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Automatic Energy Meter Billing System with Theft Detection

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Abstract - *The traditional method of energy meter billing is a long outdated, inefficient and time consuming one. It was replaced long back with the new and a better efficient method of metering. The paper here presents an innovative system which is an up gradation to the latest energy metering method yet to be implemented also along with the designing of a website providing access to the billing information from anywhere round the globe. In addition the consumer will also informed about his usage through messaging service on his mobile. The communication takes place through a GSM module wirelessly. The database will be present in the computer having a GSM receiver. It will be the billing location. The meter readings are sent time to time from the electricity meter having the GSM to the billing location. Accordingly the database is also periodically updated. The website is designed for the user's convenience. After the necessary authentication the users can gain access to the information regarding their electricity bills from any place. Also the problem of increasing electricity thefts would be slightly under control with the additional theft detection part.*

Key Words: **Energy Meter, PIC Controller, GSM Model, PHP Language, Gateway Through SMS and Website.**

1.INTRODUCTION

Gone are those days when manual intervention was required in every single system. The earlier meters which were electromechanical meters suffered from many drawbacks. They were less reliable due to their inefficiency to sustain the environmental effects. Also the job of the person collecting the meter readings by physically moving from places to places was quite impractical. Thus the traditional method demanded a change. As also in other areas automation was also necessary in the electricity meter billing system. Electricity is consumed in household as well as industrial and commercial areas on a very large scale. No sector will be able to function without the electricity supply and is hence an indispensable part of the human life. Electricity playing an important role in the lives of human beings in the 21st century the automation in the billing system was much necessary. Later these meters were replaced by the electronic meters that were more efficient compared to the previous meters. However, the meters working automatically there was lack of monitoring of the system. The consumers unaware of the electricity thefts they suffered in such cases. Hence not just the automated system but also improvisation in the system later became necessary owing to the increasing number of electricity theft incidences. The proposed system here will inform the registered consumers about their electricity usage on the website which is possible to access from any place as well as receive messages on his mobile phone regularly to alert the person. This may reduce the chances of electricity thefts.

2. LITERATURE SURVEY

There were several systems proposed for automatic energy meter reading as a solution to the traditional approach of collecting meter readings manually. This was either using a wired or wireless technique. The currently used electronic meters are read however automatically and the readings are displayed in kWh. These meters are fixed at the residential as well as commercial buildings usually at the basement. Existing methods of Automatic Meter Reading use Electric Impulse counting . The readings are automatically transferred to the MSEB where the monthly electricity bill is generated. However the problem of missing electricity bills still persists along with rising number in records of incidents of electricity thefts.

1.Ashna.k , Sudhish N. George, GSM Based Automatic Energy Meter Reading System with Instant Billing ©2013IEEEPG Scholar, Electronics & Communication Dept National Institute of Technology, Calicut. India.-GSM based wireless module will give remote access over the electricity usage Live meter reading from energy meter sent back to billing point. With authentication user can access the webpage details for getting billing details from anywhere.

2.Cephs Paul Edward V, "Support Vector Machine Based Automatic Meter Reading System", IEEE International Conference on Computational Intelligence and Computing Research, Department of Computer Science and Engineering Anna University –BIT Campus, Tiruchirapalli, India,2013-Image acquisition device like camera in front of the meter that will take realtime pictures of the meter readings. This picture is then processed, segmented and the individual digits are recognized using unsupervised feature learning technique -Support Vector Machine.

3.Adanan Rashdi, Rafia Malik, Sanam Rashid, AnamAjmal, Sulaiman Sadiq-Remote Energy Monitoring, Profiling and

control through GSM Network. 2012 International Conference on Innovations in Information Technology(IIT). Department of Electrical Engineering, Military College of Signals, National University of Sciences and technology, Islamabad, Pakistan.

3. OVERVIEW OF PROPOSED SYSTEM

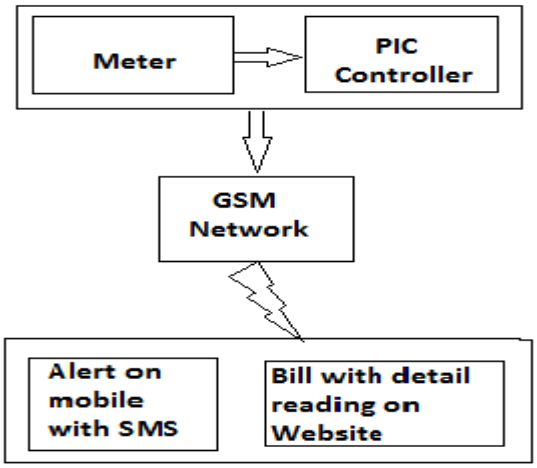


Fig -1: Overview Of Proposed System

The proposed system consist of Electronic meter, The proposed syetem is automatic do not need to go and check manually. Consumer will be notified about the power usage and current billed amount by SMS. Also consumer can check details by visiting online portal at anytime.There are two ways that consumer will come to know the details of bill. One is on mobile through and second is by visiting Website

4. DETAILED DESIGN

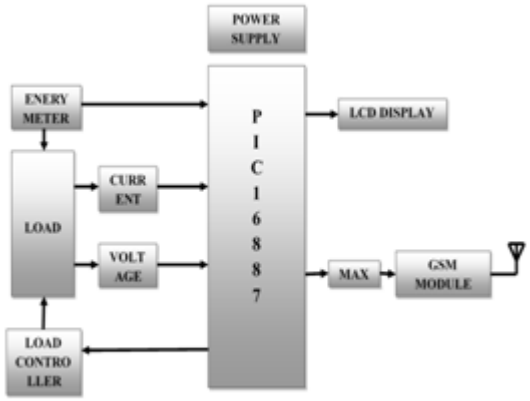


Fig -2: Detailed Design

This system will be constructed using energy meter with GSM module connected to it. In addition to it 8 bit PIC16F877A controller, LCD display, transmission facility with SMS and online portal. Different block details with functionality.

5. HARDWARE DETAILED DESIGN

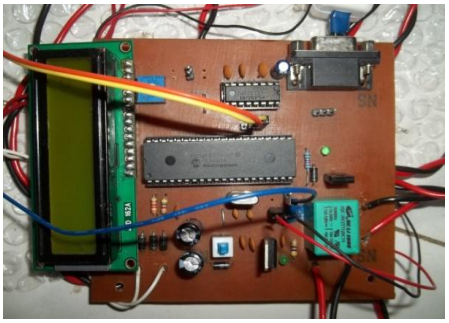


Fig -3: Hardware Detailed Design

In this system the power supply is connected to the energy meter. The otputof energy meter is given to PIC controller. Present status of power calculation will be displayed on LCD. Simultaneously data will be uploaded on website.The GSM unit is interfaced to the PIC controller via a MAX 232 convertor. GSM modem transmits usage details to office modem. Every house ,office(consumer) has a unique number (consumer number), which is given by the corresponding authority. Power calculations will be continusoly uploading on website. If consumer have recharged earlier then as the balance will low he will be alerted. The detailed circuit of the meter constructed using Energy meter, PIC Controller, LCD display (16*2), MAX 232, GSM SIM900 module, Power supply.

5.1. GSM Module

GSM/GPRS Modem –RS 232 is built with Dual Band GSM/GPRS engine – SIM 900A, works on frequencies 900/1800 Mhz. The modem is coming with RS 232 interface, which allows you connect PC as well as microcontroller with RS 232 chip. The band rate is configurable from 9600-115200 through AT command. Using this modem you can make audio calls, SMS, attend the incoming calls and internet ect through simple AT command.

Features

- Dual Band GPRS and GSM 900/1800 Mhz
- Configurable baud rate.
- SIM card holder.
- Built in network status LED.
- stack for internet data transfer over GPRS inbuilt powerful TCP/IP protocol.

5.2. Power Supply

The main components used in the power supply unit are Transformer, Rectifier, Filter, and Regulator. The 230 V ac supply is converted into 12 V ac supply through the transformer. This ac power is converted into dc power through the diodes.

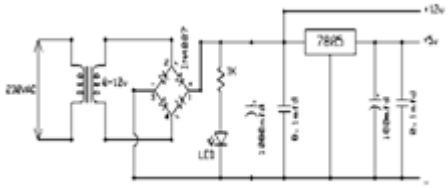


Fig -4: Power Supply

Here the bridge diode is used to convert the ac supply to the dc power supply. This converted dc power supply has the ripple content. So to reduce the ripple content of the dc power supply, the filter is used. Specifically for the controller IC regulated constant 5 V output voltage should be given. For this purpose 78XX regulator should be used in the circuit.

5.3. PIC Controller

PIC is a family of Harvard architecture controllers made by Microchip Technology, derived from the PIC1640 originally manufactured by General Instrument's Microelectronics Division. The name PIC initially referred to peripheral interface controller. PIC can either be programmed only once (with ROM memory) or have glass window (Electrically erasable PROM memory) which allows erasing by few minutes exposure to UV light. OTP (one time program) are usually cheaper. Apart from flash memory Microcontrollers of PIC16F87x and PIC16F84 series also contains 64-256 bytes of internal memory EEPROM which can be used for storing program data. PIC basic has built in READ and WRITE instructions.

5.4. MPLAB IDE

MPLAB IDE is a "wrapper" that coordinates all the tools from single graphical user interface, usually automatically. For instance, after writing the code, it can be converted to instructions which will be executed and downloaded into a controller to see how it works. In the process many tools are needed: an editor to write the code, a project manager for organizing files and settings, a compiler and assembler for converting the source code to machine code and some sort of hardware or software that connects to a target controller or simulates the microcontroller's operation.

5.5. LCD Display

A 16x2 LCD implies that it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD consists of two registers, namely, Command and Data.The command register saves the command instructions that are given to the LCD. A command is nothing but an instruction that is given to LCD to do a predefined task like initializing it, that clears its screen, sets the cursor position, controls display etc. The data register saves the data to be displayed on the LCD. The data is nothing but the ASCII value of the character to be displayed on the LCD.

5.6. MAX 232

The MAX 232 device is a dual driver/receiver that including a capacitive voltage generator to supply TIA-EIA voltage levels from a single 5 V supply. Each receiver converts the inputs the TIA/EIA to 5V TTL levels.

6. RESULTS

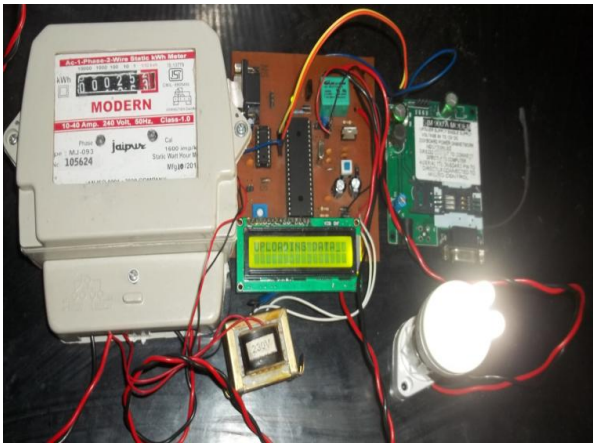


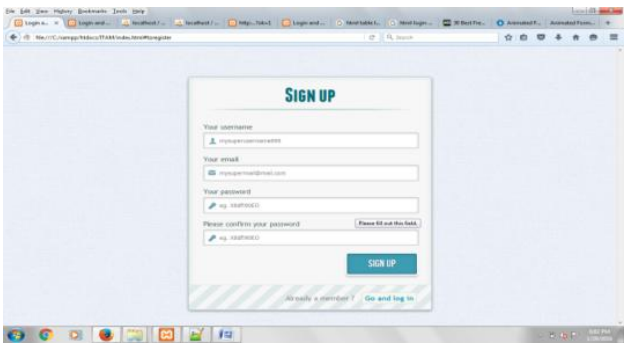
Fig -5: Automatic Energy Meter system

Fig -6: Message Send After Low Balance

Fig -7: Supply Will Cut After Zero Balance

7. PAGE DESIGNING

Software that is used in the Project includesphp as the front end software as well as MySQL as the back end tool.Application server is Xampp server. PHP is a server-side, cross-platform, HTML-embedded scripting language. (Hypertext Preprocessor)PHP is a widely-used open source general-purpose scripting language that can be embedded into HTML and suited for web development. Much of PHP's syntax is obtained from C, Java and Pearl with a few unique PHP specific features thrown in. PHP successfully eliminates the need for a number of small cgi programs allowing you to place simple scripts in your HTML files. It also makes it easier to manage large web sites placing all components of a web page in a html file. PHP is mainly focused on server-side scripting, so it is possible to do anything that any other CGI programs can do, such as collecting form data, generating dynamic page content, or sending and receiving cookies. PHP also supports most of the web servers today.



REFERENCES

[1] Ashna.k,, PG Scholar &Sudhish N George,GSM Based Automatic Energy Meter Reading System with Instant Billing Electronics & Communication Dept., National Institute of Technology, Calicut, India. ©2013 IEEE

[2] Cephs Paul Edward V, "Support Vector Machine Based Automatic Meter Reading System", IEEE International Conference on Computational Intelligence and Computing Research, Department of Computer Science and Engineering Anna University –BIT Campus, Tiruchirapalli, India,2013

[3] Champ Prapasawad, Kittiach Pornprasitpol, "Development of an Automatic Energy Meter System Based on Zigbee PRO smart Profile IEEE 802.15.4 Standard",IEEE 2012

[4] 1E Moni Silviya, 1K Meena Vinodhini, 2 Salai Thilagam J, " GSM Based Automatic Energy Meter System with Instant Billing", IJAREEIE, Vol 3,Special Issue 3,April 2014.

[5] Dinesh Kumar K, Prabhu Ramanathan Sudha Ramasmy, Development of ARM Processor based Electricity Theft Control System using GSM Network, 2015 International Conference on Circuit Power and Computing Technologies[ICCPT] ©2015 IEEE

[6] Bharat Kulkarni, GSM based Automatic Meter Reading System Using ARM Controller, IJETAE(ISSN 2250-2459,Volume 2,Issue 5,May 2012)

[7] Prof. Mrs. K. D. Mahajan, Waste Bin Monitoring System Using Integrated Technologies,IJIRSET, July 2014

[8] Prof. Mrs. K. D. Mahajan, Zigbee based Waste Bin Monitoring System, IJESRT, July 2014