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DESIGN AND IMPLEMENTATION OF REMOTELY LOCATED ENERGY METER MONITORING AND LOAD CONTROL AND BILLING SYSTEM

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A B S T R A C T

The present electricity request system in Republic of India is quality flat and time overwhelming. Errors get introduced at each stage of energy request like errors with electro-mechanical meters, human errors whereas noting down the meter readings and errors whereas process the paid bills and therefore the due bills. there's no correct thanks to recognize the facility usage details, load shedding schedules and power theft. one in all the remedies for these drawbacks is implementation of a wise energy meter. This paper is on the event of a wise energy meter that has capabilities like remote observance and dominant of energy meter. Here the consumer pays the electricity bill well before the energy consumption which might be entitled as pay 1st and so use it. every shopper has variable load demands therefore looking on those load demands appropriate quantity of units (kWh) are recharged supported the pulses from the energy meter, microcontroller decrements the quantity of units of power consumption and shows the remaining offered units on LCD display. once the count becomes zero the load is disconnected and it's reconnected once the patron recharges the units of power. this method helps the shoppers and power distribution firms to access the correct and updated knowledge from the energy meter by causing a message (SMS) thereto energy meter, the knowledge is being sent and received with the assistance of worldwide system for mobile communication (GSM) network. This energy meter offers the facility cut info to the users with a droning sound. It additionally provides the feature of disconnection of power provide to the load whenever there happens the facility felony activities like bypassing the facility provide, this may be done from the distribution company by sending a message (SMS). this method mitigates the revenue losses of the distribution company a bigger extent, that successively helps distribution company to produce quality power to shoppers.

Keywords: Energy Meter, Power Supply Unit, GSM , Control System

1. INTRODUCTION

With the growing population of India and its rising electrical power desires, the facility system has adult quickly over past fifty years. At present, at the tip of each month someone from electricity board goes to each house and take the meter readings manually that square measure used for electricity bill calculations, this can be a sluggish and punishing method. during this typical charge system individuals attempt to manipulate the meter reading by adopting varied corrupt practices like bypassing provide, magnetic interference etc. therefore the standard charge methodology is inaccurate, costlier, time overwhelming and has lack of transparency, thence this can be inflicting a stark quantity of revenue loss to the distribution corporations. Therefore, many tries were created to beat of these drawbacks of typical charge system. even supposing the meters square measure created digital, the methodology of charge is same. so the scope of this paper is to style and develop a sensible energy meter that has each the suppliers and customers with user friendly services. The technology of electrical metering instrument has traveled an extended journey from however it absolutely was a hundred years agone. From the serious and ponderous meters with serious magnets and coils, there are several enhancements that have resulted in reduction of size & weight. Resolution and accuracy of the meter have seen substantial betterment over the years. Introduction of the digital meter within the later a part of last century has fully modified the means electrical parameters square measure measured. Today, the energy consumption and energy distribution may be a huge subject for discussion thanks to the massive distinction in quantity of energy created and consumed. As a result, such a big amount of issues square measure being Janus-faced by energy customers thanks to accumulated frequency of power failures and a very important reason for power cuts is that the limitless consumption of energy by wealthy individuals. Thus, to reduce the facility cuts and to distribute the energy equally to any or all areas, some restriction ought to be created on the facility consumption of each individual. Our Article in the main deals within the channel between the electricity supplier and also the client. sometimes the electricity board use to send the workers to the patron aspect for taking the meter reading at the tip of specific instant. usually these workers square measure created on short contract basis or square measure provided from sub authorities on the contract basis solely. This job becomes tough and time overwhelming as a result of typically there could arises the clashes between one or additional authorities thanks to that the misplace of knowledge takes place. These data, that is noninheritable by the workers, square measure sent to the electricity board so the ultimate bills square measure issued and distributed among the customers. nevertheless this whole method works effectively however it desires a number of the modification because it is therefore time overwhelming, costlier, yet because the tedious job. furthermore there square measure several difficulties for the workers to succeed in at a number of the places counting on the assorted part also because the geographical conditions.

2.   RELATED WORK

The work by Win Hlaing and Somachai (2017) deals with wired home automation systems. Some studies have even planned a system that uses a foreign management|to regulate|to manage} water temperature through transmission control protocol and net protocol (TCP/IP). though this includes a lower hardware price, it winds up poignant each the build and maintenance prices. Brasek C. et al., [1] planned a replacement AMR theme exploitation WLAN technology Associate in Nursingd an ARM-based PMWCM theme. They recommended each economical Associate in Nursingd effective ways in which of implementing an AMR system, that helped save prices in not simply pre-building communication network however conjointly in cable maintenance. This results in sharing of broadband wireless network resources beside remote period of time management of the user's power knowledge, serving to save resource prices. B. S. Koay [2] planned a style of a Bluetooth-enabled energy meter that may scan energy meters wirelessly. 2 options were planned, namely, the automated meter reading (AMR) and therefore the automatic polling mechanism (APM), which will facilitate retrieve the meter reading with very little human intervention, and these were enforced within the targeted applications. the look relies on the CSR Bluetooth module similarly because the analog device ADE7756 energy meter. Li Li, Xiaoguan Hu, Jian Huang, and Ketai [3] planned a replacement theme, which mixes WLAN and WIMAX with current numerous communication styles of AMR, supported analyzing the variations of specific environments. This theme, that aids the event of AMR, provides an honest resolution and a purposeful exploration. Qazi Mamoon Ashraf et al., [4] enforced a model capable of getting energy-related knowledge once some seconds that enables the study of energy consumption patterns. The device was termed the ELIVE device. The ATMEGA328 microcontroller worked harmonic with Associate in Nursing ESP8266 WLAN system-on-chip (SoC) module, Associate in Nursing AC electrical device, similarly as current transducers. The ESP8266 allowed simple association to the net for the silicon chip with the employment of a longtime WLAN association supported serial interfacing necessities. Arduino Integrated Development atmosphere (IDE) was wont to program the microcontroller that obtained energy measurements exploitation Associate in Nursing analog to digital convertor (ADC). Tibeto-Burman Fu et al., [5] mentioned microgrids, that area unit presently receiving quite some attention, because of the everincreasing have to be compelled to alter distributed generation, guarantee power quality, and supply energy surety with respect to important load. Hence, they analyzed a high renewable-energy penetrated micro-grid. This paper provides how out of those above-named difficulties caused by the previous mechanisms of activity power. Wireless communication technology has created the exchange of knowledge quick, secure and correct. With the assistance of this technology, several of the economic aspects of energy management will be automatic, which can ultimately cause the reduced usage of work force. misdirection of current may be a rife drawback in today's world. the sole thanks to overcome this disabling disadvantage in electricity distribution is to develop a good watching system. This paper proposes Associate in Nursing integrated hardware and software system resolution that allows wireless watching of energy consumption to create it a lot of convenient for the top user. during this paper, the planned style, that contains a lowcost wireless network and protocol for sensible energy – beside an internet application capable of mechanically reading the unit and so causation the info mechanically – provides nice blessings to users by permitting them to stay a track of their meter reading. this method can facilitate users by permitting them to not solely take steps to scale back power wastage however conjointly bring down prices of consumption, beside minimizing the threat of power larceny, that is incurs nice losses to power corporations. The system has 3 parts, namely, the digital energy meter, the ESP8266 WLAN module, and internet application. The ESP8266 WLAN module is embedded into the meter, and therefore the TCP/IP protocol is utilized to permit seamless communication between the meter and therefore the internet application.

3.   MOTIVATION

Billing automation systems for public utilities (e.g. electricity, gas and water) are wide studied and enforced in developed countries across the globe. the fashionable era of machine-driven Meter Reading (AMR) started in 1985; since then totally different techniques are utilised to urge higher dependability and performance [7]. thus presently in developed countries, several thriving AMR systems area unit being employed to facilitate the customers of water, gas or electricity. Reference have projected AMR using GSM network. during this system, the GSM network is employed within the AMR to send the info using GSM electronic equipment by causing Short electronic messaging System (SMS) containing the knowledge of the entire power usage reading [1],[2]. Reference [3] inaugurates a secure and climbable machine-driven meter. This project uses existing native ISPs rather than requiring its own set of proprietary communication infrastructure. It consists of associate degree embedded micro chip system, supported embedded Linux, and a electronic equipment. Distributed structure supported wireless detector networks area unit} comprised of measure meters, detector nodes, information collectors (gateway), management center (server) and wireless communication network. Communication systems supported ZigBee communication network is utilized within the remote period of time automatic meter reading system GPRS primarily based AMR is put in in remote locations close to HT, LT customers, DTRS and FEEDERS.

4.   SMART METERS FOR DEVELOPING COUNTRIES

In several developing countries, typical energy meters square measure used for charge the energy consumed by customers. For easy operation of the house appliances, observation the grid, up the ability quality, improved load sharing, sleuthing non-technical losses, and different inexplicit blessings, good meters square measure to be introduced in developing countries. Power utility corporations worldwide lose concerning twenty billion bucks annually as a result of non-technical losses [4]. additionally, growing non-technical losses as a result of stealing and charge irregularities force the utility corporations to implement a clear and real metering system. However, preparation of good grid and good meter system involves large budgets. it'd be terribly tough for utility corporations to take a position billions of bucks on associate infrastructural upgrade that has no direct come back on the investment. So, good meters with minimum needed, however essential options could also be designed for implementation in countries with weaker economy. So, good meters won't be enforced for luxury operating, however they need to be introduced so as to fight the essential issues that power utility corporations and its customers face. good meters with nice networking capability and advanced computer code tools square measure tough to tamper and hack, that improves the distribution potency. Integration of good meters enhances facilitation of decentralized generation and power storage devices. within the close to future, total energy demand is anticipated to become double the present demand. visible of this case, several developing

countries don't have resources for the extra capability addition. To fill this gap, except increasing the put in generation capability, dominant the electricity stealing and regularizing the present electricity customers will manage the load among demands.

5. PROPOSED METHODOLOGY

In server finish GSM electronic equipment with alternative necessary electronic equipment is put in all told consumers' premises. knowledge acquisition from energy meter the blinking semiconductor diode of a meter is employed. From energy meter specifications the per unit semiconductor diode impulse rate may be achieved. Impulse rate of energy meter utilized in this project is 1600imp/Kwh. So per 0.000625Kwh semiconductor diode can provide one impulse. during this system, semiconductor diode impulses ar perceived by LDR. This LDR and semiconductor diode complete setup were enshrouded with a black cover so the external source of illumination cannot result on the practicality of the LDR. for every impulse the resistance worth of LDR is modified and dynamic of current is measured by Arduino Mega 2560. Arduino Mega 2560 count sixteen pulses and calculate used energy and add zero.01Kwh with previous knowledge. In server unit, GSM electronic equipment interfaced with a pc that forever receives SMS from shopper finish and plenty of logical functions are dead by it to show info concerning the user, used energy and bill standing . By pressing the beginning button, the energy meter are initialized so the information are noninheritable from the blinking of semiconductor diode wherever every pulse can contain a selected quantity of energy. once playacting arithmetic and logic operation this knowledge are shown during a semiconductor diode show for the simple examination of the patron. Then the noninheritable knowledge are processed so transmit through the GSM to the server unit. The server unit GSM module can receive the transmit knowledge and by process this received knowledge it'll be shown on the server pc. The received knowledge are updated step by step so hold on within the info once playacting the arithmetic and logic operation. Associate in Nursing energy or power meter may be a device that's accustomed live the quantity of current consumed by a residence, business, or Associate in Nursing electrically powered device . Typically, the energy meters are measured in asking units, the foremost usually used is that the kW-hr. - Periodic readings of electrical meters establish asking cycles and energy used throughout a cycle. GSM Module: - A GSM module may be a specialised style of electronic equipment that accepts a SIM card, and operates over a subscription to a mobile operator, rather like a transportable. From the mobile operator perspective, a GSM module appearance rather like a transportable. - once a GSM electronic equipment is connected to a pc, this enables the pc to use the GSM electronic equipment to speak over the mobile network.
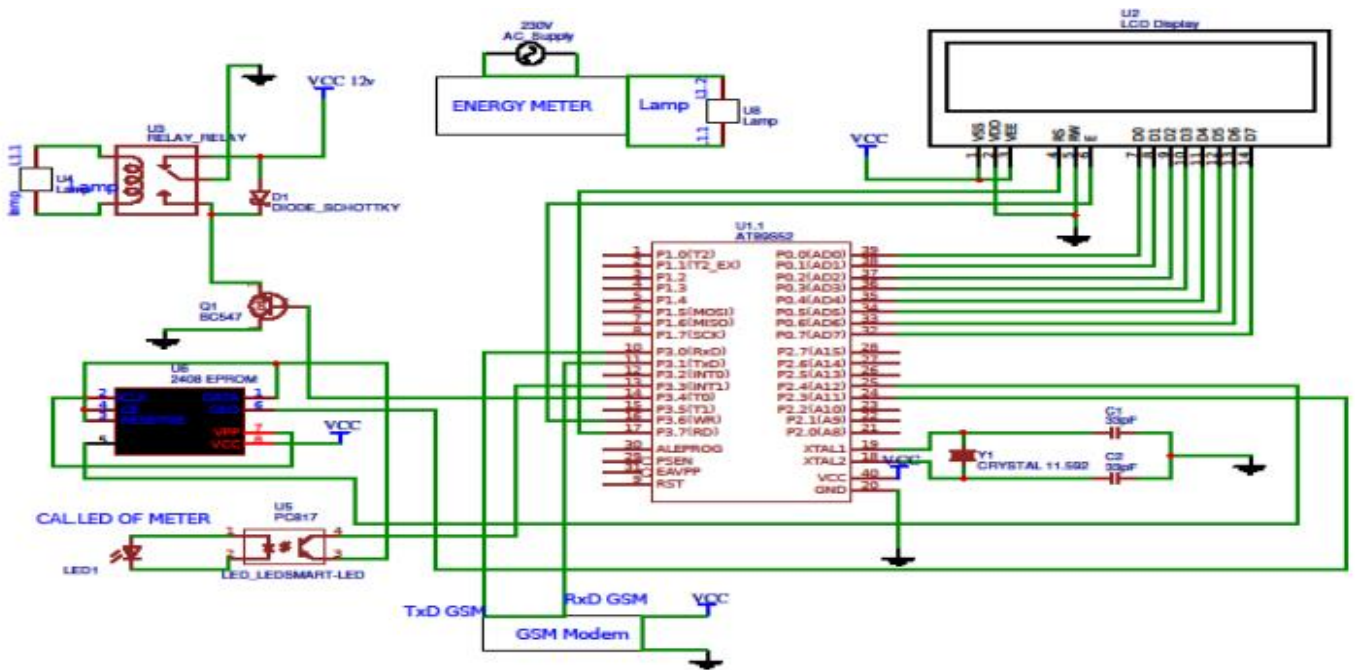

FIG.1.BLOCK DIAGRAM

6. RESULTS AND DISCUSSION

Outcomes: - good Unit Scanning and providing it to service supplier. - Remote on/off of the electricity offer supported payment of bill. - Reduces the banned aspects that takes place thanks to non- payment of bills. - for the asking current standing of meter. Applications: - The projected system are often used for multiple service suppliers. - It may also be enforced for meter reading and meter reading. supported SMS for knowledge transmission, there's propagation delay between the relay command and relay response. Table. 1 incurs the delay time once the execution of a command.

Relay Response	Time(s)

Response 01	7.65
Response 02	7.80
Response 03	7.56
Response 04	7.66

TABLE.1.RELAY RESPONSE AND TIME(s)

7. CONCLUSION

Thus with the utilization of this article we will create the system simple and fewer time consuming. additionally with this we've reduced the disadvantages of this system. One will establish user friendly and direct interfacing between the patron and also the distributor with none external interference. Additionally with this, the accuracy of the system will increase because the gross errors, experimental errors, etc. decreases. so with this we will conclude, that a time economical, reliable, and correct system analysis will be obtained that is so economical and user friendly. As there are lots of concepts and innovation that one might implement, there also are several innovative concepts that may be processed more or extended more in our project. Since here we tend to are concentrating on the supplier facet, i.e. at the ELECTRICITY BOARD. One can even embrace the options associated with the client facet, i.e. creating the fastened usage manual, so by creating the recharge of a specific quantity, client are going to be allowed to use the provision relying upon the set up designated as the same as the postpaid sim card systems, which might enhance the expertise of the economic shopper with fashionable digital utility meter. One can even embrace the feature of INSTANT BILL, at any instant of the time. By this feature shopper will grasp his/her bill at any interval of the month, so a cheap shopper will vary his/her consumption. Additionally a timer management will be provided, which might automatic weigh down the system provide, if the payment of bill isn't wiped out the desired cut-off date.

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