Smart Energy MeterMonitoring Using MQTT Protocol

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Abstract- IoT is the Growing innovation that we are utilizing in the Smart City, Smart Grid, Smart Home Automation, Automobiles and so on. In Smart Grid framework are utilized to disperse power proficiently where insignificant vitality misfortune can be overseen. Vitality Meter is one of the key segments of the keen lattice framework. Customary vitality meter can't be utilized with the cutting edge keen lattice that straightforwardly manages the IoT. In this framework we are proposing the IOT based Smart Energy Meter that we can build up the vitality meter utilizing the Energy Meter, Controller, WIFI Module, QT Based Web Application. Keen Energy Meter for a programmed meter perusing and charging framework. In the Energy Meter is specifically associated with the Controller and payload it can give the voltage and current as Analog. Information will be transmitted through the WIFI Module through the web server in that we are utilizing the MQTT convention to transmitting the information. The information will be refreshed persistently on the server and we can check Web Application graphically utilizing the QT.

Keywords- Energy Meter, Arduino Uno, ESP8266, Cloud Application.

I. INTRODUCTION

Savvy meter is a propelled vitality meter that estimates the vitality utilization of a purchaser and gives added data to the utility by utilizing a two-way correspondence conspire. Purchasers are better educated to that utilization of their vitality, with the goal that they can settle on better choices when they are utilizing the vitality. The possibility of the programmed meter perusing innovation is perusing the meter consequently and exact. Vitality meter frameworks can be interfaced with inserted controllers, for example, GSM modem to transmit the information over the portable system. The issue of productively gathering information from an extensive number of appropriated GSM Modems in the vitality meters is as yet a testing issue. Controller interfaced with vitality meter perusing frameworks, WIFI module and GSM modem to control. The reference number ought to be appeared in square section [1]. Anyway the creators name can be utilized alongside the reference number in the running content. The request of reference in the running content should coordinate with the rundown of references toward the finish of the paper. In savvy metering framework which is utilized for computing power use utilization. IoT based the vitality meter there has been lessening and controlling the vitality utilization. In this paper the WIFI to transmitting the information through the server utilizing the MQTT convention. The information will be transferred on the server. Vitality supplier can deal with the information and the client can check the information at what is the power utilization in earlier month on that based the client controlled the Power Consumption. In this paper there is made one Web Based Application made in Qt Software.

II. RELATED WORK

In Existing System of the Energy Meter is it found anyplace so it keeps up cost increment. Meter Reading is likewise Problematic in light of the fact that it is physically, Sometime meter peruser taken wrong perusing so it isn't trustable, In Rainy Season meter peruser has investigate to taken the information, Bill appropriation Process is additionally long, and Major issues is Energy Theft these are the fundamental issue in Existing System

Over Come Existing System

To conquer the current System moved to the Smart Energy Meter. In the Smart Meter Author can be utilized to the Energy Meter, Arduino Uno, ESP8266, MQTT Protocol, Qt Creator every one of these parameters to consolidate that Power utilization detail will be Securely Transmitted to the Server[2].

III. MQTT PROTOCOL BASICS

MQTT (MQ Telemetry Transport) is a lightweight informing convention that furnishes asset compelled arrange customers with a straightforward method to circulate telemetry data. The convention, which utilizes a distribute/buy in correspondence design, is utilized for machine-to-machine (M2M) correspondence and assumes an imperative job in the web of things. MQTT empowers asset obliged IoT gadgets to send, or distribute, data about an offered subject to a server that capacities as a MQTT message merchant. The intermediary at that point drives the data out to those customers that have beforehand bought in to the customer's theme. To a human, a theme resembles a various leveled document way. Customers

can buy in to a particular level of a point's progressive system or utilize a special case character to buy in to numerous levels. The MQTT convention is a decent decision for remote systems that experience fluctuating levels of inertness because of periodic data transfer capacity limitations or problematic associations. Should the association from a buying in customer to an intermediary get broken, the dealer will cradle messages and drive them out to the endorser when it is back on the web. Should the association from the distributing customer to the representative be separated without notice, the merchant can close the association and send endorsers a reserved message
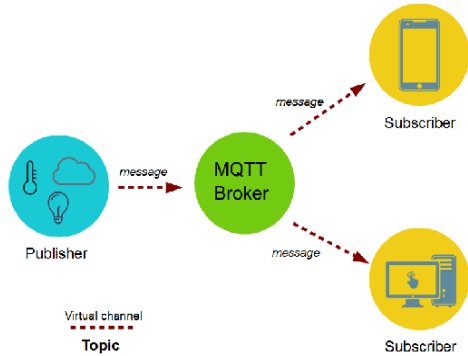


with guidelines from the distributer.

A MQTT session is isolated into four phases: association, verification, correspondence and end. A customer begins by making a TCP/IP association with the intermediary by utilizing either a standard port or a custom port characterized by the specialist's administrators. While making the association, perceive that the server may proceed with an old session on the off chance that it is furnished with a reused customer personality.

The standard ports are 1883 for non-scrambled correspondence and 8883 for encoded correspondence utilizing SSL/TLS. Amid the SSL/TLS handshake, the customer approves the server testament to validate the server. The customer may likewise give a customer declaration to the dealer amid the handshake, which the specialist can use to validate the customer. While not particularly part of the MQTT detail, it has turned out to be standard for intermediaries to help customer validation with SSL/TLS customer side endorsements. Since the MQTT convention means to be a convention for asset obliged and IoT gadgets, SSL/TLS may not generally be a choice and, at times, probably won't be wanted. In such cases, confirmation is displayed as a reasonable content username and secret key that is sent by the customer to the server as a feature of the CONNECT/CONNACK parcel succession. A few representatives, particularly open intermediaries distributed on the web, will acknowledge unknown customers. In such cases, the username and secret word are essentially left clear.

MQTT is known as a lightweight convention since every one of its messages have a little code impression. Each message comprises of a settled header - 2 bytes - a discretionary variable header, a message payload that is restricted to 256 MB of data and a nature of administration (QoS) level. The three diverse nature of administration levels decide how the substance is overseen by the MQTT convention. Albeit larger amounts of QoS are more dependable, they have more inactivity and data transfer capacity necessities, so buying in customers can determine the most elevated QoS level they might want to get. The least difficult QoS level is unacknowledged administration. This QoS level uses a PUBLISH parcel arrangement; the distributer makes an impression on the representative one time and the merchant passes the message to supporters one time. There is no component set up to ensure the message has been gotten accurately, and the representative does not spare the message. This QoS level may likewise be alluded to as at most once, QoS0, or fire and overlook. Amid the correspondence stage, a customer can perform distribute, buy in, withdraw and ping activities. The distribute task sends a double square of information (the substance) to a subject that is characterized by the publisher. MQTT underpins message BLOBS up to 256 MB in size. The configuration of the substance is application-particular. Subject memberships are made utilizing a SUBSCRIBE/SUBACK bundle combine. Un-membership is correspondingly performed utilizing an UNSUBSCRIBE/UNSUBACK bundle match. Numerous specialists trust that MQTT will assume an imperative job in the web of things, encouraging such things as stock following, car telematics, asset observing and therapeutic body region systems (MBANs). The convention is ceaselessly enhancing and now bolsters Web Sockets, another convention that empowers two-path correspondence among customers and specialists progressively.

IV. PROPOSED SYSTEM

The Proposed System is separated into three sections, for example, Energy Measuring Unit, Controller Part, and Software. Fig.1 shows the Proposed System.
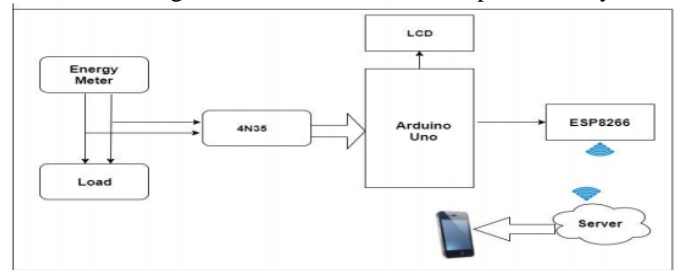
In this System the 3200impulse/KWh Energy Meter is utilized. The Load is specifically associated with meter and the drive of the meter O/P is associated with the 4n35 optocoupler IC. The O/P of the Optocoupler is associated with

the Arduino. So the Arduino will check the beats of the meter to how much vitality devoured by the heap. On that based Arduino will ascertain the power and show on the LCD[3].Fig. 2 Example of an unsatisfactory low-goals picture.

Here the ESP8266 WiFi module is associated with the Arduino. So it will send the devoured information on the server utilizing ESP8266. So client can check the utilization of the Power by load.
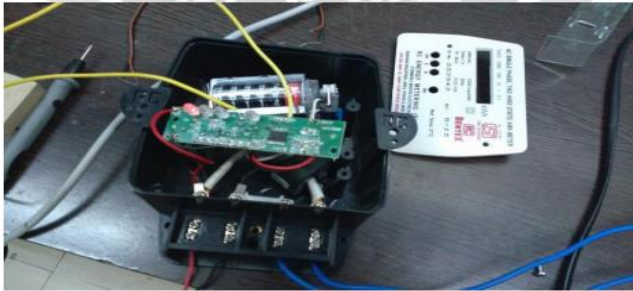
2.1 Upload Data On Server

Here the O/P of the Wi-Fi is transferred on the Server. Here Author will utilized the ThingspeakIoT stage. It gives the all administrations with respect to the IoT and furthermore there is GUI. So we can change on our prerequisites. Here the information is transferred on the Thingspeak specifically time cut So it can transferred Continually.
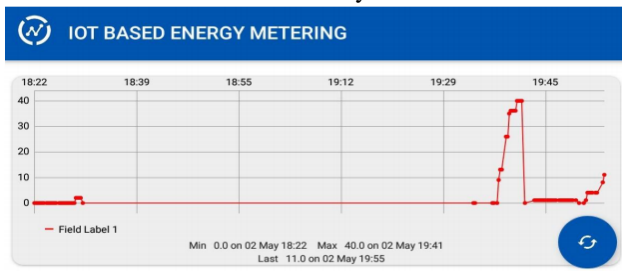

Fig -3: Upload Data on Thingspeak

3. GUI based Application Design GUI based Application utilizing QtCreator.GUI running on base station and SQLite database. In this UI is planned in Qt Creator. It is famous Graphical User Interface that utilized in implanted Linux and Windows. Qt Creator is free and open source programming. Qt is a cross-stage application and UI structure for composing web-empowered applications for versatile, work area and implanted working frameworks. Some mouse occasions in GUI are utilized so on that based we structure the application like snap occasion, Button, Slider,etc.

3.1 Database of Billing System First we make the database for creating the Billing System. So here SQLite database is utilized for producing the Billing structure.

In this database there are Five client record is store. Which contains Consumer No, Bill Month, Consumption, Bill Amount, Due Date, Consumer Name, Address, and Password. In the event that any new client include then it has produce

this all things[4]. Utilizing the Qt Creator the creator will make one Billing structure to for data of the client Details like Consumer No, Consumption of Power, Amount, Bill age , Bill Due Date, Consumer name, Address. These everything is transferred on the databased. So the client need to simple to check your information utilization the client can likewise check the historical backdrop of the expended information and furthermore observe the graphically utilization. So client can straightforward, quicker process, No vitality robbery problem[6].

V.   CONCLUSIONS
The implanted innovation is grows quick and the plan of GUI application is vital and fundamental instruments of it. This framework will make simplicity of perusing and diminish mistake in perusing and revealing. It builds up an estimation framework and GUI application dependent on Qt Creator/Embedded that will graphically demonstrates the deliberate information. Moreover, it will enhance metering, charging effectiveness and precision, in this way contributing the vitality practically. Likewise, it will dispense with manual meter perusing framework, checking the perusing framework all the more expediently, making it plausible to utilize vitality assets all the more creatively and given that continuous information helpful for adjusting electric hardware loads or loads gear and lessening vitality blackouts.

VI.   REFERENCES
[1]. MstShahnajParvin and SM LutfulKabir. A framework of a smart system for prepaid electric metering scheme. In Informatics, Electronics Vision (ICIEV),2015 International Conference on, pages 15. IEEE, 2015.
[2]. Nayan Gupta and Deepali Shukla. Design of embedded based automated meter reading system for real time processing. In Electrical, Electronics and Computer Science (SCEECS), 2016 IEEE Students Conference on, pages 16. IEEE, 2016.
[3]. Hao Zhang, Qijun Chen College of Electronics and Information, Tongji University, Shanghai, P.R.ChinaChunchiGu, "Design and Implementation of Energy Data Collection System UsingWireless Fidelity (Wi-Fi) Module and Current Transformer," in ,2014 IEEE Internrnational Conference on System Science and Engineering(JCSSE), Shanghai,China, July 11-13 2014.
[4]. MdMasudurRahman, MohdOhidul Islam, MdSerazusSalakin, et al. Arduinoandgsm based smart energy meter for advanced metering and billing system. InElec-trical Engineering and Information Communication Technology (ICEEICT), 2015International Conference on, pages 16. IEEE, 2015.
[5]. Ravi Ramakrishnan and Loveleen Gaur. Smart electricity distribution in residential areas: Internet of things (iot) based advanced metering infrastructure and cloud analytics. In Internet of Things and Applications (IOTA), International Conference on, pages 4651. IEEE, 2016.
[6]. RohitBhilare and Shital Mali. IoT based smart home with real time e-metering using e-controller. In2015 Annual IEEE India Conference (INDICON), pages 16. IEEE, 2015.