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A review of Energy Meter Billing Using Zigbee Model

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ABSTRACT

In this paper advanced Ardinou based electronic wireless billing system proposed. Nowdays the conventional methods of billing are adopted which are time consuming, high possibilities of human errors causes' incorrect energy assessment. To overcome this error, zigbee based utility billing system designed. In this paper, the collected data from energy meter taken to analyses kwh, power factor, supply voltage, current, as well as maximum demand. Also, energy distributor has authority to disconnect the power of respective consumer under certain conditions.

KEYWORDS-Net meter, Liquid Crystal Display, Zigbee Technology.

I.INTRODUCTION

Development of an Ardinou Based electronic system situated at the Energy Meters of various location of Company which are in the Zigbee Network and the same meter reading can be accessed by the Server place at the engineer's cabin. This system will be helpful for getting the power consumption data on the set time every day, which will help to the management to find the actual production cost.

A. Objectives Of Project

1) System should be Portable

2) System should be economically affordable

3) Should be easy to handle

4) Should work with High accuracy

5) Should be less time consuming

6) Should have optimum utilization of energy

The Zigbee based wireless Energy Meter reading and logging system on PC The purpose of this project is to read the Energy meter reading and transmit the reading to PC through Zigbee based wireless transmission. This system helps to give a quick reference to the users. This can be achieved by the use of control unit that continuously reads the meter into its permanent (non-volatile) memory location.

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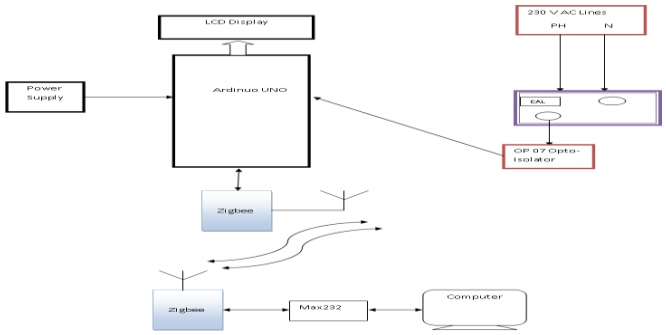

Fig1. Block diagram of wireless billing system

Then the control unit takes the responsibility to transmit the data and the received data is sent to PC. The final output of this project is going to be the reading of the meter to be displayed on PC wirelessly. Zigbee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power, wireless sensor networks. Zigbee is the set of specs built around the IEEE 802.15.4 wireless protocol. As Zigbee is the upcoming technology in wireless field, we had tried to demonstrate its way of functionality and various aspects like kinds, advantages and disadvantages using a small application of controlling the any kind of electronic devices and machines. The Zigbee technology is broadly adopted for bulk and fast data transmission over a dedicated channel the control unit which we are making use can also be termed as an onboard computers or microcontrollers. The name onboard computer is given due to the presence of its built in memory (RAM, ROM) and also due to its input and output ports. The control unit at the energy meter end reads the meter readings and forwards it to the other end using this Zigbee. This information is received by the Zigbee module interfaced to PC and the readings are displayed in the hyper terminal of PC. The Microcontroller used in the project is programmed using Embedded C language. The major advantage of this system is making use of Zigbee module which helps for a wireless transmission. We can also enjoy the freedom of sharing the same reading with multiple Zigbee ports where we need require the multiple transmitters.

B. Components Required

Ardinuo

Power Supply

Energy Meter

Display

Zigbee Pair

The main features of this project are-

1. Zigbee based Wireless transmission.
2. Large transmission range.
3. Secured transmission.
4. Dynamic update of meter reading on PC.

C. Advantages-

1. Zigbee technology.
2. Interfacing Zigbee module to Microcontroller.
3. Interfacing Zigbee module to PC
4. Energy meter interfacing.
5. LCD interfacing with Microcontroller.
6. Embedded C programming.

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digitalinput/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI ~~USB~~-to-serial driver chip. Instead, it features the Atmega16U2 programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

FEATURES-

Operating voltage 7-12v

14 digital I/O pins

6Analog Input Pins
32KB Flash memory
2KB SRAM
6MHz Clock Speed

PHYSICAL PARAMETERS-

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

Power-

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm centre-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and VIN pin headers of the POWER connector. The board can

operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts. The power pins are as follows: VIN-The input voltage to the Arduino board when it's using an external power source. You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin 5V.This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board.

3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

GND. Ground pins.

IOREF. This pin on the Arduino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs for working with the 5V or 3.3V

Memory-

The AT mega328 has 32 KB (with 0.5 KB used for the boot loader).

It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

Input and Output-

Each of the 14 digital pins on the Uno can be used as an input or output, using pin Mode ,digital Write , and digital Read functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 ohms. In addition, some pins have specialized functions:

Analog Reference function

TWI-A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.

AREF: Reference voltage for the analog inputs. Used with analog Reference.

RESET- Bring this line LO to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

Communication- The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). However, on Windows, an .in file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and

USB connection to the computer. A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus.

Programming:-

The Arduino Uno can be programmed with the Arduino software. Select "Arduino Uno from the Tools Board menu. The ATmega328 on the Arduino Uno comes pre-burned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. You can also bypass the boot loader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar.

Automatic (Software) Reset-

Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the Atmega328 via a 100 Nano farad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the boot loader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload.

This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the boot loader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data.

USB Over current protection-

The Arduino Uno has a resettable polypus that protects your computer's USB ports from shorts and over current. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

Specification-

Table- Arduino Specifications

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by boot loader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)

Power Supply-

The microcontroller need +5V DC, These specifications dictate the use of a low-cost, ubiquitous linear regulator National Semiconductor LM7805. The LM7805 requires an input voltage of at least 7.5V in order to guarantee regulation, so the unregulated power supply should supply at least this voltage under worst-case current consumption, assumed to be about 200mA.

Because a full-wave rectifier will be used for efficiency (diodes D1-D2), we can assume that about 1.4V will be lost across the bridge (0.7V per conducting diode). We therefore need a transformer was selected as T1, which is of rating 9 secondary at 500 mA.

Facilities And Requirement-

Computer with software like Keil 3, Proteus, Flash magic software, IR detectors are little microchips with a photocell that are tuned to listen to infrared light. They are almost always used for remote control detection - every TV and DVD player has one ofthese in the front to listen for the IR signal from the clicker. Inside the remote control is a matching IR LED, which emits IR pulses to tell the TV to turn on, off or change channels. IR light is not visible to the human eye, which means it takes a little more work to test a setup. Size square, 7mm by 8mm detector area Pri

150 Rs.

The Output-0V (low) on detection of 38 KHz carrier, 5V (high) otherwise Sensitivity range- 800nm to 1100nm with peak response at 940nm. Frequency range is 35 KHz to 41 KHz with peak detection at 38 KHz Power supply-3-5V DC 3mA Liquid Crystal Display.

Introduction-LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

II.CONCLUSION

The research were able to integrate energy meter using zigbee model which monitors KWh and billing wirelessly. The LCD screen shows average power and display the equivalent energy calculations. This energy meter can be controlled from the utility site under any circumstances.

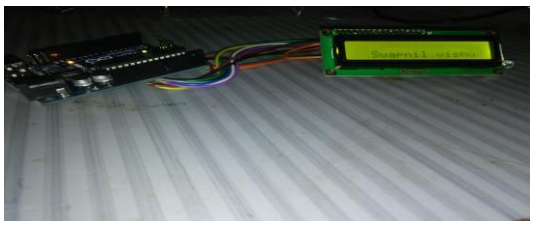

Fig2.Demo Result

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