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Advancement in Electric Meter Readings

Prof. Mrs. K. A. Khedikar[1], Ms. Minakshi Shriniwas Talkokul[2], Ms. Rohini Venugopal Panicker[3]

Asst. Professor, CSE, WIT, Solapur, India[1]

Student, CSE, WIT, Solapur, India[2, 3]

Abstract: Electricity is one of the basic requirements of human beings, which is widely used for domestic, industrial and agricultural purposes. The basic approach of our project is to utilize telecommunication systems for automated transmission of data to facilitate bill generation. Traditional meter reading for any utility consumption and billing is done by human operator from houses to houses and building to building. This requires huge number of labor operators and long working hour to achieve complete area data reading and billing. Human operator billing are prone to reading error, also has errors while recording what was read and during data entry. Hard to access meters at rural accounts, indoor meters, obstacles. This System will hear by resolve the time consuming process to get readings and generation of bill. In this system, No. of units sends to the MSEB at Schedule date and time. And according to bill is generated and sends to the user's Email ID.

Keywords: Electricity board, Automatic Meter Reading, Interrupt Request, Communication port, Light-Dependent Resistor (LDR).

I. INTRODUCTION

From the early days till today meter reading for electricity consumption and billing is done by human operators from houses to houses. This therefore requires a very large number of human operators and long working hours to acquire complete data reading and billing in a particular area.

However, there may be cases where human operators miss to bill few houses in an area or restricted and slowed down by bad weather condition, transportation problems, etc.

Human operators are very much likely to make mistake while billing or reading a meter and sometimes the house's electric power meter may be placed in a location where it is not easily accessible. We proposed this idea to efficiently read meter, and reduce billing error and operation costs.

In our proposed idea of project we are reducing the human intervention of taking the readings through digital camera clicks by designing such a circuit which wirelessly sends the readings of every month on a fixed date to the EB. Our circuit comprises of two arduino boards connected to a set of transceivers connected to each of the board at sender and receiver

II. LITERATURE REVIEW

DEVELOPMENT OF A SMART POWER METER FOR AMI BASED ON ZIG-BEE COMMUNICATION [1]-

In This Paper, Many governments deploy ubiquitous IT project, which aims to combine the latest wireless network and wide-band technologies etc. to accomplish a ubiquitous wireless communication network. The ubiquitous wireless communication network can be utilized for the Advanced Metering Infrastructure (AMI). Therefore, the new wireless communication technologies to design and implement a Zig-Bee based smart power meter.

AUTOMATIC POWER METER READING SYSTEM USING GSM NETWORK BY MR. H.G. RODNEY TAN IN JULY 2009[2] -

In This paper, traditional metering method for retrieving the energy data is not convenient and the cost of the data logging systems is high. so it designs and develops Automatic meter reading (AMR) system. AMR system is a boom for remote monitoring and control domestic energy meter. AMR system give the information of meter reading, power cut, total load used, power disconnect and tempering on request or regularly in particular interval through SMS. This information is being sent and received by concerned energy Provider Company with the help of Global system for mobile communication (GSM) network.

WIRELESS MONITORING USING ZIG-BEE [3]-

In this paper, Remote monitoring system was developed for home security based on Zig- Bee technology. The system can send abnormal images and warning messages through MMS and SMS, receive remote instruction, and remote monitor household appliances. Transmitting data by use of Zig-Bee technology is featured with low consumption, short time delay, small size, less investment, high security, strong flexibility and etc.

III. PROPOSED SYSTEM AND DESIGN

PROBLEM STATEMENT

Today's method of meter reading has very much errors, as there is a human intervention. Person from the EB visit each house & take the photograph of meter thus he can take approximately 100 meters photo each day. Next these photos are read to get data from them. If the house is closed person has to revisit that place, some meters are

The Arduino Uno R3 [4] is a microcontroller board based on the ATMega328 IC. It has 14 digital input/output pins

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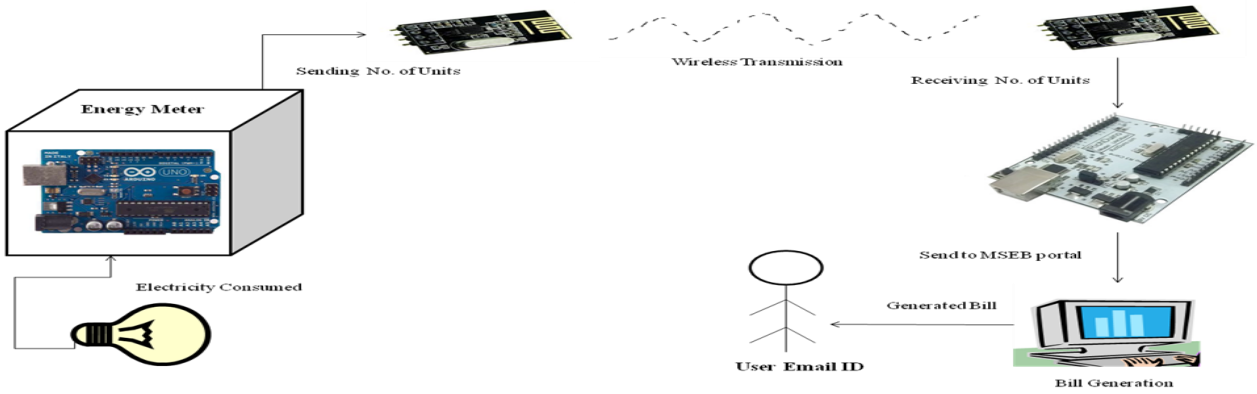
(of which 6 can be used as Pulse Width Modulation-PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button also not accessible. Again if customer gets faulty bill he has to visit the office, stand in a queue and get it corrected. These problems are just because of human intervention. To avoid human intervention in the billing process, in this new generation, Automatic reading meter system is considered.



Fig(a):Proposed system design

PROPOSED ARCHITECTURE

In this proposed system we have used a static single phase techno energy meter, with a supply of 250 V, 500 watt tungsten bulb connected to the meter for giving supply of power consumption. Another input to the meter is a Arduino Uno R3 configured with NRF and LDR.For wireless transmission of pulses another arduino is connected to the PC the reading is received at the COM port which is then evaluated to get the correct units of power consumed. The reading received is then programmed to get the final bill. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Fig (b).Arduino Uno R3

Richduino [5] is specialized in designing and manufacturing Arduino compatible boards with add on features. This is UNO Basic board derived from Arduino UNO R3 specifications. It is built around ATmega328.

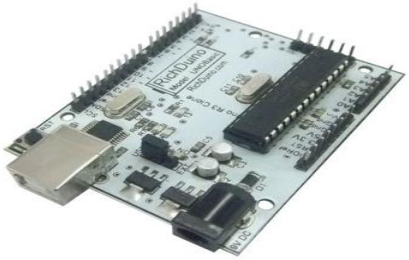


Fig (c): Richduino

The **NRF24L01 [6]** is a highly integrated, Ultra Low Power (ULP) 2Mbps RF transceiver IC for the 2.4GHz ISM (Industrial, Scientific and Medical) band. The nRF24L01 integrates a complete 2.4GHz RF transceiver, RF synthesizer, and baseband logic including the Enhanced ShockBurst hardware protocol accelerator supporting a high-speed SPI interface for the application controller.

Fig (d):NRF24L01

A **photoresistor[7]** (or light-dependent resistor(LDR), or photocell) is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. We just need a sensor that responds to visible light e.g. by alternating it's resistance.so we use Photo transistor.

Fig (e): LDR

COM[8] (Communication port)- is the original, yet still common, name of the serial port interface on IBM PC-compatible computers. It might refer not only to physical ports, but also to virtual ports, such as ports created by Bluetooth or USB-to-serial adapters. The COM ports in PC-compatible are typically defined as:
COM1: I/O port 0x3F8, Interrupt Request (IRQ) 4

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COM2: I/O port 0x2F8, IRQ 3
COM3: I/O port 0x3E8, IRQ 4
COM4: I/O port 0x2E8, IRQ 3

In a computer, an IRQ is a hardware signal send to the processor that temporarily stops running program and allows a special program i.e. an interrupt handler to run instead. Hardware interrupts are used to handle events such as receiving data from a modem or network card, key presses, or mouse movements.

IRQ 3 is the serial port controller for serial port 2 and it shared with serial port 4, if present. IRQ 4 is the serial port controller for serial port 1 and it shared with serial port 3, if present.

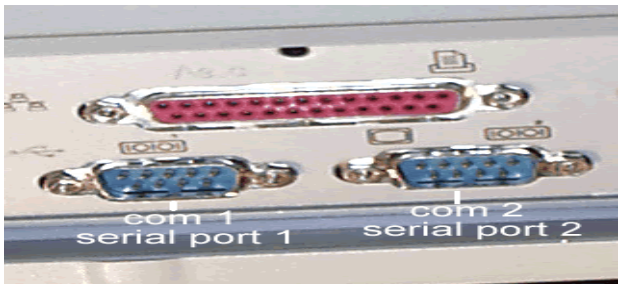

Fig (f): COM Ports

ALGORITHM

1. Login Admin with its User id and Password. and Performs one time user registration.
2. Initialize arduino with other components, Schedule date, time and start communication.
3. At a Given Schedule, Arduino capture meter no. and no. of units and send it to MSEB portal.
4. Recognize values received at MSEB portal via COM port.
5. Generates the Bill by receiving no. of units.
6. Display GUI form or bill with Meter id, Units consumed & Bill amount.
7. Send PDF of generated bill to the User's E-mail ID.

IV. WORK DONE

For developing the proposed system following things are undertaken.
Today every home, offices, companies, industries have electricity connection. So in this project we are interfacing electricity energy meter with microcontrollers. Here, Arduino is used for interfacing and the main aim of this project is to know, how much unit is obtained and the total amount of rupees has to be paid.

1. Reading Calculation: Here meter is interfaced with microcontroller through the pulse that is always blinked on the meter. Further that pulse is calculated as per its blinking period, using this principle we calculated it for one unit and accordingly what charge will be for a unit. After 0.3125 watt energy uses Meter LED (calibrate) blinks. Means if we use 100 watt bulb for a minute then the pulse will blink 5.2 times in a minute. And this can be calculates using given formula.

Pulse= (Pulse rate of Meter* watt * 60) / (1000 * 3600)
If pulse rate of meter is 3200 imp and watt used is 100 then we have
Pulse = (3200 * 100 * 60) / (1000 * 3600)
Pulse = 5.333333333 per minute
If 5.3333333333 pulses occurred in a minute then
In one hour pulses will occur
Pulse = 5.3333333333* 60
Pulse = ~320
~320 Pulses will occur in a hour
So, in one hour 100 watt bulb consumed 100 watt electricity and almost 320 pulses blinks.
Now we can calculates one pulse electricity consumed in watt
One pulse (watt) = 100/320= 0.3125
Means 0.3125 watts electricity consumed a single pulse.
Now Units
Unit = (one pulse energy (electricity))* pulses / 1000
If One pulse = 0.3125 watt
Pulses in 10 hours = 3200
Then Unit will be
Unit = (0.3125 * 3200)/1000
Unit = 1
Means, one unit in 10 hours for a 100 watt bulb.
Now suppose one unit rate is 7 rupee then
For a single pulse cost will be
Single pulse cost = (7 * one pulse energy consumed) / 1000
Single pulse cost = (7 * 0.3125) / 1000
Single pulse cost = 0.0021875 Rupee

2. Transmission:
After the readings are obtained through arduino then these readings are wirelessly transmitted by the NRF24L01 Transmitter which is connected at client side
These transmitted Readings in the form if pulse inputs are received by another NRF24L01 Receiver circuit at the server end which is connected to arduino. The arduino at the server end sends the readings to the server PC, where the further calculation of units to generate bill is done.

3. Bill Generation:
After receiving the readings the final step is to generate the bill for the month. based on the units consumption a detailed bill is generated showing the total energy consumption and amount as per the type of user. The billing amount is also send to user through SMS service on the registered mobile number of customer.

V. ADVANTAGES

1. It is completely generalized.
2. It has secure transmission of units.
3. It sends Email containing bill of every month to user.
4. The system is general purpose and easy to understand and use for administrator.

VI. LIMITATION

1. Area coverage of NRF is limited.

VII. CONCLUSION AND FUTURE WORK:

In this paper with the help of presented proposed system it is possible to avoid meter reader visit and revisit (if there are any problems in billing) to each house to take reading. Also if consumer gets faulty bill he has to go to MSEB office to correct it and be in long queue. This is avoided here by taking meter reading wirelessly using the circuit designed with meter and sending these readings to server wirelessly.

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In future to reduce cost it may be possible to use single circuitry for each society or whole apartment energy meter room.

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REFERENCES

[1]. http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumbe r=5385726 &abstractAccess=no&userType=inst
[2]. H. G. Rodney Tan, C. H. Lee and V. H. Mork, "Automatic power meter reading systems using GSM network", IEEE, 8 th International Power Engineering Conference, pp. 465-469, 2007.
[3]. http://ieeexplore.ieee.org/xpl/freeabs_all.jsp? arnumber=4460126&abstractAccess=no&userType=inst
[4]. https://www.google.co.in/search?q=what+is+COM+port& biw=1600&bih=755&source=lnms&tbm=isch&sa=X&ved=0ahUK Ewip-Knr_L3LAhWUkI4KHTvJBCoQ_AUIBigB#tbm=isch&q=arduino &imgrc=DtjoP3EzpZIzRM%3A
[5]. https://www.google.co.in/search?q=what+is+COM+port&biw =16 00 &bih=755&source=lnms&tbm=isch&sa=X&ved=0ahUKEwip-Knr_L3LAhWUkI4KHTvJBCoQ_AUIBigB#tbm=isch&q= richarduino
[6]. https://www.google.co.in/search?q=nrf24l01&espv=2& biw=1600 &bih=755&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjFm43 pgb7LAhXUkI4KHSsGDd8Q_AUIBigB
[7]. https://www.google.co.in/search?q=what+is+COM+port&biw= 160 0&bih=755&source=lnms&tbm=isch&sa=X&ved=0ahUKEwip-Knr_L3LAhWUkI4KHTvJBCoQ_AUIBigB#tbm=isch&q=nrf24l0 1&imgrc=48CD7fU8PmaqdM%3A

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