IoT Based Prepaid Electricity

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ABSTRACT

This paper presents a novel design method of minimizing the queue at the electricity billing counters and to restrict the usage of electricity automatically, if the bill is not paid. The project also aims at proposing a system that will reduce the loss of power and revenue due to power thefts and other illegal activities. The work system adopts a totally new concept of "Prepaid Electricity". The IoT based concept is used so that we can continuously monitor the consumption of power (in watts) and if it reaches the minimum amount, it would automatically alert the consumer to recharge through internet. In this Ardiuno processor is used to monitor and control the entire system model. This technology holds good for all electricity distribution companies, private communities, IT parks and self-containing housing projects. The implementation of this project will help in better energy management, conservation of energy and also in doing away with the unnecessary hassles over incorrect billing. The automated billing system will keep track of the real time consumption and will leave little scope for disagreement on consumption and billing.
Keywords : Prepaid, Electricity, Arduino Controller, Constant Update through GSM and Internet.

I. INTRODUCTION

The Existing system explained the concept of Smart Meter using AT89S52 microcontroller which will consume more power. All the existing system proposed a system to measure the electricity and it will be sent to the distributor.This process is periodic and hence power reduction is tedious in this case. This project provides an effective means of data collection that allow substantial saving through the reduction of meter re-read, greater data accuracy, allow frequent reading, improved billing and customer service, more timely electrical energy profiles and consumption trends updates, and better deployment of human resources.

This can be achieved by the use of advanced microcontroller Arduino unit that continuously monitors and records the Energy Meter readings in its permanent (non-volatile) memory location. This system also makes use of a GSM modem for monitoring, reading and controlling of Energy Meter from a remote server automatically using the existing GSM networks for cellular phones.

The GSM modem which utilize the GSM network to send its power usage using the short message service (SMS) back to the energy provider wirelessly.

GSM infrastructure in past two decades made meter reading system wireless. The GSM infrastructure, which has national wide coverage, can be used to request and retrieve power consumption notification over individual houses and flats. Apart from making readings using GSM communication, billing system is needed to be made prepaid to avoid unnecessary usage of power.

II. METHODS AND MATERIAL

A. Block Diagram – Master
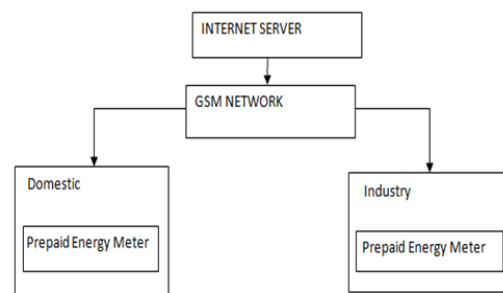
Block Diagram – Slave
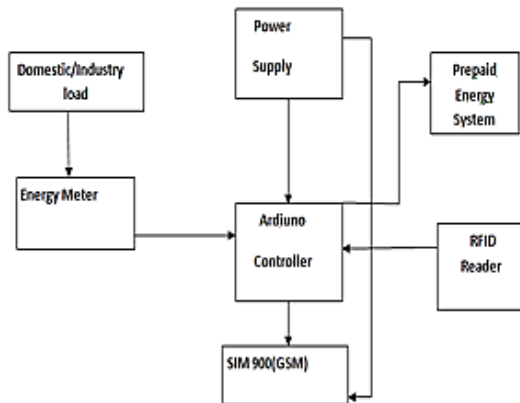
B. Description:

ENERGY METER:

An energy meter is a device that measures the amount of electric energy consumed by a residence, a business, or an electrically powered device.

SIM 900:

This is a GSM/GPRS-compatible Quad-band cell phone, which works on a frequency of 850/900/1800/1900MHz and which can be used not only to access the Internet, but also for oral communication (provided that it is connected to a microphone and a small loud speaker) and for SMSs. Externally, it looks like a big package (0.94 inches x 0.94 inches x 0.12 inches) with L-shaped contacts on four sides so that they can be soldered both on the side and at the bottom. Internally, the module is managed by an AMR926EJ-S processor, which controls phone communication, data communication (through an integrated TCP/IP stack), and (through an UART and a TTL serial interface) the communication with the circuit interfaced with the cell phone itself.

PREPAID ENERGY SYSTEM:

Whenever the user swipes the RFID card to recharge the specific amount that will be deducted and the amount will be updated in the Internet.
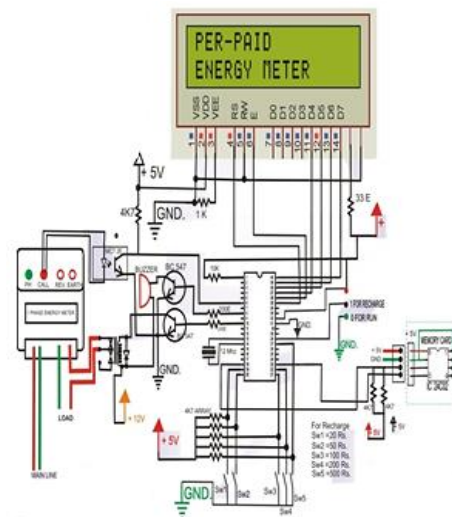
RFID:

Radio-Frequency Identification (RFID) is the use of radio waves to read and capture information stored on a tag attached to an object. A tag can be read from up to several feet away and does not need to be within direct line-of-sight of the reader to be tracked.
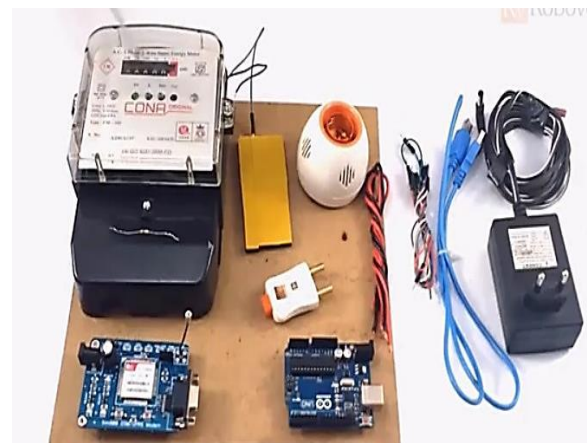
ARDUINO CONTROLLER:

The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 16 MHz quartz crystal, 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 a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again
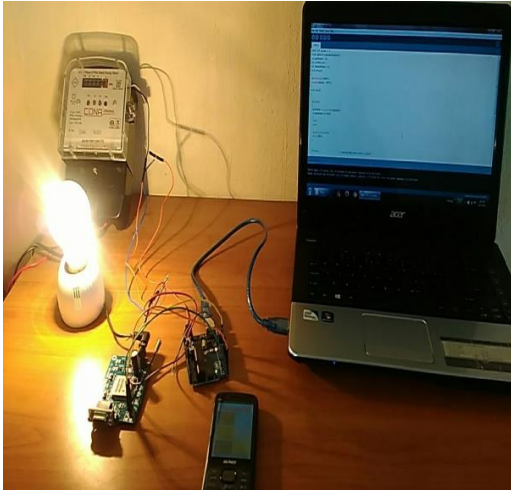
CIRCUIT DIAGRAM

HARDWARE IMPLEMENTATION

III. RESULTS AND DISCUSSION

Hardware Results

efficiency in calculation of bills for used electricity. Smart energy meters will bring a solution of creating awareness on unnecessary wastage of power and will tend to reduce wastage of power. This module will reduce the burden of energy providing by establishing the connection easily and no theft of power will take place.

FUTURE WORK:

In future the Tamilnadu electricity Board can alert the consumers for their power consumption and bill pay system using GSM. Consumers can also pay the bill via IVRS mobile system. This method to predict the Estimation of overall power requirement of each district and power generation can be planned and avoid power cuts and power shortage.
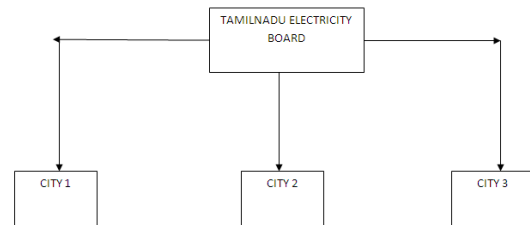
IV. CONCLUSION

The design of IoT based Prepaid Electricity can make the users to pay for the electricity before its consumption. In this way, consumers hold credit and then use the electricity until the credit is exhausted. If the available credit is exhausted then the electricity supply is cutoff by a relay. An arrangement is also made to intimate the user with the help of GSM communication module when their credit in their balance goes low. This system has been proposed as an innovative solution to the problem of affordability in utilities system.

Since a microcontroller based system is being designed, the readings can be continuously recorded. This reduces human labour and at the same time increases the

V. REFERENCES

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