An IoT based Smart Energy Meter Monitoring System using Android Application

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Abstract: *The headway of the Internet of Things has been arising step by step. The Internet of Things (IoT) spins association that implanted with gadgets, programming, sensors, actuators that help clients in observing and controlling gadgets from a distance and proficiently. In the IoT based framework article and living being are given extraordinary identifiers with the capacity to move information. The area of IoT has intensified from the intermingling of remote advances, microelectromechanical frameworks and the Internet. These days IoT innovation is being applied in numerous areas like power, gas, water and so forth to make our life computerized. These days because of the inordinate utilization of the web, these regions become modernized and online installment framework makes conceivable. However, getting to meter perusing is a manual interaction and has the chance of blunder which causes high income cost .This innovation works with the evaluation of energy utilization and investigation of information for charging and installment. This innovation expects to bring the gadget on the web and associating gadget with the web which is in other term Internet of Things. This innovation utilizing remote correspondence is less expensive than wired medium. Thus, WiFi is more reasonable for the proposed framework as it is extremely considered normal in each home.*

Keywords: Energy Meter

I. INTRODUCTION

The headway of the Internet of Things has been arising step by step. The Internet of Things (IoT) spins association that implanted with gadgets, programming, sensors, actuators that help clients in observing and controlling gadgets from a distance and proficiently. In the IoT based framework article and living being are given extraordinary identifiers with the capacity to move information. The area of IoT has intensified from the intermingling of remote advances, microelectromechanical frameworks and the Internet. These days IoT innovation is being applied in numerous areas like power, gas, water and so forth to make our life computerized. These days because of the inordinate utilization of the web, these regions become modernized and online installment framework makes conceivable. However, getting to meter perusing is a manual interaction and has the chance of blunder which causes high income cost .This innovation works with the evaluation of energy utilization and investigation of information for charging and installment. This innovation expects to bring the gadget on the web and associating gadget with the web which is in other term Internet of Things. This innovation utilizing remote correspondence is less expensive than wired medium. Thus, WiFi is more reasonable for the proposed framework as it is extremely considered normal in each home.

 As per statistic, the quantity of cell phone clients on the planet was 2.87 billion of every 2017 . The level of android telephone client in Bangladesh was 79.21% in December 2017 . This measurements shows utilization of Android telephones in the country. Thus, we pick the Android stage to execute our framework.

The aggregate sum of introduced power age limit (counting hostage power) in Bangladesh is 15,351 megawatts (MW) assessed in January 2017. In 2015, 92% of the metropolitan populace and 67% of the provincial populace approach the office of power. Individuals need to check their power meter perusing physically. In Bangladesh, there are certain individuals who don't comprehend meter perusing. Consequently, they don't have the foggiest idea about the pre-owned measure of power.

The point of the work is to plan and foster a continuous minimal expense energy meter observing frameworks incorporated with an android application.

The remainder of the paper is coordinated as follows.

Area II surveys the connected papers lined up with the proposed framework. Area III makes sense of the model of the proposed framework. Area IV shows the outcomes and investigation. Area V finishes up with impediment and future bearings.

II. LITERATURE REVIEW

Lately tremendous exploration and papers have proposed the plan and improvement of energy meter checking framework. In Here We proposed a Wi-Fi put together shrewd meter based with respect to IoT. Here We utilized an Energy meter which shows carefully on portable, ESP8266 Wi-Fi module and a web application for the UI. The ESP8266 Wi-Fi module has appended into the meter. The ESP8266 Wi-Fi module has been executed for method for correspondence between the meter and web application for example BLYNK. The proposed framework is gotten and open source. In Communication conspire has been proposed and created programming in light of BLYNK. In An introduced a review report on the use of savvy power meters and a few vital a Meter Reading based Power Meter with Wi-Fi parts of the metering system. As well as any open doors emerging because of the coming of Date are featured. In the proposed a framework where Arduino Uno Software has been screen every one of the important exercises in the progression of power, the utilization of flow and power units and referenced any desire for lessening the issues related with installment, compute the expense of the unit of power. In proposed a continuous checking framework for private energy meter. The introduced framework gave comprehensive and constant admittance to energy utilization to the customer by taking advantage of the headway of IoT innovation.

III. PROPOSED METHODOLOGY

This part examines the design and working standards of the proposed energy meter observing framework. It likewise shows the gadget interconnection of parts while working progressively.

3.1 Architecture
The engineering of the proposed framework is partitioned into three significant parts. They are
1. Wiring
2. Coding
3. Blynk application arrangement

A. Wiring
In this Intially, we need to associate Acs712 sensor to Node MCU.so that we can quantify current first interface gnd of sensor to gnd Of nodeMCU , VCC of the sensor to Vin of nodeMCU, then, at that point, associate sensor result to the A0 pin of Node MCU.
Then, at that point, there are two focuses to Energy Meter that are Phase and Neutral ,Connect Phase to Switch one point and Neutral to the one mark of socket , and staying single places of switch and attachment interface with sensor.

B. Coding
Transfer code to nodeMCU, For that need to change three things in the code


```
char auth[] = "****************************";
char ssid[] = "****************************";
char pass[] = "****************************";
```

Change this three things and transfer the code into nodeMCU

C. Blynk Application Setting
It is a very image process. First we need to download Blynk from play store and sign into the Email with the goal that we can see power, current, watt hour and unit energy consumed by the gadget
Setting Up Blynk Application
Blynk is an application that runs over Android and IOS gadgets to control any IoT based application utilizing Smartphones. It permits you to make us IoT application. Here we will show the IoT Energy Meter Data on Blynk Application.

1. So download and introduce the Blynk Application from Google Play Store. IOS clients can download from the App Store. When the establishment is finished, open the application and sign-up utilizing your Email id and Password.
2. From the dashboard make another task and select ESP8266 and Wifi Connection.
3. Then, at that point, drag and drop gadgets and dole out the variable according to code and afterward email the validation code.
4. We will get the confirmation code via the Email . Duplicate this confirmation code. This will be utilized in our code.
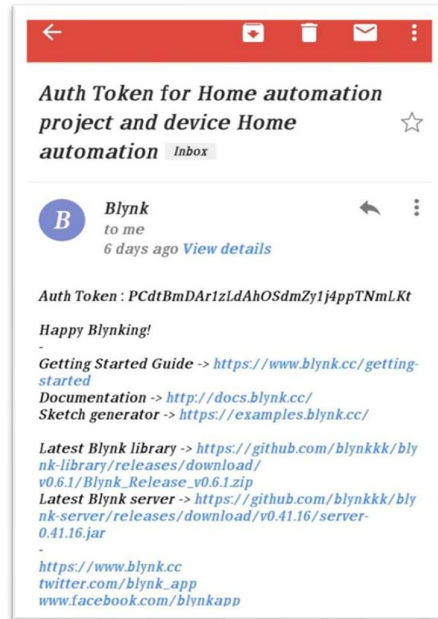
Required Library Installation
A. ESP8266 WiFi Library
It gives a capacity to effectively WiFi correspondence utilizing ESP8266 from your sketch by means of the sequential on like Arduino UNO, Leonardo and MEGA. Likewise this library has a troubleshoot yield office can screen the communicated and got information

B. Blynk_Library
Blynk is the most famous Internet of Things stage for interfacing any equipment to the cloud, planning applications to control them, and dealing with your sent items at scale. With Blynk Library we can interface north of 400 equipment models including Arduino, ESP8266 and ESP32 to the Blynk.

Fig. : Proposed Model

Stream of the Process

At first, the gadget is being mounted on an energy meter. Venture can be partitioned into Three sections –

1. Wiring
2. Coding
3. Blynk application arrangement

Initially, we need to interface Acs712 sensor to Node MCU.so that we can gauge current First associate gnd of sensor to gnd Of nodeMCU , VCC of the sensor to Vin of nodeMCU, then, at that point, interface sensor result to the A0 pin of Node MCU.

Then, at that point, there are two focuses to Energy Meter that are Phase and Neutral ,Connect Phase to Switch one point and Neutral to the one place of socke , and staying single marks of switch and attachment interface with sensor.

1. Blynk confirmation key
2. WiFi ID
3. WiFi secret phrase.

Change this three things in code and transfer the code into nodeMCU.

Downloading Blynk from play store and sign into the Email with the goal that we can see power, current, watt hour and unit energy consumed by the gadget.

Thus, This is the working of Project. By utilizing this we can without much of a stretch Monitor Energy Meter on our Mobile Phone.

The gadget contains an Arduino Uno programming of rendition 1.8.9 where coding part finished.

The sensor works out current,voltage from the electric meter and converts it to the decipherable information. Those information will be put away on the particular ID of the application. The clients can see the android application and recovered results in like manner.
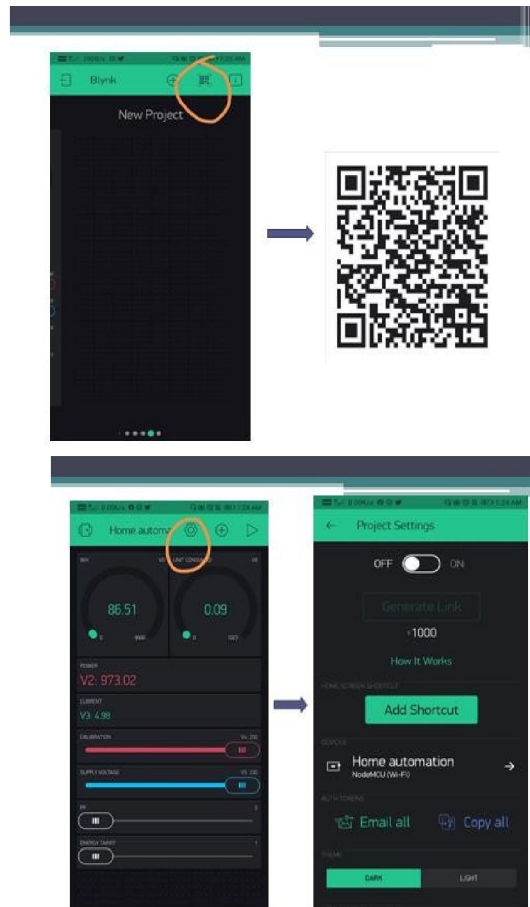
IV. RESULTS & DISCUSSION

In this part, we talk about the most common way of observing power, current, watt hour and unit energy consumed by the gadget. In todays world, tremendous exploration have proposed the plan and improvement of energy meter observing framework. This proposed a Wi-Fi put together shrewd energy meter based with respect to IoT. Here We have utilized an ESP8266 Wi-Fi module and a web application for the UI. The ESP8266 Wi-Fi module has joined into the meter. The proposed framework is secure. An Automatic Meter Reading based energy Meter with Wi-Fi Communication has been proposed and created programming in view of Arduino IDE 1.8.9.

This application empowers the client to control their power utilizations in the house by being familiar with the utilization of force whenever. It maintains a strategic distance from the human mediation lessens the expense, save human power. It works both consequently and physically. This meter sends charging straightforwardly to portable before due date without causing human mediation.

We can screen our Energy Meter by utilizing Blynk Application. . It can screen power, current, watt hour and unit energy consumed by the gadget. Sets aside time and cash via mechanizing far off information collection . Meter sends charging straightforwardly to versatile before due date without causing human mediation.

V. CONCLUSION

The proposed framework can diminish the sufferings of the client and make clients worry about the over the top utilization of power as well as defective gadgets at home. Through this framework, clients can without much of a stretch view complete units and all out expenses of power. The framework is effectively discernible and dependable.

In this manner checking and keeping histories of our power utilization is a simple undertaking here. To mechanize this, we have utilize the Internet of Things. The Internet of Things sets aside time and cash via computerizing distant information assortment. Shrewd Energy Meter has gotten a considerable amount of praise across the globe lately.

REFERENCES

[1]. Q. M., Ashraf, M. I. M., Yusoff, A. A., Azman, N. M., Nor, N. A. A., Fuzi, M. S., Saharedan, & N. A. Omar, "Energy monitoring prototype for Internet of Things: Preliminary results", In 2015 IEEE 2nd World Forum on Internet of Things (WF-IoT), IEEE, pp. 1- 5, Dec. 2015.

[2]. C. C., Aggarwal, N., Ashish, & A., Sheth, "The internet of things: A survey from the data-centric perspective", In Managing and mining sensor data, pp. 383-428, Springer, Boston, MA, 2013.

[3]. S., Karthikeyan, & P. T. V., Bhuvaneswari, "Iot based real-time residential energy meter monitoring system", In 2017 Trends in Industrial Measurement and Automation (TIMA), IEEE, pp. 1-5, Jan. 2017.

[4]. "Number of smartphone users worldwide from 2014 to 2020 (in billions)", 2018. [Online]. Available: https://www.statista.com/statistics/330695/number-of- smartphone-users-worldwide/ [Access:16-oct- 2018]

[5]. "Market share of mobile operating systems in Bangladesh from January 2016 to April 2019, by month", 2019. [Online].Available: https://www.statista.com/statistics/528256/mobile- operating-system-share-in-pakistan/ [Access: 9- Jun-2019]

[6]. "Electricity sector in Bangladesh", 2018. [Online]. Available: https://en.wikipedia.org/wiki/ Electricity_sector_in _Bangla desh#cite_note-5 [Access: 16-oct-2018]

[7]. Applications, IEEE, pp. 403-407, May. 2009.

[8]. D., Alahakoon, & X., Yu, "Smart electricity meter data intelligence for future energy systems: A survey", IEEE Transactions on Industrial Informatics, 12(1), pp. 425- 436, 2015.

[9]. N., Anggraini, A., Fiade, & M. Fauzan, "Flow measurement of charges and electricity costs monitoring system with android based Iot (case study: Boarding house Adelina)", In 2017 5th International Conference on Cyber and IT Service Management (CITSM), IEEE, pp. 1-5, August, 2017.

[10]. Build anything on Android. Available: https://developer.android.com/ [Access: 16-oct- 2018]

[11]. Firebase Cloud Database. [Online] Available: https://firebase.google.com/?gclid=Cj0KCQjw3PLn BRCp