the supply through the relay module. If the current theft is occur means it can automatically identify and fine will be charge to the customer. In this method to introduced the ladder type billing system. The ladder type electricity price refers to an electric pricing model which set the average residential consumption to number of ladder or step to calculate the cost price.

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How to cite this article:

Anto Bennet M *et al*.2016, Wireless Based Domestic Pricing And Meter Reading System For EB. *Int J Recent Sci Res.* 7(6), pp. 11727-11732.

TSSN 0976-3031