IoT based Smart Energy Meter

Bheke Aditya Deepak[1], Mirza Samihyder Abbasrazi[2], Argade Sourav Anil[3], Prof. Gunjal S. D.[4], Prof. Arote P. J.[5]

[1]Student, Dept. of Computer Engineering, Jaihind College of Engineering, Kuran
[2]Student, Dept. of Computer Engineering, Jaihind College of Engineering, Kuran
[3]Student, Dept. of Electronics and Telecommunications Engineering, Jaihind College of Engineering, Kuran
[4]Professor, Dept. of Computer Engineering, Jaihind College of Engineering, Kuran
[5]Professor, Dept. of Electronics and Telecommunications, Jaihind College of Engineering, Kuran

---

***Abstract*— Electricity robbery remains a massive loss incurred via energy distribution groups. This robbery arises majorly due to activities finished with the aid of customers including power-meter by-passing, energy-meter tampering etc. This studies study gives a technique for managing power meter by means of-passing and tampering. The gadget design is based totally on the tracking of the readings of contemporary sensors through a programmed microcontroller. While one of the current sensors video display units the modern-day drawn by the user's load, the latter established earlier than the meter video display units modern drawn via all loads. Any discrepancy between the values study, suggests robbery. A non-permanent transfer is also set up inside the meter to trigger the meter once its miles tampered with. Furthermore, the user is supplied with a far flung get entry to to the energy meter for recharging electricity units and for tracking electricity intake. It became located that the machine correctly measured load consumption and detect any try and by means of-pass or tamper with the electricity meter. Lastly, all unscrupulous attempts had been reported using GSM era. This study has especially centered to expand a IOT Based Prepaid Smart Metering System which could be able to address some of the demanding situations presently to be had in the regular virtual automated metering gadget in Eurasia. Smart Metering with its unique performance with the Internet of Things (IoT) have a tendency to be an efficient device for power control, se- remedy in opposition to the intervention by way of third events, and dependable for tracking and actual-time faraway tracking. Hence, this assignment paintings is finished via analysing available functions and journals on the prevailing design of Smart Metering and discussed on in addition prime utility. In the currently working system, electricity meter studying for energy utilization and billing is carried out by means of human employees from domestic to home and building to homes. The purpose of this challenge is to develop a Smart Electricity meter the use of GSM. This can reduce human mistakes and allows to retrieve the real time meter value thru GSM and send it to clients cell smartphone thru GSM. This additionally al- lows power board to adjust the variable package price in precise length. The administrator can examine the customers energy intake statistics and generate the record from the information online. The prototype might be able to introduce the billing system to the clients, get the strength intake information from smart meter, preserve the statistics in centralized database and generate the record

***Keywords*— IOT, Energy meter, GSM**

I. INTRODUCTION

In the present system, electric meter studying for electricity utilization and billing is executed with the aid of human people who go to homes/buildings to collect this studying. This requires a huge number of employees and working hours to collect the complete records and generate bills. Billing achieved in this manner is vulnerable to reading errors. It can be time-eating, restrained and slowed down due to unfavourable environmental situations wherein employees won't be capable of go to houses. Paper bills may be without difficulty misplaced while distribution as post-box mailing isn't always usually reliable. In a rustic like India with a big number of distinctly dense population (residential housing and industrial buildings) requires substantial manpower and working hours to finish the titanic challenge of series accurate meter readings. These finally increases the power provider's operation fee which trickles down to consumer's energy bills being extended. The paper introduces a solution to address the problem confronted with the aid of both the clients and the distribution companies. This work uses the smart power meter which makes use of the features of embedded structures if you want to put in force the desired functionalities. The raspberry pi and colour sensors (TCS 3200) are used that counts the overall variety of LED blinks situated on electric meters. This is an upload-directly to existing electric powered meter. A consumer tracks its strength uses the usage of a customized advanced web site or smart App and take movements as in step with his choices It ought to be used very judiciously for its proper usage. But in our country, we have lot of localities where we have surplus deliver for the power at the same time as many areas do now not even have get admission to to it. Our rules of its distribution are also in part accountable for this due to the fact we're nonetheless no longer able to efficaciously estimate our genuine requirement and nonetheless energy robbery is triumphing. On the alternative hand, customers also are now not satisfied with the services of electricity corporations. Most of the time

they have proceedings regarding statistical errors within the month-to-month payments. With this we will monitor meter and music if any fault is there or now not. In previous meter a circular metallic strip rotates and in keeping with that rotation we calculate the consumption. But our meter works on pulse that's created according to intake and we previously linked an- droid board which monitor the heart beat and consistent with pulse the invoice is generated. With the assist of this task, we're aiming to acquire the monthly electricity intake from a far flung area directly to centralized workplace. In this way we will lessen human efforts needed to record the meter readings which can be until now recorded through traveling every home in my opinion. Smart electricity meter is an digital tool that measures the most accurate amount of energy fed on through a residence, enterprise or any electrically-powered tool. A clever meter is dependable supply for maximum correct information of fed on strength that reduces the risk of mistakes in the present billing machine to minimal.

II. LITERATURE SURVEY

Paper Name: IoT Based Smart Meter

Author Name: Abdullah Irfan, Syed Zulqadar Hassan∗, Rohan Ahmed, Irfan Ishaq, Amir Zahoor, Tasawar Murtaza, Muhammad Farhan Masood

Year: 2019

Summary: A clever meter is designed for each commercial and home users. The meter is accountable for acquiring statistics, displaying and updating/uploading over the cloud to permit the grid proprietor to get admission to that statistics, screen and take respective moves (if important). The models are designed using Arduino (Uno and Mega). Wireless connectivity is accomplished through Bluetooth modules and circuits are designed to depict the real operations of the system. Power consumption is measured and displayed to the person and transmitted to the cloud via Wi-Fi provider or cellular community.

Paper Name: NPP: IoT based totally Energy Meter with Smart Monitoring of Home Appliances

Author Name: Vishnukant V. Gavhane, Mayuri R. Kshirsagar, Ganesh M. Kale, Shubham Katangle, Dr. S. B. Deosarkar

Year: 2021

Summary:

This machine uses Arduino Mega 2560 microcontroller as the main controlling unit. The capabilities of this project are of two sorts i.E., an power meter with virtual show and tracking of home appliances using IoT. For strength meter the microcontroller is interfaced with a voltage sensor (ZMPT101B) and a modern sensor (ACS712). The values are stated and the gadgets are measured with the corresponding values and thus price is calculated. As a hearth safety measure, a flame sensor is being brought with a relay. It is used in case of a short circuit or any mishap. The output obtained is proven on the sixteen*2 LCD module. The readings gathered is despatched to the cloud storage (Thingspeak) over Wi-fi, in which it's miles recorded and analysed in graphical form. Monitoring of the house home equipment is finished via interfacing the 8-channel relay module to Arduino Mega

Paper Name: IoT based Monitoring and Optimizing of Energy Utilization of Domestic and Industrial Loads

Author Name: Dr. Santhosh. P, Arun Singh. K S, Ajay. M, Dr. Gaayathry K,

Year: 2021

Summary:

The smart electricity meter provides accurate electricity intake information in the approach of character hundreds. In this proposed machine, the s mart power meter includes NodeMCU which speak and control all of the technique thru IOT. The power intake by using the info received by the voltage sensor and present day sensor and also the character patron hundreds are frequently monitored and controlled by means of IOT. Smart meter is meant for each domestic and industrial purposes. The meter is responsible for acquiring records, from the obtained information character and the whole power intake has been calculated to reveal and updating/transmitting over the cloud database to allow the purchaser to collect that facts, take a look at and take corresponding movements, if wanted. The models are designed the use of Arduino (Node MCU).

Paper Name: IoT Based Smart Digital Electric Meter for Home Appliances

Author Name: Ayodeji Olalekan Salau, Lekhika Chettri, Tshering Kiden Bhutia, Mayalmit Lepcha

Year: 2020

Summary:

The proposed machine is developed to permit consumer's reveal of their energy usage. This enables users to recognize the fee in their every day energy usage. This enables set off customers to decrease their strength intake. Since the gadget is interfaced with an android application, the person is capable of monitor his utilization in real-time. In recent times, Android devices have gained extensive software. These devices at the moment are becoming ubiquitous with a big range of people, colleges, homes, and agencies using android gadgets. The proposed architecture of the equipment based totally digital electric meter This module includes a current sensor (ACS712) and an Arduino UNO microprocessor. The modern sensor calls for values of

the mains voltage and modern-day flowing via the wire connected to the unit whose power consumption is to be measured. The obtained records is transmitted to the Arduino microcontroller which does the important calculations to decide the real energy utilization. The result of the calculations is sent via a WIFI module and are displayed by way of the android application

Paper Name: Design, Implementation, and Deployment of an IoT Based Smart Energy Management System

Author Name: M. USMAN SALEEM, M. REHAN USMAN, AND MUSTAFA SHAKIR,

Year: 2021

Summary:

Work accomplished in this paper affords huge-ranging load control and monitoring scheme for electrical and aggregated home equipment, collectively with hardware capable of tracking and comparing grid efficiency parameters in real-time. External load control (e.G., aircon and lighting systems) is also to be had and the addition of the software program framework permits the evaluation of the grid parameters of deployed facilities by means of producing various control reviews. The hardware utilized to satisfy this concept includes an wise SM designed to fulfill the technological characteristics It is an affordable platform designed the use of MSP430F67641 micro controller unit (MCU) for there-section strength monitoring and nodeMCU for growing bi-directional wireless interface with the Ent rack-primarily based management platform

III. OBJECTIVES

- Remotely monitor energymeter
- Datasecurity
- Reduce costtime.

IV. METHODOLOGY

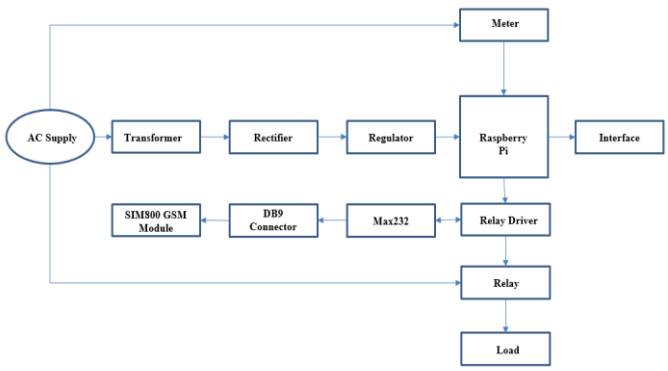

Fig:- System Architecture

This strength meter billing plus load control the use of GSM machine is directly connected with 230V ac. Because this gadget normally consists of electronic additives which might be operated at five or 6V dc consequently 230v ac is stepped right down to 9 or 6v ac with the assist of step down transformer. Then those ac voltages are transformed into dc with assist of bridge rectifier after which these are regulated into 5V dc with the assist of voltage regulated LM 7805. LCD display, Max232, relay motive force and microcontroller are powered up with this voltage regulator. Microcontroller is the essentially foremost sensible controller of this system. It is interfaced with relay driver, power meter, LCD display and GSM modem with the help of interfaced device MAX 232. The energy meter is interfaced to a microcontroller of RPI. The strength meter readings also are examine by way of the microcontroller and displayed on an LCD Screen; this facts is also sent via SMS through a GSM modem interfaced to the microcontroller. The GSM modem additionally has SMS receiving capability. On receiving particular user request, it sends required sign to the microcontroller in an effort to do counting for required operation. This mechanism requires the clients to pay for the energy before its consumption. On that manner, customers keep credit and then use the energy until the credit is ended. If the to be had credit score is ended then the electricity supply is cutoff through a relay. Readings made with the aid of operators are prone to errors. This mission indicates the above noted troubles. These system will first check in the user. For making recharge the purchaser have to must login to the gadget. The username and password should create to login then it'll test for the consumer is valid or now not via server. It can able to recharge thru user telephone app only if the user is permitted person. As recharge ends it will reduce off the power.

V. CONCLUSION

This mission has provided an IoT based smart power control machine. An Electronic Meter Automation Device has been evolved which can be established on an antique meter. This device mounting directly to the old meters can make them act as a smart meter. A webpage and smart App were evolved. The meters can be without difficulty accessed via custom designed internet pages, smart App and the notification can be sent the usage of SMS. Meters can be grew to become ON and OFF automatically once a user exhausts its pay as you go threshold cost or via the smart App. Large-scale facts collection is in the system and in future, we plan to deploy few smart meters in locality other than the college to look the real household response of our gadget.

VI. FUTURE SCOPE

In destiny, this undertaking can be implemented and confirmed in far flung regions. Future upgrades can be

integrated to in shape the gadget for 3 segment electric powered distribution system in India. Along with all these new architectural additives can be incorporated, so that the gadget can be absolutely used for optimizing the strength intake. This approach will reduce the energy wastage and keep a number of power for future use Measurement of parameters like power line present day and electricity line voltage has now not been available in a pleasant way to optimize energy community management. But due to development in gift technology we are able to give better method to detect the power robbery.

ACKNOWLEDGMENT

The heading of the Acknowledgment section and the References section must not be numbered.

Causal Productions wishes to acknowledge Michael Shell and other contributors for developing and maintaining the IEEE LaTeX style files which have been used in the preparation of this template. To see the list of contributors, please refer to the top of file IEEETran.cls in the IEEE LaTeX distribution.

REFERENCES

[1] Anitha.k ,prathik, "Smart Energy Meter surveillance Using IoT" ,Institute of Electrical and Electronics Engineers(IEEE), 2019.

[2] Devadhanishini, et.al" "Smart Power Monitoring Using IoT"5th International Conference on Advanced Computing & Communication Systems (ICACCS) 2019.

[3] Mohammad Hossein Yaghmaee Design and Implementation of an Internet of Things Based Smart Energy Metering" 6th IEEE International Conference on Smart Energy Grid Engineering 2018.

[4] Himanshu kpatel "arduino based smart energy meter" 2nd Int'l Conf. on Electrical Engineering and Information &Communication Technology (ICEEICT) 2018.

[5] "Bibek Kanti Barman, et.al" proposed paper "smart meter using IoT" department of international electronics and electrical engineering (IEEE) 2017.