

MQTT Based Smart Energy Measuring System

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ABSTRACT

IoT is the Growing technology that we are using in the Smart City, Smart Grid, Smart Home Automation, Automobiles etc. In Smart Grid system are used to distribute electricity very efficiently where minimal energy loss can be managed. Energy Meter is one of the key components of the smart grid system. Traditional energy meter cannot be used with the next generation smart grid that directly deals with the IoT. In this system we are proposing the IOT based Smart Energy Meter that we can develop the energy meter using the Energy Meter, Controller, WIFI Module, QT Based Web Application. Smart Energy Meter for an automatic meter reading and billing system. In the Energy Meter is directly connected to the Controller and payload it can give the voltage and current in the form of Analog. Data will be transmitted through the WIFI Module through the web server in that we are using the MQTT protocol to transmitting the data. The data will be updated continuously on the server and we can check Web Application graphically using the QT.

Keyword : - Energy Meter , Arduino Uno, ESP8266, 4n35 IC, Qt Application

1. Introduction

Smart meter is an advanced energy meter that measures the energy consumption of a consumer and provides added information to the utility by using a two-way communication scheme. Consumers are better informed to that consumption of their energy, so that they can make better decisions when they are using the energy.

The idea of the automatic meter reading technology is reading the meter automatically and accurate. Energy meter systems can be interfaced with embedded controllers such as GSM modem to transmit the data over the mobile network. The problem of efficiently collecting data from a large number of distributed GSM Modems in the energy meters is still a challenging problem. Controller interfaced with energy meter reading systems, WIFI module and GSM modem to control. The reference number should be shown in square bracket [1]. However the authors name can be used along with the reference number in the running text. The order of reference in the running text should match with the list of references at the end of the paper.

In smart metering system which is used for calculating power usage consumption. In the IoT based the energy meter there has been reducing and controlling the energy consumption.

In this paper the WIFI to transmitting the data through the server using the MQTT protocol. The data will be uploaded on the server. Energy provider can manage the data and the customer can check the data at what is the power consumption in previous month on that based the customer controlled the Power Consumption. In this paper there is created one Web Based Application created in Qt Software.

1.1 Existing System

In Existing System of the Energy Meter is it located anywhere so it maintains cost increase. Meter Reading is also Problematic because it is manually, Sometime meter reader taken wrong reading so it is not trustable, In Rainy Season meter reader has troubleshoot to taken the data, Bill distribution Process is also long, and Major issues is Energy Theft these are the main problem in Existing System[5].

1.2 Over Come Existing System

To overcome the existing System moved to the Smart Energy Meter. In the Smart Meter Author can be used to the Energy Meter, Arduino Uno, ESP8266, MQTT Protocol, Qt Creator all these parameters to combine that Power consumption detail will be Securely Transmitted to the Server[2].

2. Proposed System

The Proposed System is divided into three parts such as Energy Measuring Unit, Controller Part, and Software Part. Fig.1 shows the Proposed System.

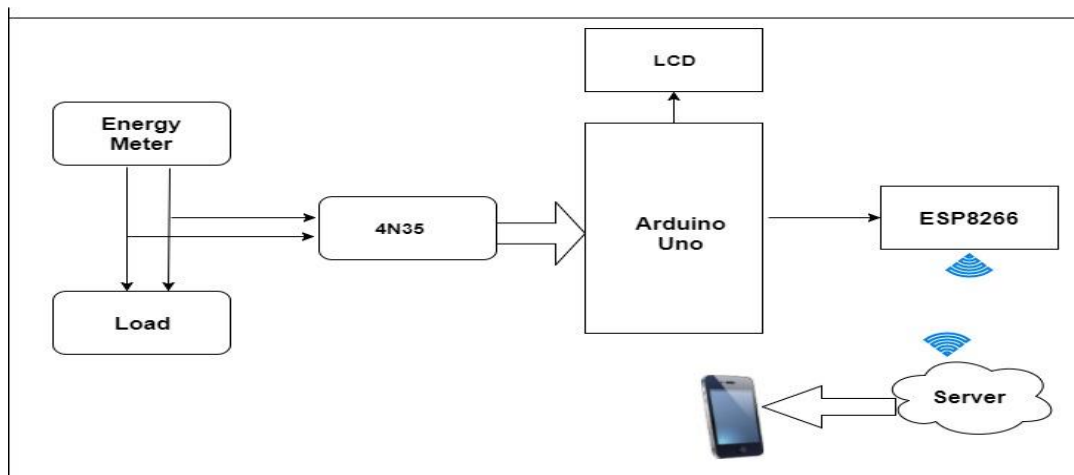


Fig.1: Proposed Model

In this System the 3200impulse/KWh Energy Meter is used. The Load is directly connected to meter and the impulse of the meter O/P is connected to the 4n35 optocoupler IC. The O/P of the Optocoupler is connected to the Arduino. So the Arduino will count the pulses of the meter to how much energy consumed by the load. On that based Arduino will calculate the power and display on the LCD[3].

Here the ESP8266 WiFi module is connected to the Arduino. So it will send the consumed data on the server using ESP8266. So user can check the consumption of the Power by load.

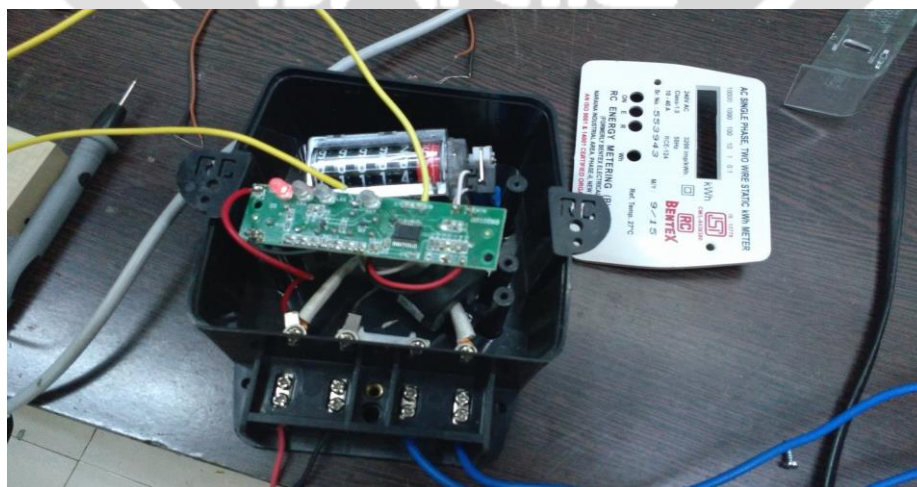


Fig -2: Energy Meter

2.1 Upload Data On Server

Here the O/P of the Wi-Fi is uploaded on the Server. Here Author will use the Thingspeak IoT platform. It provides all services regarding the IoT and also there is a GUI. So we can change our requirements. Here the data is uploaded on the Thingspeak in particular time slice so it can be uploaded continually.

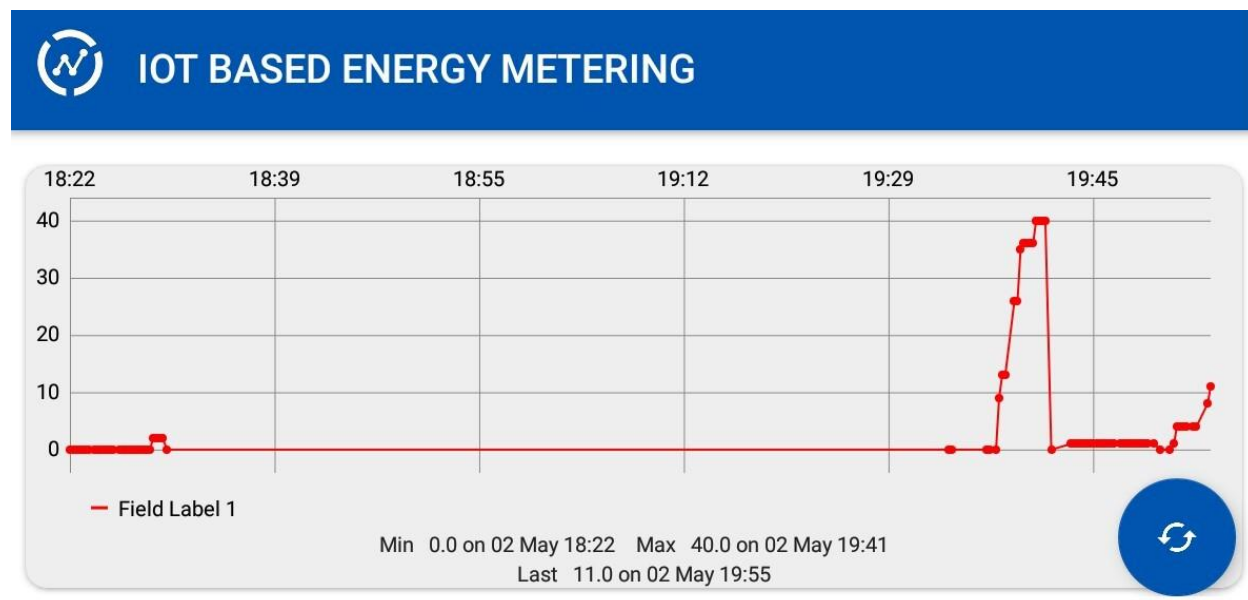


Fig -3: Upload Data on Thingspeak

3. GUI based Application

Design a GUI based application using Qt Creator. GUI running on base station and SQLite database. In this user interface is designed in Qt Creator. It is a popular Graphical User Interface that is used in embedded Linux as well as Windows. Qt Creator is free and open source software. Qt is a cross-platform application and UI framework for writing web-enabled applications for mobile, desktop and embedded operating systems. Some mouse events in GUI are used so on that basis we design the application like click event, Button, Slider, etc. [3]

3.1 Database of Billing System

First we create the database for generating the Billing System. So here SQLite database is used for generating the Billing form.

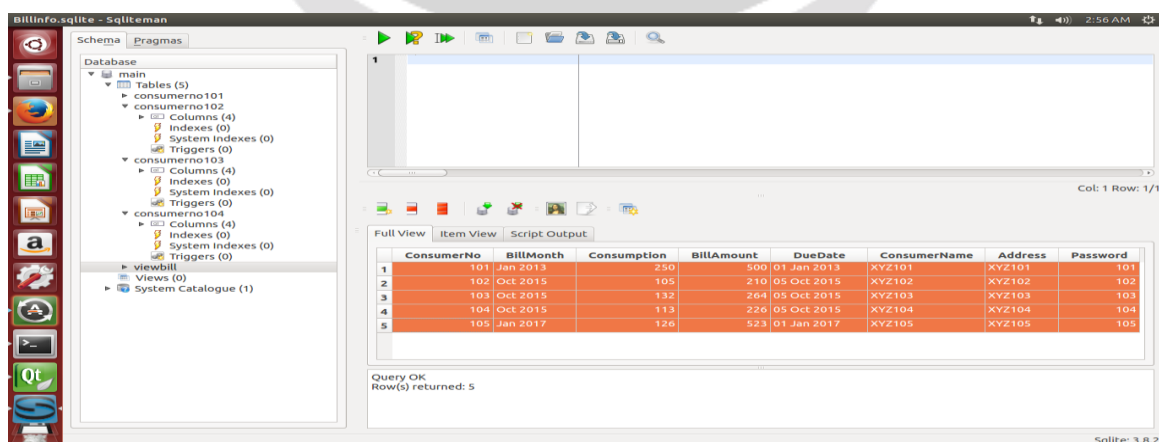


Fig -4: Database of Billing System

In this database there are Five user record is store. In that there is Consumer No, Bill Month, Consumption, Bill Amount, Due Date, Consumer Name, Address, and Password. If any new user add then it has generate this all things[4].

Using the Qt Creator the author will create one Billing form to for information of the user Details like Consumer No, Consumption of Power, Amount, Bill generation , Bill Due Date, Consumer name, Address. These all things are uploaded on the databased. So the user want to easy to check your data consumption the user can also check the history of the consumed data and also see the graphically consumption. So user can very easy to understand, faster process, No energy theft problem[6].



Fig-5: Graphically viewing by Bill

4. CONCLUSIONS

The embedded technology is develops fast and the design of GUI application is important and essential mechanisms of it. This system will make ease of reading and reduce error in reading and reporting. It develops a measurement system and GUI application based on Qt Creator/Embedded that will graphically shows the measured data. Furthermore, it will improve metering, billing efficiency and accuracy, thereby contributing the energy in a maintainable way. Also, it will eliminate manual meter reading system, monitoring the reading system more speedily, making it probable to use energy resources more resourcefully and given that real-time data useful for balancing electric equipment loads or loads equipment and reducing energy outages.

5. REFERENCES

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