IOT-BASED SMART ENERGY METER FOR EFFICIENT ENERGY UTILIZATION IN SMART GRID USING ESP 8266 12E

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ABSTRACT

Efficiency in energy use plays a critical role in the development of the smart grid in the power system. Hence, a key priority of the intelligent grid is optimal power consumption monitoring and management. One of the main issues with the existing power metre gadget is that there is no full duplex communication. A sophisticated power metre that is entirely based on the Internet of Things is suggested as a solution to this issue (IoT). The suggested smart electricity metre calculates and manages power usage using ESP 8266 12E, a Wi-Fi module, and uploads the results to the cloud where the customer or producer may examine the results. As a result, customer-level energy analysis becomes more easier and more manageable. This gadget additionally helps in detecting electricity theft. Thus, this clever meter helps in domestic automation the usage of IoT and enabling wi-fi conversation which is a terrific step closer to Digital India.
Keywords: Smart Grid, Energy Meter, Internet of Things.

INTRODUCTION

An interconnected system of smart gadgets that can exchange data is known as the internet of things (IoT). The "thing" in the Internet of Things (IoT) is an object that has been given an IP address and the capability to collect and transfer data over a network without the need for human assistance or intervention. Examples of such objects include a person wearing a heart monitor or a car with built-in sensors. The items' inherent technology enables them to interact with interior conditions or the outside world, which has an impact on the choices made. Given the world's rapid expansion and progress, the energy crisis has grown significantly. Power usage has to be analyzed and controlled by a suitable system. The current system is labor-intensive, error-prone, and time-consuming [1]. The values that we get from the existing system are not precise and accurate though it may be digital type but it is always necessary that a concern person from the power department should visit the consumer house in order to note down the data and error can get introduced at each and every step. Therefore, the remedy for this solution is smart energy meter. The smart grid plays a great role in our present society. Tens of millions of the people"s daily life will be degraded dramatically because of the unstable and unreliable power grid [2]. Smart meter is a reliable status real time monitoring, automatic collection of information, user interaction and power control device [3]. It provides a two way flow of information between consumers and suppliers providing better controllability and efficiency. IoT based energy meter system mainly consists of three major parts i.e. Controller, Wi-Fi and Theft detection part. Whenever there is any fault or theft, the theft detection sensor senses the error and circuit response according to the information it receives. The controller plays a major role in the system making sure all the components are working fine. Therefore, IoT can improve the performance and efficiency of the smart grid mostly in the three phases. Firstly, it increases the reliability and durability. Secondly, it focuses on enablement i.e. collection and analyzation of data to manage active devices within the smart grid. Lastly, controlling can be done by analyzing the result obtained from the second phase whichhelps the grid department to make fine decision for future upliftment. The energy meter available till now can only control and monitor the energy consumption of customers. Smart energy meter developed using power line communication (PLC) helps in power loss [11]. Several system using Arduino as well as microcontroller have been developed though the efficiency to measure power consumption drastically increased but due to cost effective it may not be considered as the suitable one. The consumer cannot have a good and accurate track of the energy consumption on a more interval basis .The conventional meter has some of the common errors like.

Time consuming.

Chance of theft.

Error while taking the information and extra human involvement.

LITERATURE SURVEY

Anitha et al., [1] proposed "Smart strength meter surveillance the usage of IoT" about IoT, net of matters as an rising discipline and IoT primarily based gadgets have created a revolution in electronics and IT. The major goal of this mission is to create cognizance about power consumption and. environment friendly use of domestic home equipment for strength savings. Due to guide work, present electrical energy billing gadget has principal drawbacks. This gadget will supply the facts on meter reading, strength reduce when strength consumption exceeds past the particular restriction the use of IoT. The Arduino esp8266 micro controller is programmed toper structure the goals with the assist of GSM module. It is proposed to overcome all the negative aspects in the already current power meter. All the important points are despatched to the consumer"s cellular thru the IoT and the GSM module and it is additionally displayed in the LCD. It is a time financial savings and it helps to take away the human interference the use of IoT.

Devadhanishini et al., [2] "Smart Power Monitoring Using IoT" that strength Consumption is the very necessary and difficult issue. Automatic Electrical Energy meter is used in massive electric powered electricity distribution system. The integration of the Arduino WIFI and SMS affords the gadget as Smart Power Monitoring system. Smart power meter offers records for optimization and lessthe strength consumption. This gadget additionally consists of a movement sensor such that if there is no human in residence or residence it will mechanically flip off the energy supply. Mohammed Hosseiu et al., [3] introduced a paper titled "Design and implementation of clever meter the usage of IoT" describing the boom of IoT and digital technology. The future electricity grid wants to be applied in a disbursed topology that can dynamically take in one-of-a-kind strength sources. IoT can be utilized for more than a few functions of the clever grid consisting strength consumption, clever meter, electric powered energy demand facet administration and more than a few vicinity of strength production. In this paper, the Smart Energy Metering(SEM) is defined as the predominant reason of SEM is indispensable for amassing statistics on power consumption of family home equipment andreveal the environmental parameters and supply the required offerings to domestic users. Himanshu K Patel et al., [4] validated "Arduino primarily based clever power meter" that eliminates human intervention in meter readings and consignment era thereby decreasing the error that typically reasons in India. The gadget consists the provision of sending an SMS to person for replace on strength consumption alongside with closing invoice era alongside with the freedom of reload by using SMS. The disconnection of energy grant on demand or due to pending dues used to be carried out the use of a relay. The machine employs GSM for bidirectional communication. Bibek Kanti Barman, et al., [5] proposed "smart meter the usage of IoT" on environment friendly electricity utilization performs a very quintessential function for the improvement of clever grid in energy system. Hence perfect monitoring and controlling of strength consumption is a most important precedence of the clever grid. The power meter has manyissues related to it and one of the key troubles is there is no full duplex conversation to remedy this problem, a clever power meter is proposed primarily based on Internet of Things. The clever power meter controls and calculate the consumption of electricity the usage of ESP 8266 12E, a Wi-Fi module and ship it to the cloud from the place the purchaser or purchaser can look at the reading. Therefore, electricity take a look at hasbeen with the aid of the patron turns into an awful lot less difficult and controllable. This gadget additionally helps in detecting strength loss. Thus, this clever meter helps indomestic automation the usage of IoT Garrab et al., [6] proposed AMR method for strength saving in Smart Grids the usage of Smart Meter and partial Power Line Communication" on the elevating demand of energy. Smart meters are one of the proposed options for the Smart Grid. In this article, an AMR answer which offers specific end-to-end application. It is based totally on an power meter with low-power microcontrollerMSP430FE423A and the Power Line Communication standards. The microcontroller consists of an electricity metering module ESP430CEl Landi et al., [7] introduced "ARM-based Energy administration device the use of clever meter and Web server about a less costly real-time ARM-based electricity administration system. An built-in Web Server helps to acquire the data of strength consumptions, electricity nice and is to interface gadgets for load displacement. The gadget is used to get right of entry to the information. In this way it is feasible to control the energy consumption of the electricity device main to a consumption of power.

Koay et al., [8] defined "Design and implementation of Bluetooth strength meter" described around the 12 months 2004, digital meter has started out to change the electromechanical meters in Singapore. A wi-fi digital energy meter would offer larger comfort to the meter studying task. Bluetooth technological know-how is a feasible wi-fi answer to this issue. The electricity reader can accumulate the energy consumption studying from the strength meter wirelessly based totally on Bluetooth. Two techniquesthat can retrieve the meter studying with little human intervention, are brought and applied in the centered applications, they are Automatic meter reading(AMR) and the Automatic polling mechanism(APM). Some industrial functions are utilized for the Bluetooth-enabledpower meter.

PROPOSED SYSTEM

In the proposed approach the patron can deal with their vitality utilization with the aid of understanding their vitality use time to time. The approach no longer simply offers two route interchanges amongst utility and customer but in addition offers specific capacities that are if the patron neglects to pay the energy cost the vitality provide would be chopped down from the utility aspect and as soon as the invoice is paid the vitality provide is reconnected. In addition with the current machine progressive to consist of an alert message to the consumer strength bump off for 15 days once, consistent alert message with repayments important points and electricity utilization till the fee is done. To keep away from the similarly consumption of energy, we are putting a restriction for every family and if the restrict exceeds techniques are used to reduce down the home equipment in accordance to the consumer comfort each mechanically and manually. If there is a fault in e-meter it additionally sends a notification to the user. IOT Server - Cayenne.com is used as a cloud server. Cayenne is a first on-line builder/tool to create IOT projects. Voltage and modern values are always saved in server. Alerts can be scheduled in a server. The proposed framework for the most section works in two modes.
1. Automatic Mode 2.Manual Mode
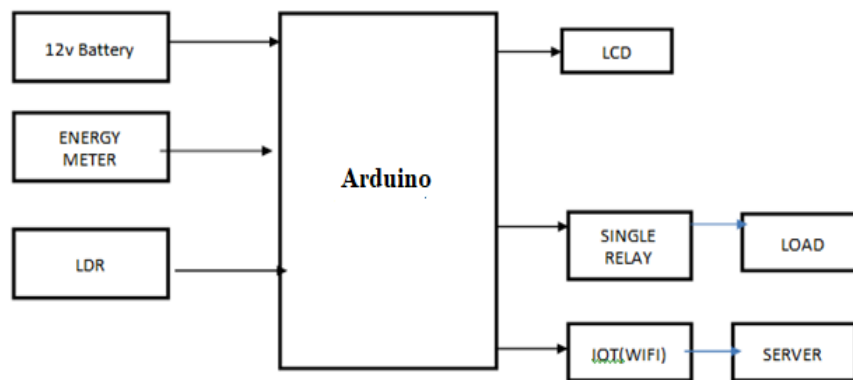
Fig.1: Block diagram of the project.

RESULTS AND DISCUSSIONS

After detecting the data from different sensor devices, which are positioned in particular area of interest. The sensed data will be automatically sent to the web server, when a proper connection is recognized with sever device. The web server page which will allow us to monitor and control the system. By entering IP address of server which is placed for monitoring we will get the equivalent web page. The web page gives the information ofthe Energy parameters in that particular region, where the embedded monitoring system is placed.
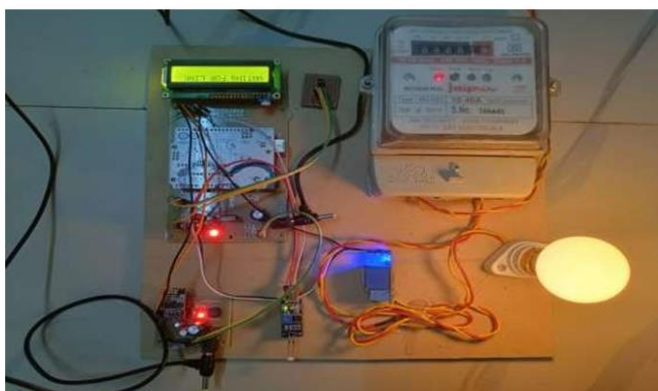
APPLICATIONS
1. Residential and commercial building in a public energy supply system
2. Municipal corporation
3. Public power sources
4. MSEB
5. Govt. energy plant

ADVANTAGES
1. To reduce wastage of energy.
2. Prevent electricity shortage during dry seasons.
3. Make every customer a self-interested guardian of the power (energy) supply.
4. Real time bill monitoring.
5. Time reduced receiving bill.

CONCLUSION

Smart strength monitoring device consists of Arduino, WI-FI, strength meter. The device mechanically reads the electricity meter and offers domestic automation thru an app developed and electricity administration carried out thru this application. The proposed gadget consumes much less power and it will limit guide work. We can acquire month-to-month electricity consumption from a faraway place immediately to centralize office. In this way we minimize human effort wanted to report the meter studying which are until now recorded by using traveling the home individually.

REFERENCES
1. Alkali, A.H., Dada, E.G., Kida, A.M. and Ali, A.A.,. "Sunlight and Rainfall Activated Retractable Roof", International Journal of Computer Engineering and Applications, 12(11), pp.1-12, 2018
2. Maryam OmarOmar Bin SaminOmar Bin SaminImran and AhmedImran Ahmed, "Smartshed: An Automatic Shed System Based On Rain, Temperature And Light Intensity",Conference: International Conference on Science, Innovation and Management (ICSIM 2019)At: Bangkok, Thailand April 2019.
3. Abhijit G Kalbande, "Mart Automation System Using Arduino and Rain Drop Sensor", International Journal Of Current Engineering And Scientific Research (Ijcesr), Volume-4, Issue-6, 2017.
4. https://patents.google.com/patent/US7909048B2/en
5. Reddy, P.A., Prudhvi, G.S., Reddy, P.S.S. and Ramesh, S.S., Automatic rain sensing car wiper 2018. [6] Balathandapani, R., Boopathi, D., Jotheeshwaran, S., Arundeva, G. andSaranya, C. "Automatic rain water and crop saving system using embedded technology". International Journal of Science, Engineering and Technology Research (IJSETR), 4(3), 2015.
6. Ajay, A., Shivashankar, P.S. and Sunil, D.M.,"Agriculture Crop Protection With Rain Water Harvesting And Power Generation.
7. Mazidi, M.A., Mazidi, J.G. and McKinlay, R.D., The 8051 microcontroller and embedded systems: using Assembly and C (Vol. 626). Pearson/Prentice Hall. 2006.
8. Alazzawi, L. and Chakravarty, A., "Design and implementation of a reconfigurable automatic rain sensitive windshield wiper". International Journal of Advances in Engineering & Technology, 8(2), p.73, 2015.