A SURVEY ON SMART ELECTRIVITY BILLING AND METER MANAGEMENT

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ABSTRACT

As it has been observed in the last few years that electricity meter connections and its due bills have impacted various category of people in India. Consumers as well as Electricity Supply borads have been suffering in some or the other way. Consumers sometimes get heavy electricity bills, and on the other hand, electricity supply boards do not get the due bills recovered well in time. Various approaches have been presented and researched by many authors. This paper aims in doing the thorough survey on those presented techniques, designs, models and architectures to understand their working and thereby identify the research gap and improve the system further more.

Keyword: - *Smart Meter, GSM Module, Android Application, Wifi Module, Smart Grid.*

1. INTRODUCTION

In the kith and kin, Electricity is one in all the basic requirements it's ordinarily used for domestic, industrial and agricultural functions. recent days Power thievery is that the biggest drawback within the Asian country. that causes ton of loss to electricity boards. we will save tons of power providing we will stop these thefts. this is often done victimization sensible Energy Meter (SEM). SEM is an electrical device within having a chip. it's measurement the electrical energy consumed and a wireless protocol for electronic communication. This paper is helpful to presents a sensible energy meter for AN automatic metering and request system. during this meter energy used and also the corresponding quantity are incessantly displayed on the alphanumeric display and communicated to the dominant base station. The feedback from the user helps to spot the use between approved and unauthorized users that helps to manage the facility thievery. Communication is finished between user/household and station victimization Zigbee. within the thievery cases GSM network is employed for causing SMS to the native authorities. Either paid or paid this meter will work. this technique replaces ancient meter reading strategies and allows remote access of existing energy meter by the energy supplier. conjointly they'll often monitor the meter readings while not the person visiting their house.

2. LITERATURE SURVEY

2.1 Design and implementation of smart energy meter

The planned system has 2 sections ,first is Home Section and second is Electrical Base Station (EB). Communication is finished between these 2 section by wireless network. This system monitors the load, observation suggests that the user scheming the facility consumed at a given time. Energy used and also the corresponding quantity are incessantly displayed on alphanumeric display and communicated to the dominant base station. The feedback from the user to helps to spot and management the facility using GSM module SMS containing monthly bill in conjunction with the day of the month is shipped to the several meter owner that is gift within the EB section.

This module conjointly the helps in alerting the approved individuals through AN SMS throughout the facility thievery.
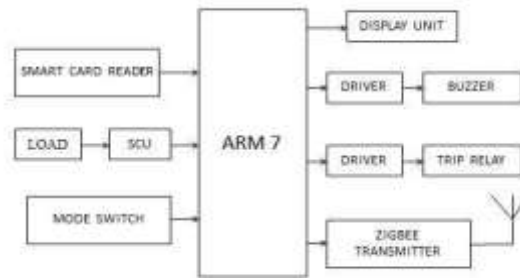

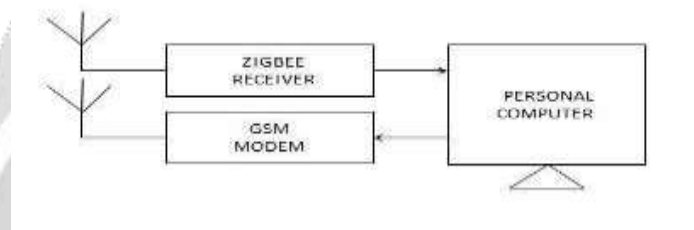**Fig -1**: Block Diagram of User's House Module

Fig -2: Block Diagram of Base Station Module

The progress of technology concerning electrical distribution network may be a non-stop method. within the gift work wireless meter reading system is incessantly designed to watch the meter reading and to close up the facility provide remotely. Whenever the patron fails to pay the bill. It avoids the human intervention, provides economical meter reading, avoids the request error and reduces the upkeep price. the corresponding info can show on alphanumeric display for the user notification. the benefits of SEM area unit it needs less force, there's no got to chase payments, power thievery detection are double, when bill is shipped to the patron with day of the month, then the meter will act as either paid or paid meter, it will minimize the facility consumption during a house.

2.2 Internet of Things (IOT) Based Energy Meter

The existing domestic energy or meter reading systems generally has many problems, like issue in construction, too slender metric, too low rate, poor real time, not sleek a pair of methodology communication etc. to unravel on top of problems, this paper uses the wireless technology for Automatic Meter Reading system. A projected technique provides the communication between the Electricity Board section and so the patron section victimization internet of things (IOT) for transmission the customer's electricity consumption and bill information that is calculated victimization ARM7 microcontroller.

Fig -3: Block Diagram of Web Server vogue

The power fluctuations square measure monitored victimization the voltage detector and current detector square measure fed to the microcontroller that indicates it to the Electricity Board. betting on the power generation, the house hold devices square measure controlled automatically. From Electricity Board section the information concerning the bill amount and payment square measure communicated to the customer via SI system for Mobile communication . the power and request information is unendingly transmitted by the utilization of IOT and monitored by the Electricity Board section. Whenever there is power stealing or unpaid bills familiar ,the Electricity Board can cut the availability to the consumer. The GSM output format has been analyzed.ThePIC-16F877A Microcontroller the operations were studied and it's programmed and {so} the system operational model was developed so on accomplish the target. "The IOT primarily based Energy meter" saves the customer's time by making them work "leaner". The operation of the conniving the power price is simple and doesn't involve delays. instead of victimization DAQ that's extraordinarily dear throughout this project PIC (16F877A) microcontroller along with serial communication has been accustomed interface with the virtual terminal.

The IOT primarily based Energy meter for conniving price and showed in liquid display has been achieved victimization MPLAB and PIC 16F877A. the power price is send through serial communication to the Virtual terminal created in PROTEUS. This project can thus enlighten management regarding wasted time, and inessential journeys, book keeping associate degreed request as a results of it provides associate degree correct accounting of units driven as a results of the hindrance of malpractice.

2.3 GSM Enabled Smart Energy Meter And Automation Of Home Appliances

As we all know Electrical utilities ar stricken by vast losses thanks to power larceny, inadequate usage of energy, unpaid bills, low power quality. several viable solutions ar projected out of that good energy metering, energy management system and good home automation ar some that looks to be potential enough. These technologies ar presently utilized by developed countries. beneath meter information acquisition system of Restructured Accelerated Power Development and Reform program (R-APDRP) theme within the year 2009-10, Asian nation plans to develop Advanced Metering Infrastructure (AMI). however no effort has been created to develop Associate in Nursing economic model for the purchasers which might play a key role in higher acceptance of the theme. during this paper, {a good | a sensible | a wise} energy system for the residential customers is developed and a sensible switch board which might curtail the requirement to upgrade to smart appliances to create the system a lot of economic. Further, a Virtual Instrumentation has been developed which might be operate in any pc to perform as In Home show (IHD) for Energy Management System (EMS). A Smart Energy Meter is a device which measures the energy consumption at certain set intervals and sends that information to the utility for monitoring, management and billing purposes.
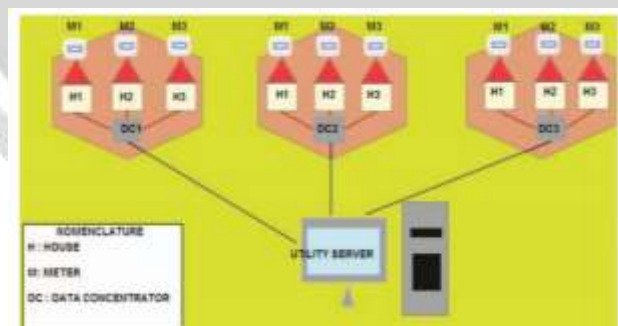

Fig -4: Smart Energy Meter Architecture

An attempt has been created to form a sensible model of smart energy meter. The planned model may be used to measure voltage, current and calculate the ability consumption of a family. This knowledge is employed as a feedback to watch the energy consumption and create the user aware once the load exceeds. Provision for practicing demand response is provided. Also, it provides a possible for active dynamic tariff system in India. Provision of remote switch of appliances is additionally provided. Keeping in sight the big-ticket IP addressable appliances the good switch mistreatment relays provides a viable choice to stick with the conventional appliances.

Further analysis may be disbursed on the network architecture, communication technology and dedicated mobile application for knowledge analysis. conjointly system for correcting power factor and watching the ability quality also can be developed.

2.4 Smart Energy Metering and Power theft management exploitation Arduino & GSM

In developing countries like India there's increasing and continuous growth and development all told sectors, many industries are rising for the management and growth of our country. Energy demand plays a significant role all told sectors of developing country. Electricity is the most vital blessing that science has given to the human race. With the constant boost within the energy necessities wherever customers are increasing systematically with the rise in population Energy thieving is the commonest drawback sweet-faced by the individuals these days. Utilities in electricity system are destroying the amounts of revenue every year because of energy thieving. Losses in electricity energy sector will return below 2 sets: technical and social control. The most ordinarily sweet-faced is the Non-Technical losses are because of lack of utility labor interference sporadically. These losses are abundant higher in developing countries like India. The new designed AMR used for energy measurements reveal the construct and dealing of recent automatic power metering system, however, this multiplied the Electricity thieving forms body losses. Thanks to not regular interval checkout at the consumer's residence. It's quite not possible to envision and solve our thieving by going each customers door to door. The projected model consists of digital energy meter, AN Arduino (microcontroller), GSM electronic equipment and SSR. Once shift power on the Arduino and therefore, the GSM electronic equipment, activate the SSR and connects the energy meter to load via SSR. A brand-new procedure is followed supported MICROCONTROLLER Atmega328P to notice and management the energy meter from power thieving and solve it by remotely disconnect and reconnecting the service (line) of a specific shopper. AN SMS is sent mechanically to the utility central server through GSM module whenever unauthorized activities detected and a separate message can challenge to the microcontroller to disconnect the unauthorized offer. A novel methodology is enforced by interspersed the GSM feature into good meters with Solid state relay to handle the non-technical losses, request difficulties, and voltage fluctuation complication.
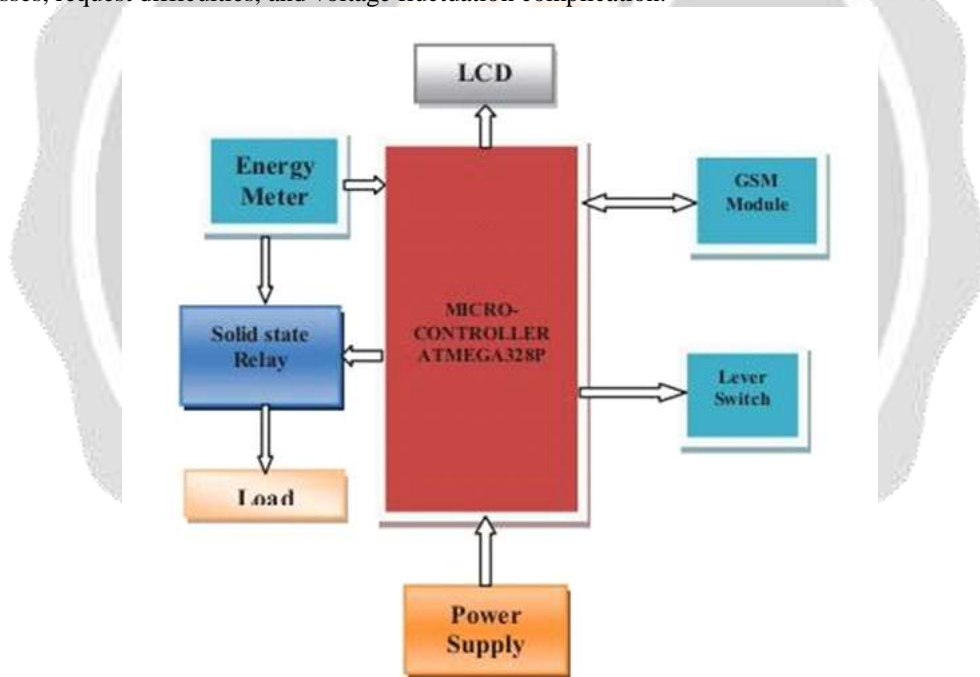
The system design of Arduino and GSM based mostly good energy meter is shown within the Fig. 1. The energy consumption is being calculated an exploitation the energy a meter IC and Arduino. To stop influence stealing, a detection program is gift within the Arduino. Arduino and GSM based a mostly good energy meter may be divided into many components as Energy Meter IC, a lcd, Arduino, GSM modem, Relay, Optocoupler, Lever switch, show a unit and the power offer Unit etc. The voltage the electrical device or potential electrical device: Potential transformers is known as voltage transformers. It's a basically step down transformers terribly correct turns quantitative relation. regular measuring the instrument accustomed lives the modification in high magnitude to lowers voltage for step down electrical device. It works in technique with a lot of range of primary turns, and a less range of secondary turns. The higher worth voltage and current cannot be measured directly. So, we want one voltage device, and two current sensors for the planned system.

Conventional single part energy meter use one current detector and voltage detector to estimate the kWh consumed by the electrical load by the merchandise of current and voltage. During unauthorized sound within the lines than any of those sensors offers zero price and definitely the merchandise of voltage and current will be zero leading to no energy measured within the energy meter. By connecting a new current detector with a solid state relay with minimal variation within the energy meter helps to trace down power thieving, connect/disconnect the provision. A continuing 5V DC offer given to Microcontroller and LCD unit. Communication are connected between microcontroller and utility center through GSM electronic equipment. Lever switch provided to sight the physical disturbance (tampering) given to the good meter. to trace down the unauthorized masses a broach before the meter is on the far side the scope of this projected construct. SOFTWARE REQUIREMENT: Arduino programs area unit wont to write in any programming language with a compiler construct that produces practicable binary computer code. Armed affords associate degree improvement of this setting for projected systems microcontrollers, AVR Studio and therefore, the newer Armed Studio. A typical Arduino C/C++ sketch incorporates 2, functions that area unit compiled associate degree connected with a program stub main() into a practicable cyclic government program: setup(): is employed for initializing settings that run just the once at the beginning of a program. loop(): is employed to run a similar perform multiple times until the board powers off. The combined hardware advantage for each utility, and therefore, the client. Arduino, SSR, and GSM stationed Energy Meter for good metering, power thieving detection, and voltage variation is constructed that scan}to read and send information via wireless protocol exploitation GSM technology through GSM electronic equipment, capable of managing and dominant the provision to it meter through SSR. within the case of power thieving, defaulter meter line cutting/joining labor system is reduced. Power consumption, power quality, and its accuracy are often monitored by the customers directly in their mobile. This method can cut back the labor work and human error within the distribution system, and additionally defend the buyer instrumentation.

3. CONCLUSION

Conclusion As per the research and survey done so far for the previously presented works done by various authors, it is identified that most of the approaches are dependent on hardware components a lot to sync with smart meters to update the meters units to the server or distribution board. The more the hardware components , more is the incurred cost and the chances of getting parts damaged. Also, various systems require separate GSM module to make sure that the connectivity for SMS is obtained. SMS are not the efficient ways as sometimes there is delay in SMS delivery due to some message centers. So the survey hereby generates the need to create the system which is more robust and less hardware dependent.

4. REFERENCES

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