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IOT Based Smart Electric Energy Meter Using ES8266

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Abstract: Electricity is one of the prime needs of the humans in our day to day life keeping a track on the consumption of electricity is very important as it is useful in the saving of Electricity. We have created an IOT based project which is used for keeping a track on electric consumption. This IOT based smart electricity energy meter is based on the ESP8266 module and adruino application , this ESP8266 module is helpful for sending the data to the required device and arduino application is used to monitor it. In the project we use both the current and voltage meters for measuring of the quantities ,these measured quantities are been processed and stored in the ESP8266 module and are been transferred to the connected device thus in this way we can always keep a track on the consumption of the energy.

I. INTRODUCTION

In the current billing framework, the consumer can't monitor the changing energy consumptions. If the operator missed to take the reading of the electricity consumptions, then the consumer gets the average electricity bill based on previous months, years of energy consumption. The solution for every one of these issues is to keep track of the consumer's load on timely basis, with the help of real time automatic reading technology . This can be done by using the accurate reading and billing system based on IOT based smart energy metering. The energy consumption can't be tracked by consumers as most of the consumers are not able to understand the energy consumption by just taking the glance of the meter display. Also, the consumers have to check the meter and check for billing date in the case of missed reading from the operator. If consumers will check their energy consumption on their mobile instead of checking energy meter, it will become very suitable for electricity consumers in the space of energy management. The Internet of things (IOT) is the internet operating things embedded with software, sensors, and network connectivity. The IOT system gathers the information and exchange the information with the appropriate framework. In the planned system, energy meter is connected to the IOT framework . There should be a provision for the consumers to trace their energy consumption from time-to-time, so that the consumer can track or manages consumption over the period of consideration. This system is useful for the permanent consumers and the provider. This system permits the provider to disconnect the association from a far-off server just in case the consumer fails to pay his/her electricity bill. This system eliminates the interference of human throughout the disconnection and reconnection of the load. In this project, we will learnhow to make our own **IoT Based Electricity Energy Meter** using **ESP8266** & monitor data on the **ANDROID Application**. With the current technology, you need to go to the **meter reading** room and take down readings. Thus monitoring and keeping track records of your **electricity consumption** is a tedious task. To automate this, we can use the Internet of Things. The Internet of Things saves time and money by automating **remote data collection**. Smart **Energy Meter** has received quite a lot of acclaim across the globe in recent years. So, why not to build our own **IoT Based Electricity Energy Meter**.We need to select the **current sensor** We will interface the CT- with **ESP8266Wifi Module** & Send the data to android Application. The **android Application** Dashboard will display the, *Current, Power & total unit consumed in kWh*.

II. SOFTWARE USED

A. Aurdino Simulator

Arduino IDE - All the software programing is written in Arduino integrated development environment (IDE). Arduino IDE is open-source software which makes it easy to write code and upload it to the board. The programing is done in C language. After finalizing the program and required logic, the hex file of the program is created by using compiler. The hex file is then uploaded to ESP32 microcontroller [4]. In the program there is some loops created according to flow chart given below. If the consumers Limit is reached, then the message will be given to the user. Then after that if the consumer increase their limit then normal flow is going on. But if then not increase their limit, then there may be condition of cut the supply occurs.

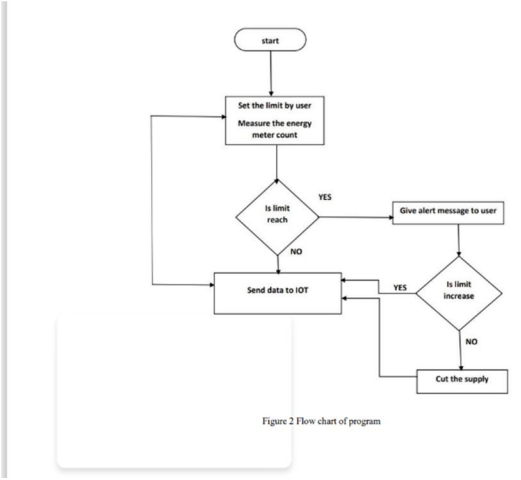
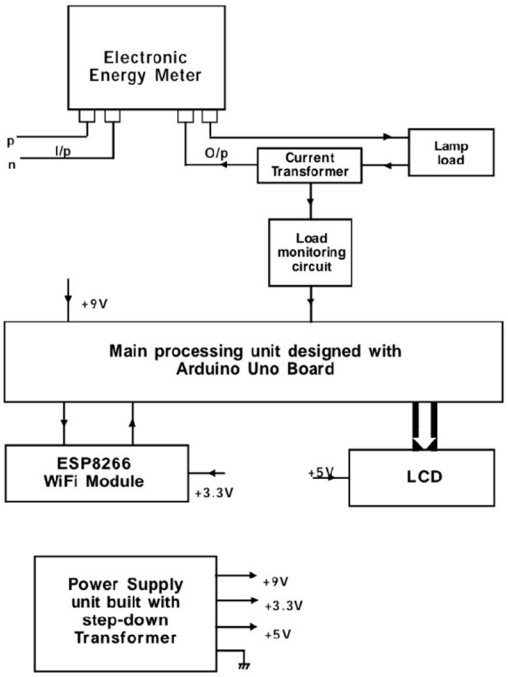


Figure 2 Flow chart of program

IOT based smart Energy Meter

Block Diagram



III. HARDWARE USED

A. CT Circuit

Current transformers (CT) are used in High Voltage (HV) and Medium Voltage (MV)installations to give an image of electrical current to protection relays and units and metering equipment and they are designed to provide a current in its secondary proportional to the current flowing in its primary. CT are connected in series and protection devices and metering equipments are connected to the secondary of the CT in series association

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B. ESP 8266 Wifi Module

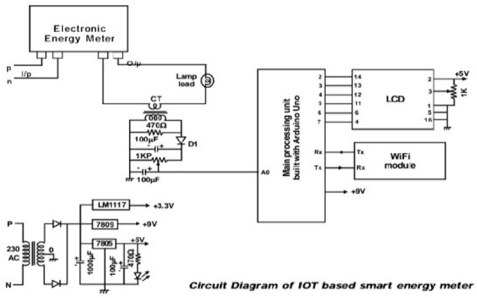
ESP8266 is Wi-Fi enabled system on chip (SoC) module developed by Espressif system. It is mostly used for the development of the Internet of Things (IoT) embedded applications.
The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturing company Espressif Systems.
The ESP8266 is capable of either hosting an application or offloading all the Wi-Fi networking functions from another application processor.
Each ESP8266 Wi-Fi module comes pre-programmed with an AT command set firmware, now you can simply hook this up to your Arduino device and get as much Wi-Fi ability as a Wi-Fi Shield offers.

C. Electronic Energy Meter

Electronic energy meters are accurate, precise and reliable type of measuring instruments when compared to electromechanical induction type meters. When connected to loads, they consume less power and start measuring instantaneous.

D. LCD

LCD stands for liquid crystal display it mostly used in different electronic projects and devices to display different values. LCD uses liquid crystals for the production of visible image. 16 x 2 liquid crystal display is a basic LCD module used in DIy electronic projects and circuits. In this LCD module, there are two rows every row consists of sixteen numbers.



Circuit Diagram of IOT based smart energy meter

IV. INSTALLATION OF REQUIRED LIBRARY

A. EmonLib Library

1) The Emonlib Library is used for **Electricity Energy Meter**. EmonLibrary is a Continuous Monitoring of Electricity Energy repeats, every **5 or 10s**, a sequence of voltage and current measurements.

2) EemonLib continuously measures in the background the voltage and all the current input channels, calculates a **true average quantity** for each and then informs the sketch that the measurements are available and should be read and processed.

B. BlynkLibrary:

1) Blynk is the most popular **Internet of Things** platform for connecting any hardware to the cloud, designing apps to control them, and managing your deployed products at scale.

2) With Blynk Library you can connect over 400 hardware models including A**rduino, ESP8266 & ESP32** to the **Blynk Cloud**.

V. WORKING PROCESS

1) The connections are given based on circuit diagram.

2) The energy meter is connected to the lamp load

3) The lamped load is connected to the CT circuit , the CT circuit has inbuilt resistors and capacitors

4) The CT circuit is then connected to the arduino uno which is the main processing unit

5) The Arduino uno is then connected to the wifi module which is used for transmission of data to the mobile phone of the user

6) The user has the mobile access through which the user can monitor the current usage of the circuit

VI. CONCLUSION

A. The IOT based smart energy metering is capable to calculate the exact energy consumed by the load. By considering the total monthly consumption the electricity bill can be calculated.

B. The total number of kWh consumed is displayed on both liquid crystal display and IOT platform.

C. Consumer can easily monitor and control the use of energy. In future this project can be extended for prepaid electricity consumer, where the supply can be turned ON and OFF automatically once a user exhausts its limit.

D. This system can reduce the wastage of energy and conveys the awareness among all the consumers. In this situation of Covid and social distancing, this system can eliminate the manual intervention.

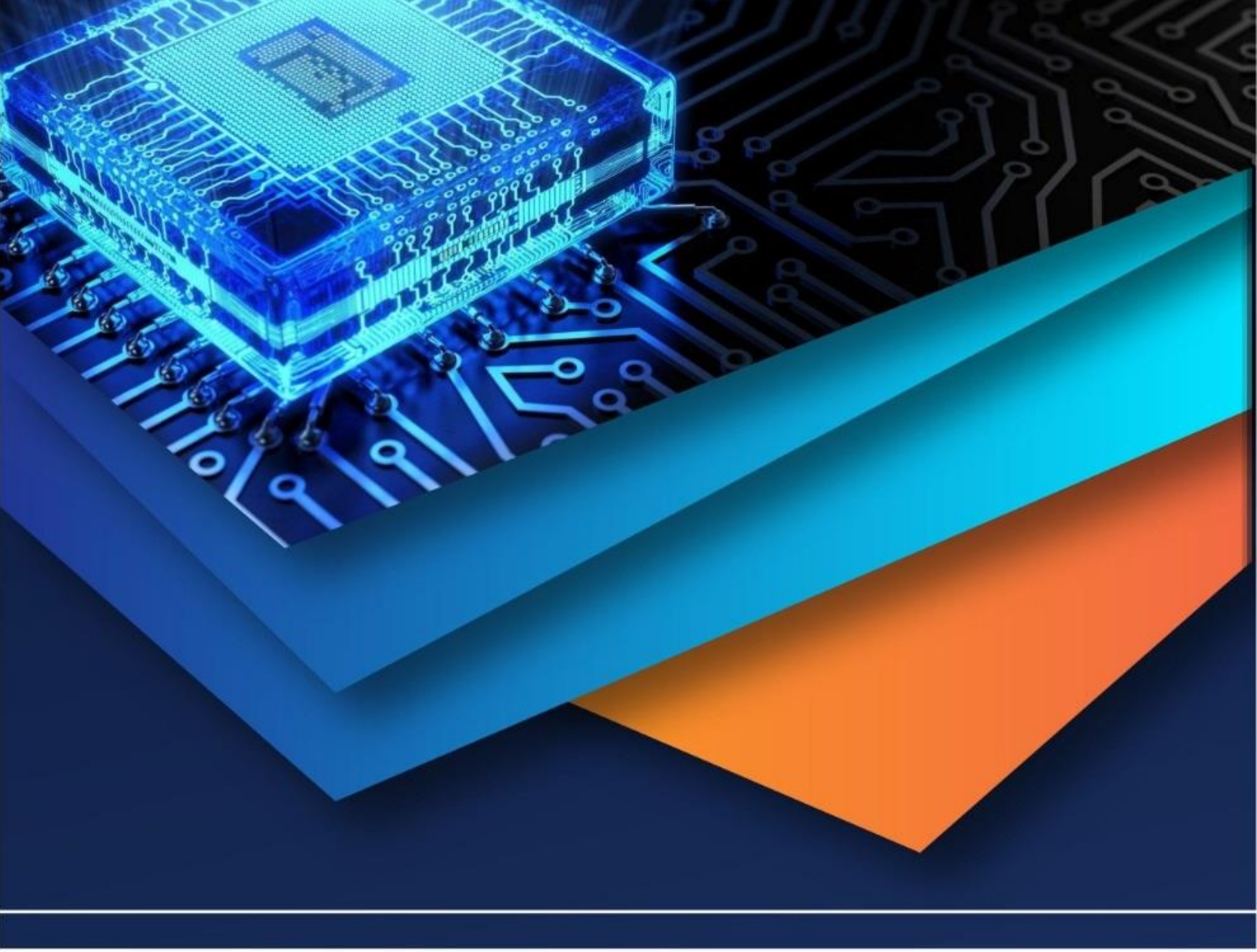
REFERENCES

[1] Othman, Ammar, and Nur Hafiza Zakaria. "Energy Meter based Wireless Monitoring System using Blynk Application via smartphone." 2020 IEEE 2nd International Conference on Artificial Intelligence in Engineering and Technology (IICAIET). IEEE, 2020.

[2] Rafi, Muhammad. ELECTRONIC DEVICE CONTROLLER BASED ON INTERNET OF THINGS USING ESP32 AND BLYNK. Diss. Universitas Muhammadiyah Surakarta, 2021.

[3] K. Li, J. Liu, C. Yue and M. Zhang, "Remote power management and meter-reading system based on ARM microprocessor", IEEE Precision Electromagnetic Measurements Digest CPEM, pp. 216-217, June, 2008

[4] G. L. Prashanti and K .V.Prasad, Wireless power meter monitoring with power theft detection and intimation system using GSM and Zigbee networks, Proc of IOSR-JECE, Vol 9, Issue 6, Ves.I (NovDec, 2014), PP 04- 08



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