SMART PREPAID METER DATA FOR ENERGY SYSTEM

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Abstract - *Electricity plays a vital role in day to day life. The electricity consumption in India is the third biggest after China and USA . The per person energy use rate in India is nearly 0.7 KW. The foremost objective of this article is that the consumer can recharge and monitor from anywhere. There are major drawbacks in the existing system due to manual work. This article proposes and analyse the system which is used for energy meter billing and monitoring. Here, the consumer needs to pay the bill on schedule, if couldn't, the electric power connectivity can be turned off autonomously from the distanced host. This idea is being carried out to reduce the human dependency to acquire the month-to-month analyzing and reduce the technical issues concerning billing process. This mission extends the design and implementation of a strength monitoring gadget with the pre-intimation of energy schedule with the use of Arduino micro controller and a GSM (international machine for mobile communique) module [6]. From the energy board phase, the pre-planned power close down information is communicated to the purchaser via GSM If the customer does no longer pay the invoice in time, the person is knowledgeable through a message. If nevertheless the client does no longer pay the invoice, then as per specific consideration, alert message can be dispatched then automatically electricity connection is disconnected from the remote server. on this proposed electricity meter, the meter gives the electricity rate up on each day basis, its corresponding rupees, billing info and charge the use of IoT. This system not handiest reduces the hard work fee for noticing the residential electricity intake in normal intervals however additionally will increase the strength conservation with the assist of alarm systems and the electricity meter.*

Key Words: *arduino, GSM, IoT,energy consumption, human dependancy, shut down, alert message, payment method*

1. INTRODUCTION

The utility sector in India has one National Grid with an installed capacity of 330.86 GW as on 30 November 2017. Renewable power plants constituted for 31.7% of total installed capacity. During the year 2016-2017, the gross electricity generated by utilities in India was 1,236.39 TWh and the total electricity generation in the country was 1,433.4 TWh. In the year 2016-2017, the gross electricity consumption was 1,122 kWh per capita. India is the third largest producer of electricity in the world and stands fourth largest in the electricity consumption. The electric energy consumed by the agricultural sector was recorded 17.89% in 2015-16 among all countries.

Despite cheaper electricity tariff in India, the per capita electricity consumption is low compared to many countries [1]. The power generation capacity in India is surplus but the adequate infrastructure for supplying electricity to all needy people is lacking. In order to develop the infrastructure to to supply adequate electricity to all the needy people in the country by March 2019, the Government of India launched a scheme called "Power for All". This scheme will ensure continuous and uninterrupted power supply to all industries, households, and commercial establishments by improving necessary infrastructure. It's a joint responsibility by the Government of India with states to share funding and create overall growth of the economy.National energy Plan of 2016 prepared via the government of India states that the country does now not want additional non- renewable electricity vegetation inside the software zone till 2027, with the commissioning of 50,half MWcoal-based totally electricity plant life underneath construction and attaining 275,000 MW general mounted renewable electricity   capacity.

The proposed metering gadget in this paper gives to automate this manner thereby putting off fallacies and dishonest behavior. It promotes a paperless surroundings wherein the meter updates can be directly dispatched to the person via SMS. The proposed meter is a change of the to be had smart meters. Applied the usage of Arduino micro-controller and GSM, it provides bidirectional conversation between the user and meter. Ease of studying and load disconnection/re-connection are some of the tendencies that make this proposed metering gadget a better alternative to ordinary structures. The manufacturing value of the proposed meter is calculated to be much less than that of widely wide-spread meters imparting comparable features. While put into complete-scale manufacturing, the fee may be in addition reduced. As the state progresses closer to becoming virtual with the upcoming smart cities, the proposed metering system is a prime step that overcomes the shortcomings of the existent meters. The paper further covers a thorough literature survey, the proposed device specifications, the software and hardware implementations accompanied by using the realization of the paper.

1.1 LITERATURE SURVEY

The history and evolution of electricity meter dates lower back to the Eighteen Eighties, a bit earlier than the enormous use of electricity. The generation of gasoline lamps additionally contained the strength dimension system in which the amount of energy fed on in keeping with family turned into calculated. With the discovery and use of energy, the electric lamps unexpectedly replaced the fuel lamps, proving to be brighter and more price efficient. a new machine for consumption measurement changed into required.

DC meters measured rate in the unit ampere- hours. With time the DC meters proved to be insufficient. Then came Edison's meters categorized as electrolytic and electro-chemical meters. The electro - chemical meters, though sufficed the reason, had been labor-intensive to examine. consequently, no longer welcomed by means of users. It was in 1889, that a Hungarian named Otto Blathy created and patented the first AC meter the use of kilowatt-hour as the standard unit,

1.2 PROPOSEDSYSTEM

Arduino based Smart Energy Meter for advanced metering and billing system is built which is able to read and send data via wired protocol using technology through excel, capable of manage the meter as well as the data logging connection. However this project needs more modification for more reliable and higher degree of satisfaction and safety. The IOT module connected to the energy meter voltage system to determine that how much power is consumed by the led for specific time period using RTC. When the cloud receives the amount of consumed power and the Arduino controller transfer the data to the wireless module which is connected to the webpage along with this data can also send to respective owner via GSM MODULE. This method provides easier data monitoring on the smart energy meter. Specialized application for monitoring energy with accurate consumption rate with respect to time. IOT produces faster data communication. Real time monitoring is possible.

1.3 SYSTEM DESCRIPTION

Smart energy Meter is a concept in which you can recharge its balance, like we do in our mobile phones. on this venture we're building a automated device with the aid of using Arduino and GSM module [3]. you can recharge the electricity balance through this gadget, simply by means of sending a SMS. It is able to additionally disconnect the home electricity deliver connection, if there may be low or 0 stability inside the gadget. And this machine will reads the energy meter readings and mechanically send some updates to user's mobile cellphone like low stability alert, reduce off alert, resumealert and rechargealert.

An lcd show is placed in each residential house to inform about the messages concerning the power reduce, strength intake on day by day foundation, billing information for the important restrict indication. With the help of this prepaid , it becomes more of convenient for the people to save energy resources by recharging and using electricity only when it is needed.

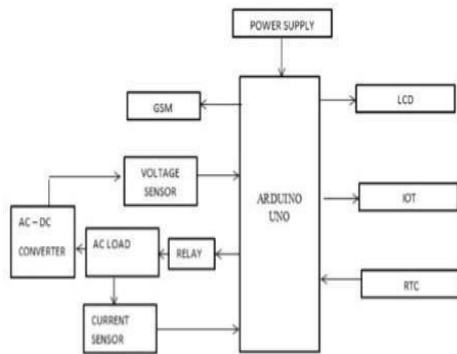## 2. SOFTWARE IMPLEMENTATION

BLOCK DIAGRAM

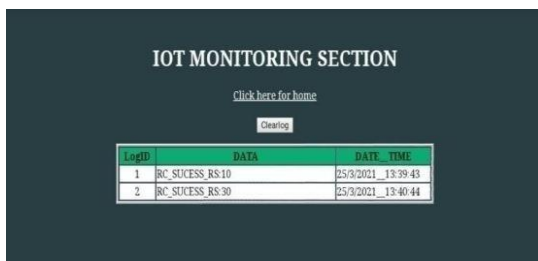Fig.1.Functional block diagram of complete system

Fig 2.Image of a local server to collect data

2.1 HARDWARE IMPLEMENTATION

Arduino UNO:

Arduino is open- source hardware. It is a micro- controller board based on the AT mega 328P which is the brain of the system, where all the system actions are programmed. It controls the entire system. It also transfers the data to the wireless module which is connected to the web page.

Current sensor and voltage sensor:

The voltage and current sensors measure the voltage and current values used by the load and those values are displayed in the LCD.

Global system for mobile communication[GSM]:

GSM can be used to recharge the electricity balance through this gadget, simply by means of sending a SMS. It is able to additionally disconnect the home electricity deliver connection,if there may be 0 0r stability inside the gadget. And this also can send some updates to user's mobile like low stability alert, reduce off alert, resume alert and recharge alert.

Relay:

A relay is a switching device as it works to isolate or change the state of an electric circuit from one state to another. Here when recharge is not done till the critical period, it will switch off the power supply to the load.

RTC:

The DS1307 serial real time clock(RTC) be low or 0 is a low-energy, full built-binary coded decimal(BCD) clock which is used to determine how much power is consumed by load for specific time period. It is also used to determine the time till the pack is valid.

Liquid crystal Display[LCD]:

A 26x26 liquid crystal display is very fundamental module designed to project on screen information of a microcomputer on to a large screen.Here it is used to display the voltage and current sensor readings as well as the reduce off and recharge alerts.

IOT-ESP-12E BASED NODEMCU:

A local server is made to collect and monitor the data based on the recharge done by the customer. The IOT module connected to the energy meter allows the voltage system to determine that how much of power is consumed by the LED for a specific time period using RTC IOT ,which provides faster data communication. Real time monitoring is possible.
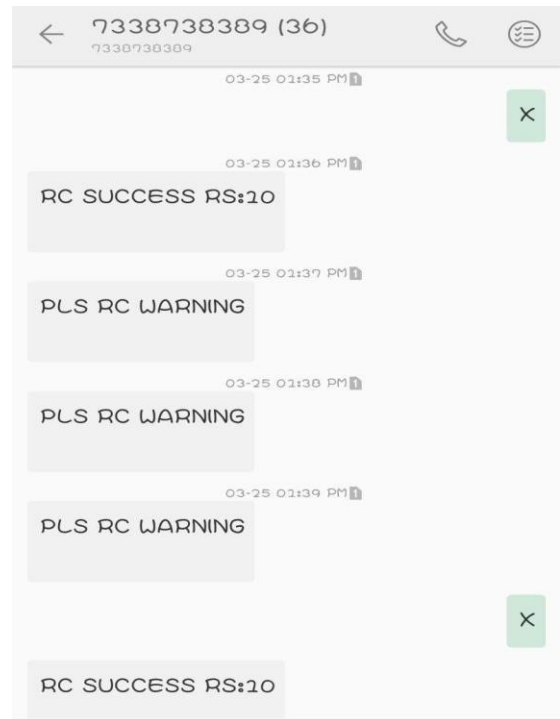
2.2 output

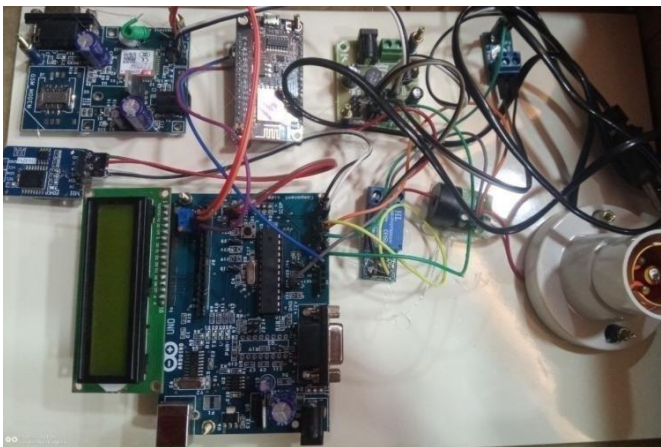Fig.3 LED output

Fig.5 SMS received by customer via GSM

Fig.4 Experimental setup

3. Advantanges

We can monitor and recharge the pack anywhere and at anytime. The quality of a service gets improved due to this system . This system provides a live updates on a consumption. A user can get balance credit through mobile or web portal.   This system keep records of recharge and consumption history for OPEX savings. It provide direct web-based access for the power monitoring and it eliminates the need for a manual Supervision. In future, smart meter improves awareness of energy consumption.

4. Conclusion

The purpose is to create a consumer-pleasant billing device with least human mistakes, by using present day technology that is compatible inspite of the old metering units. The gadget employs GSM for bidirectional verbal exchange whilst timer gives the real time despite the fact that there may be no supply. This device permits the customer to effortlessly screen their strength utilisation. The device proves to be advantageous in the sort of manner that the user receives updates on intake through a message. For similarly implementations, the machine can be exploited with a few robbery protections. Despite that the fact the machine is designed to suit for home use as of now, the studies for its economical feasibility on a industrial scale for industries in an unexplored area. The industrial machine ought to encompass power aspect metering in addition to manipulate strength correction systems at exclusive loading conditions. This could be additionally useful to the industries as it prevent them from consequences for low energy implementations.

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