DESIGN AND IMPLEMENTATION OF SMART ENERGY MONITORING SYSTEM USING IoT

Sachin K [1], Brunda P D [2], Navya [3], Jyoti Donur [4], Ajitha [5]
Dept. of Electronics &communication Engineering
[1] *Assistant Professor,* [2,3,4,5] *final year BE student AIET, Mijar, Moodbidri.*

Abstract— **In spite of numerous endeavors, Energy emergency is the current day issue and it is deteriorating step by step. To conquer the present circumstance individuals are finding different energy proficient assets. Among them, power is the primary concern which should be observed and controlled. With the ascent in force utilization in all aspects of the world there is a resulting ascends in force burglary and over use of intensity. This paper focuses on smart energy meter that eases the work of human. The GSM technology introduced eliminates all the drawbacks by absolutely automating the energy meter .i.e. the meter readings area unit taken and detected mechanically and detected units area unit often sent to the asking purpose mistreatment the GSM and corresponding bills area unit calculated and sent to the user at the right time. It reduces the time; it reduces the human men, and can offer correct readings. This method replaces ancient energy meter reading strategies and permits remote accessing of existing energy meter by the energy supplier. They will monitor the readings often while not visiting the person's house.**

Index Terms — **Smart Energy Meter, Internet of Things (IoT), Global System for Mobile Communications (GSM), Wireless Fidelity (Wi-Fi), webpage.**

I. INTRODUCTION

Urbanization brings about increment of private and business loads at higher rate in developing countries, It will prompts an interest supply setback in various countries. The electrical energy use in India is the third most prominent after China and USA with 5.8% overall proposal in 2019.The per individual energy use rate in India is closer to 0.7 KW. India's proposal with overall energy solicitation will rise to 9% by 2035. To beat the condition people are finding diverse energy compelling resources.

A Smart Energy Meter (SEM) is an electrical gadget having energy meter chip for electric energy burned-through estimation and for advanced correspondence Smart energy meter, which utilizes the features of embedded structures for instance blend of hardware and programming to execute needed helpfulness. The paper clarifies about assessment of Arduino and various regulators, and the utilization of GSM and Wi-Fi modems to introduce 'Smart' idea. With the usage of GSM modem the purchaser similarly as expert association will get the used energy scrutinizing with the different whole, Consumers will even get cautioning in the construction text through GSM when they will show up at their edge regard which shoppers have set. Likewise with the help of Wi-Fi modem the consumers can screen there consumed perusing and can set the edge a motivation through page. The framework engages the power division to peruse the meter readings month to month without an individual visiting each house. The system will be accomplished by the use of Arduino unit that unendingly screen and records the energy meter studying in its lasting (non-unpredictable) memory space. The Arduino perpetually records the studying and therefore the live meter studying will be shown on page to the customer on solicitation. The system framework will be used to detach the force offer of the house once needed.
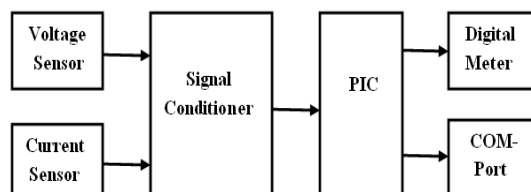

Fig. 1: Block diagram of Digital Energy meter

II. LITERATURE SURVEY

[1] A model which intends to control and screen power utilization of a specific zone or area. The planned model screens the force utilization of the end clients and removes the force supply when it surpasses as far as possible. The gadget sends the force utilization information to the provider's blynk worker utilizing IoT innovation. The proposed model can be set before the transmission of the heap in each place of that specific region. It comprises a meter that produces a consistent unit beat which can speak with network through an Internet passage WI-FI. With the assistance of web availability, correspondence will be conceivable between end-client and the provider. The provider can screen and control the force utilization of the end client from a distant spot. Alongside that the gadget sends notice to the provider about status of intensity devoured and information sheet will produce utilizing lab view.

[2] SEM used to measure voltage, current and calculate the facility consumption of a unit. The obtained knowledge is employed as a feedback to watch the energy consumption and build the user aware once the load exceeds. Provision of remote shift of appliances is additionally provided. Keeping seeable the pricey science available appliances the sensible shift mistreatment relays provides a viable choice to persist with the traditional appliances. Additional analysis will be dispensed on the spec, communication technology and dedicated mobile application for knowledge analysis. The appliances will be simply accessed through platforms like MQ measuring Transport (MQTT) and therefore the notification will be sent mistreatment Short Message Service (SMS). Offer relays will be turned ON and OFF mechanically once a user exhausts its paid threshold price. Individual relays with the appliances even have variety of benefits i.e. the devices will be on an individual basis disconnected if not required then, even from a distance and may be reconnected mechanically. The planned device helps within the property usage of energy and saves or reduces any further charge charges because the customers are awake to their usage at real time. Therefore energy management is dispensed and thus saving generations.

 [3] A review of prepaid energy meter, which can deal with the utilization of force on consumer's side to keep away from wastage of force power. Since there is need to utilize energy in better and beneficial way, prepaid energy meter winds up being an asylum in the force area. The huge drawback of a post-paid system is that there is no control of usage from the consumer's side. There is a lot of wastage of force power in light of consumer's absence of arranging of electrical use in a capable way. Since the stock of intensity is confined, as a capable resident, there is a need to utilize power in a predominant and capable way. The course association needs to get a huge whole through impending bills, which achieves extensive pay disasters and besides impediments to modernization because of nonappearance of resources.

[4]A model of SEM utilizing GSM is proposed. The project targets to proposing a framework that will reduce the loss of power and income because of power thefts and other illegal operations. By accepting this method Consumers hold credit and a while later use the force until the credit is depleted. If the available credit is depleted, by then the force supply is cut-off by hand-off. A game plan is made to suggest the customer with the assistance of GSM correspondence module when the credit yet to be resolved goes low. The framework has been proposed as an inventive answer for the issue of moderateness

in utilities structure. Since a microcontroller based structure is being arranged, the readings can be consistently recorded. This reduces human work and simultaneously expands the proficiency in calculation of bills for used power. Smart energy meters will bring a solution of making care on unnecessary wastage of power and will in general reduce wastage of power. The module will reduce the weight of energy giving by developing the association effectively and no theft of power will happen.

[5] In SEM using IoT and Arduino, Arduino is used because it is energy efficient i.e. consumes less power, fastest and has two Universal Asynchronous Receiver-Transmitters (UARTS). In this method, energy meters which are as of now introduced at our homes are not replaced, however a small adjustment on the generally introduced meters can change the existing meters into smart meters. The utilization of GSM module gives an element of warning through SMS. One can easily access the meter working through page that we planned. Current perusing with cost can be seen on page. Programmed ON and OFF of meter is conceivable. Limit esteem setting and sending of warning is the extra undertaking included. The engendered model is utilized to figure the energy utilization of the family, and even make the energy unit perusing to be convenient. Subsequently it decreases the wastage of energy and brings mindfulness among consumers. Indeed, even it will deduct the manual intervention.

[6] A SEM which is utilized to limit the power larceny. Fundamentally, energy meter is a device that calculates the power consumed by home, business or an electrical device. Energy meter is associated through remote innovation, which gives unwavering quality. The energy meter gives the phenomenon of recognizing power robbery and consequently cuts the power of untrustworthy client. It checks the situation with energy meter and limits power larceny which assists with diminishing the power cut. The framework is minimal effort for the continuous energy the board. It gives a few energy meters that consistently screen associated loads communicating with Micro regulator by means of remote. The proposed Smart Meter organization can be effortlessly introduced in a home and in ventures with the likelihood to checking the different burdens. Identifying an issue in appropriation framework should be possible by imparting between the distribution transformer and the consumer's energy meter. In the event that there is supply in the transformer and no supply in the buyers end it implies that there is a line shortcoming between the customer and the distribution transformer.

[7] Prepaid energy meter which can handle the use of power on consumer side to stay away from wastage of power. Prepaid energy meter is an idea to limit the power theft with an expense productive way. The clients not will undoubtedly pay overabundances measure of cash; clients need to pay as per their necessity. Prepaid energy meter is more dependable and easy to use. The prepaid far off energy meter ends up being a shelter in the power area. The system is also capable of detecting the tampering of meter by the customer's. Proposes a new system based upon Arduino microcontroller to protect the energy meter from meter tampering. The proposed system reduces the thefts as it automatically cut off the power whenever proposes prepaid energy meter that utilizes Light Dependent Resistor (LDR) sensor, GSM, Relay and 16*2 LCD display. SMS automatically send to utility worker through Global System for Mobile (GSM) network when these actions distinguished. A novel technique is proposed to solve

the issue with AMR frameworks without influencing its significant benefit of far off checking. Incorporating this new component into smart meters gives a robust metering solution.

[8] Smart meter for energy management system using microcontroller to gather the insights of power utilizations, power quality and can interface devices for load relocation. The device is described by simple admittance to the data and the combination of a smart meter and information correspondence, ability permit nearby and far off access. It is possible to deal with the power utilization of the power framework to driving a general decrease in utilization and expenses. Web server allow with the collection the information and analysis the data's to present the visual presentation periodically, so better energy management scheme can be implemented. Not only measurements relating to the quantity of electricity used, however additionally permit the client to manage temperature, humidity of a particular environment. The mix of a particularly smart meter with a suitable correspondence framework could give distant access and facilitate planning.

[9] An Arduino and a GSM based smart prepaid energy meter have been proposed. Units are bought by utilizing GSM innovation and those units are concluded by power utilization. The task presents a solitary stage energy meter for homegrown customers with prepayment charging strategy. The proposed brilliant meter has highlight to advise the buyer about energy utilization. The critical favored outlook is the limit of the framework to refresh the current traditional meters into keen prepaid meters with an association of Arduino and GSM. It dispenses with the troubles by direct contact by representative and customer to getting the perusing of the customary meter and furthermore decreases of blunder in bill. The proposition framework comprises of two sections: customer's side part and worker side. The customer part comprises of a RFID reader, Master cards, GSM organization, Arduino microcontroller and electronic meter. The framework works with high precision which could tell the client the measure of energy devoured at any second and these outcomes the client will be encouraged to support energy utilization.

[10]In an IoT based smart metering system utilizing a Composite Design technique, the work gave a straightforward and helpful arrangement as an energy utilization rate remote meter. The exploration created Arduino based energy utilization rate meter for private homes utilizing multidisciplinary ideas in Mechatronics. The framework includes continuous interest side administration utilizing composite plan approach (CDM). It includes the metering and cloud worker bunch units. The work presented ACS712 Hall Effect current sensor, Arduino Uno (with ATmega328 chipset), and SIM800L GSM modules to accomplish the framework functionalities. The plan depiction on supervisor run-time climate empowered direct troubleshooting in the open source Integrated Development Environment (IDE). The framework was effective in estimating current, power utilization and furthermore handling the expense caused by a client. These measurements are conveying the energy utilization and cost to the cloud worker. It makes simpler for clients to see utilization rate pervasively.

III. CONCLUSION

A Smart energy meter with a complete design and different methodology is introduced in the above papers and follows the different designs.GSM based energy meter is beneficial for both supplier and consumer. Sensor frameworks are utilized to detect the different qualities. Since a microcontroller based framework is planned, the readings can be continuously recorded. This reduces human work.

REFERENCES

[1] Harsha Khandel, Suchitra Pandey and D. Reynolds,IoT based power consumption monitoring and controlling system, International Research Journal of Engineering and Technology (IRJET), Volume: 05 Issue: 07 July 2018.

[2] Aiswarya Ajay, Akhil Mohan, Mekha Nair M I,Vrinda A R, Ms. Shilpa George, IoT Enabled Energy Management Meter. International Research Journal of Engineering and Technology (IRJET), Volume: 07 Issue: 07| July 2020.

[3] Akshay T, Maneesh T, Rejith M.R, Rohith V, Sruthi K.R, Lakshmi.R, Prepaid Energy Meter with Home Automation. International Research Journal of Engineering and Technology (IRJET), Volume: 05 Issue: 04| Apr-2018.

[4] Shivprasad S. More, Ketaki K. Korane, Akshaykumar K. Khamkar, Aditya V. Jadhav, Nachiket C. Keripale, Ajay B. Shinde, Prepaid Energy Meter System, International Research Journal of Engineering and Technology (IRJET), Volume: 07 Issue: 06 | June 2020.

[5] Monish Mohan, Gachu Krishnan, Dias Antony, S. Ramraj, K. Chithra, IoT Based Smart Electricity Meter Reading and Control System, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 7, Issue 3,March 2018.

[6] M Jhansi, K Pushpa Rani, Smart Energy Meter for DetectingFraudulent Electricity Connections, International Journalof Mechanical Engineering and Technology (IJMET), Volume 8, Issue 7, July 2017.

[7] Jesteena, Baswaraj Gadgay, Mallesh Hatti, Smart Energy Meter using Arduino UNO, International Journal for Research in Applied Science & Engineering Technology (IJRASET), Volume 7, Oct 2019.

[8] Sumathi.S, Meenakshi.G, Ashok, Smart Meter for Energy Management, International Journal for Research in Applied Science & Engineering Technology (IJRASET), Volume 3, Issue 1, Jan 2015.

[9] K.P. Nithya, J.Jason, D.Srikanth, I.Ranjan, R. Praveen, Smart Meter Reading and Theft Control System by Using GSM, International Journal of innovative Research in Technology, Volume 5, Issue 10, March 2019.

[10] R. Al-Hiji, N. Al-Harrasi, and Z. Al-Mufargi, Implementation of Smart Energy Meter Using Arduino GSM Technology, Journal of Information and Computational Science, vol. 9, no. 11, p. 11, 2019.