Smart Electricity Energy Meter IOT

Simon Guevarra
Department of EECE Mapua University
Computer Engineering
Manila, Philippines
syguevara@mymail.mapua.edu.ph

Von Ang
Department of EECE Mapua University
Computer Engineering
Manila, Philippines
velang@mymail.mapua.edu.ph

***Abstract*—The smart electricity energy meter in which it records the voltage, current, power, and kwh is very useful for those who wants to monitor their consumption of energy in their homes. This is integrated through the Blynk app in which it has been set up to constantly update the user with their energy consumption.**

Keywords—Blynk, Voltage, Current, Power, KWH, energy

I. INTRODUCTION

Recently, electric energy consumption growth has risen significantly and thus, needed greatly increased energy supply in the coming decades due to increasing population and economic development [1]The rising energy costs and global warming can be seen clearly as our life continues. We need to keep an eye for our energy consumption. The energy management system like this can help monitor, control, and reduce the energy consumption significantly. Above all it is integrated to IOT and you can check it to your phones which makes it very convenient for the user. Statistics reveal that the energy monitoring and managing system can reduce energy consumption from 8% up to 20% which can help a lot of people in saving energy.

The Internet of Things (IoT), also called as the Internet of objects is a new technology facilitating the comfort of data and information accessing among any objects or devices for human to make life easier and smart in many aspects [2]. Recently, there are a diversity of IoT applications such as smart energy, smart city, and smart building .To support these applications, a device for gathering the data of energy usage incorporating with the concept of the IoT needs to be carefully developed. Being an IoT device, it can bring more convenience for managing energy consumption because their collected data are stored in a cloud server, so they can be monitored and retrieved at any locations where internet is available not revise any of the current designations.[3][4]

The objective of this paper is to simply integrated a Smart Electricity Energy Meter than can measure the voltage, current, power, and kwh. This will also be integrated to the IOT. Blynk is an app that can be downloaded to the Google Playstore or Apple Appstore, and this will be used for the IOT implementation in which the device can measure the Electricity consumption for the user.

II. METHODS

A. Design Consideration

The authors used the following materials for building the Smart Electricity Energy Meter IOT, these are ESP32 for the IOT Implementation, ZMPT101B AC Voltage Sensor module, SCT013030 Non Invasive AC Current Sensor, (1) 100 ohms resistor, (2) 10k ohms resistor, (1) 10 uF Capacitor, a breadboard, jumping wires, and power chord. The software that were used are Arduino IDE for the programming of the microcontroller ESP32, and the Blynk app which is for the IOT Implementation for the mobile device.

B. Device Configuration

The device was designed by the authors and they used Arduino IDE for programming the microcontroller ESP32. Using 4 libraries which are EmonLib, Wifi, WifiClient, BlynksimpleEsp32, the microcontroller was then programmed and then the IOT device has been set up.

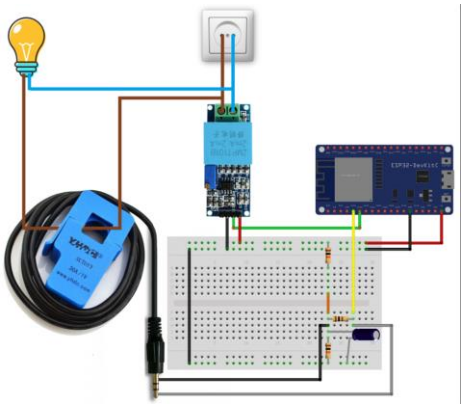

Figure 1. Hardware Setup

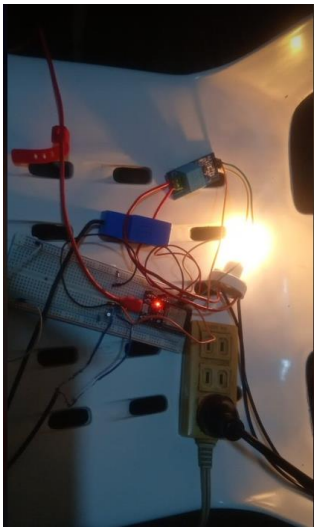

Figure 1A. Actual Hardware Setup

A burden resistor is required. If an unburdened current transformer is attached to a current- carying conductor, the current transformer will generate an unsafe voltage which could break and destroy the device.

For the Blynk App Setup, we are to download the app from Google Playstore or Apple Appstore. From there we create a project in which we name it as Energy Monitoring

and then we are to setup the gauge and then rename it to Voltage, Current, Power, and KWH.

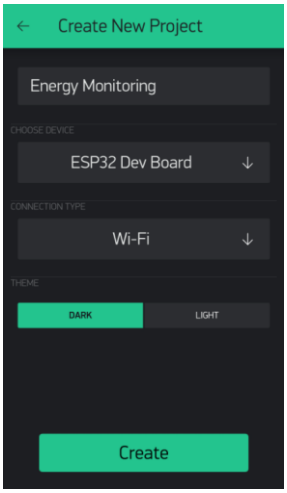

Figure 2.A. Blynk App Setup

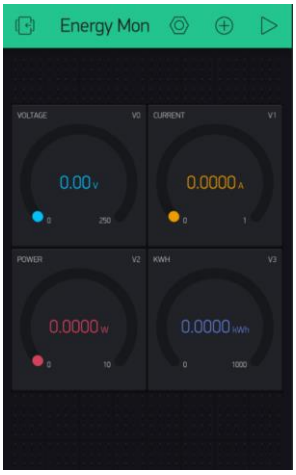

Figure 2.B. Final Blynk App Setup

In this figure, we already configured the final installation and then we proceed to the Arduino IDE for coding implementation for the microcontroller.

III. Results

The AC voltage and AC current sensors generate a signal that is delivered to the microcontroller, which displays the RMS voltage and RMS current in the Blynk application's primary interface. The RMS voltage in volt units, RMS current in ampere units, and the RMS current and voltage were utilized to compute and display the values of average power in watt units and total energy usage of the load in kilowatt-hours units in the Blynk application.

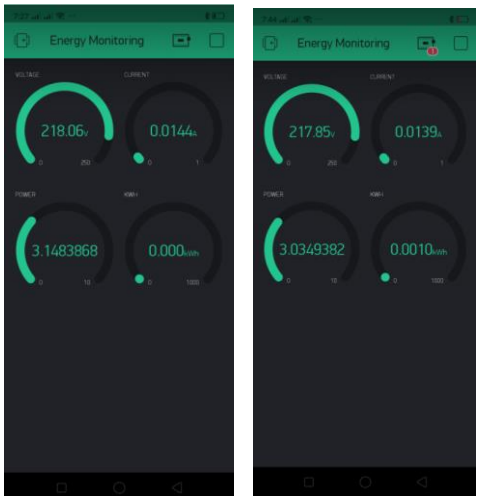

Figure 3 Actual Results Obtained

V	A	Power
218.06	0.0144	3.1483
217.32	0.0133	2.9012
212.82	0.0137	2.8901
221.45	0.0142	3.1032
218.22	0.0139	2.9055
216.61	0.0140	3.0536
217.85	0.0139	3.0349

Table 1 : Results

IV. Conclusion

AC is dangerous to work with, everyone has to be extra careful when handling this. The individual should certainly know how the circuits work and the right location of the switches and pins. Blynk is an easy-to-use IOT platform and can be used not only in ESP32 but many other microcontrollers as well. This was a low cost IOT device composing of a voltage sensor and a current sensor and a microcontroller ESP32. The IOT device was tested and has yielded results and was found working well.

Acknowledgment

The authors are indebted to Mapua University Manila for providing the environment needed for gathering information and for our professor DR. Jocelyn Villaverde for guiding us throughout this paper.

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IoT Research Division, ETRI cschoi@etri.re.kr, {jdjeong, ilwoo, wkpark}@etri.re.kr

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