

Electricity Monitoring System Based on internet of Things (Iot)

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Abstract— Technological developments are increasingly developing very rapidly, so that almost all activities or to solve problems are carried out by utilizing technology. As soon as the use of electrical equipment has different electrical power, the measurement of electrical power is usually carried out using a simple measuring instrument so that the result data is too long to obtain. To solve this problem, an internet of things (IoT) based electric power monitoring system is needed to Obtain information by measuring electrical energy, including voltage (V) and kwh unit of energy, requires components such as the Pzem-004t sensor so that information can be generated in real time, and to be accessible from the internet network. To connect to the Android application this tool uses the Nodemcu esp8266 module, the monitoring display uses the Blynk application to display the required information.

Keywords— Internet of things ,Sensor Pzem-004t,Nodemcu esp8266

I. INTRODUCTION (HEADING 1)

Electrical energy is one of the most important needs of the community and as the most important economic resource needed in various activities. In the future, the need for electricity will continue to increase along with the increase and development of both the population, the amount of investment, technological developments including the development of the world of education for all levels of education (Wahid et al., 2014).

Savings in the use of electrical energy is the first step that can be taken to assist the government in reducing the deficit of electricity sources in Indonesia. In its utilization, sometimes it is not known how much energy has been used, so it tends to waste electrical energy so that it is necessary to measure the use of electrical energy.

The development of internet technology today, namely the development Internet of Things (IoT). Internet of Things is a concept where an object has the ability to transfer data without requiring

human-to-human or human-to-computer interaction (MUFarooq, 2015). From the development of Internet of Things technology that has begun to become popular in society today, the idea emerged for a voltage and alternating electric current (AC) sensor system that is connected wirelessly via a Wi-Fi network to monitor the use of electrical energy on-line through internet applications. Android. The research method used is the prototype method of the PZEM-004t wireless sensor design using the ESP8266 module as a liaison with the server via an available Wi-Fi network.

Based on the problems above, it is very important to create an electrical power monitoring system using IoT (Internet of Things) because using this system you can monitor the use of electrical energy in real time using the Blynk application. In order for the electrical power monitoring system to work optimally, it needs to be equipped with other supporting components, such as the PZEM-004t sensor which functions to measure power, voltage, current and energy contained in an electric current, and the ESP8266 module which will later act as a liaison with the server via network Wi-Fi

II. METHOD

The system design that author use is the prototype method, because in the prototype development method and customers can interact with each other during the system creation process and have several stages including:

1. Listening to customers: at this stage is done by collecting needs from the system by listening to complaints from customers. To create a system that fits your needs, you must first know how the system is running and then find out the problems that occur.
2. Designing and Making Prototype: At this stage, the design and manufacture of a prototype system is carried out. The prototype made is adapted to the system requirements that have been previously defined from customer or user complaints.
3. Trial: At this stage, the prototype of the system is tested with the designed tool. Then evaluate the shortcomings of the experimental results of the tool. The development then re-tested the results of improving the existing prototype.

III. RESULT AND DISCUSSION

3.1 Hardware Implementation Plan

In designing a sketch of the supporting software system used is Fritzing, which is to assemble all Arduino components related to the system into one device to be made.

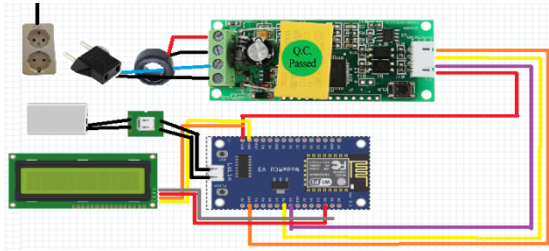


Figure 3.1 Electrical Power Monitoring System Circuit

3.2 Software Implementation Plan

To display the temperature and humidity, the microcontroller must be programmed first. In this study, the software used to program the microcontroller is Arduino IDE version 1.8.12 which can be downloaded from the official Arduino website www.arduino.cc. The steps to start using the software are as follows:

- a. To start the program by opening the start menu on the PC, program, select Arduino IDE 1.8.12.
- b. In addition, you can also click Arduino IDE on the desktop.

After starting to run the software, the Arduino IDE sketch is ready to use. The main view is shown in the following image.

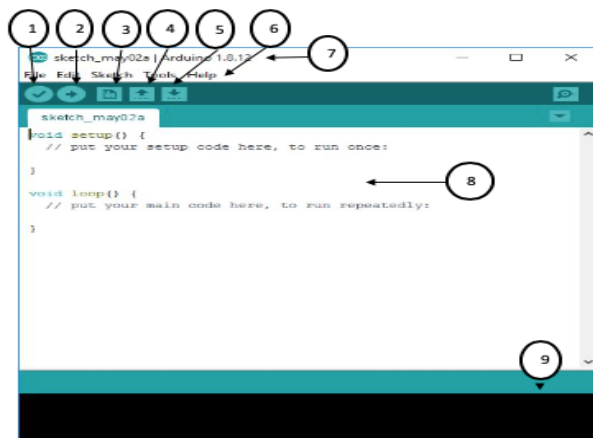


Figure 3.2 Main Display Arduino IDE 1.8.12

Description:

1. Verify which functions to compile the program and check if the program has worked well or not.
2. Button to upload program to controller board
3. New button to display new sketch
4. Open button to open a file that already exists on the device.

5. Save button to save the program
6. Main menu on Arduino IDE
7. The name for the created sketch.
8. The main area for creating programs
9. The port used for programming.

The material used in the Arduino IDE is the C programming language, one example of the instructions used is looping (repetition), if and else (branching) HIGH (set pin to 1), LOW (set pin 0) and so on.

3.3 Tool Experiment

The experiment of monitoring electrical power monitoring tools was carried out with a box that had been made using a box of plastic material measuring 40 cm x 20 cm. The circuit steps that will be carried out are connecting to a USB connected to a 5v cable port

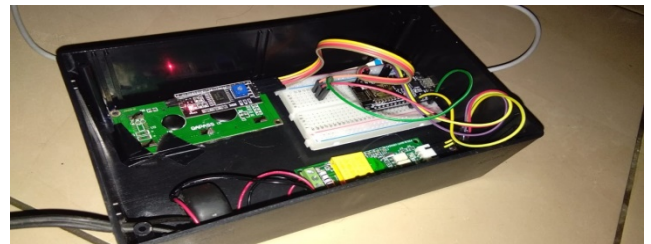


Figure 3.3 A series of connected tools

The device is connected with a 5v USB port cable because the wiring process is done correctly, it can be seen from the picture that the led is on, it means the board has a current where GND and ViN share the current to each GPIO pin with numeric pins and symbols (13,12,27,33,15,14,SCL) and at that moment the wifi module looks for the host name connectivity that has been previously set and uploaded to the Nodemcu ESP3266 microcontroller via the Arduino IDE application.

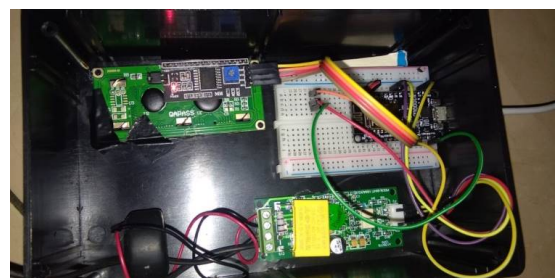


Figure 3.4 System parts in tools

Shows the tool is functioning because the wiring arrangement is done correctly, and the blynk application on the smartphone has synced the wifi module and the device

can be used at a considerable distance. To reactivate the voltage measurement, simply input the object into the ac terminal and it will turn on again.



Figure 3.5 The process of activating the blynk application

The table below is an experimental table of the tool, the researchers conducted experiments in House A and House B as objects testing. The following are the results of the experiment of the three objects measured:

Table 3.1 The results of testing the electrical power of House A

Time (minutes)	Volts	Kwh
1	231.80	0.05
2	232.70	0.05
3	233.40	0.06
4	232.60	0.05
5	234.70	0.06
Average	233.04	0.054

An experiment has been carried out for 5 minutes on the electric current at home A get the average voltage is 188.86v.

Table 3.2 The results of testing the electrical power of House B

Time (minutes)	Volt	Kwh
1	193.40	0.05
2	190.03	0.05
3	188.20	0.05
4	186.40	0.05
5	186.03	0.05
Average	188.86	0.05

An experiment for 5 minutes has been carried out on the electric current at home B, the average voltage is 188.86v.

IV. CONCLUSION

Based on the research that has been done, it can be concluded that the design of an Internet of Things (IoT) based electrical power monitoring system is useful for providing convenience for users to find out the electric current voltage to obtain information using the blynk application on a smartphone. The tool used is the Pzemp-004t which functions to measure current, voltage, power, and energy. Microcontroller as to control all sensors and modules in the detection device, NodeMCU esp 8266 a microcontroller to connect to a wifi network.

The research method for the Internet of Things (IoT) based electric power monitoring system tool, using the prototype method which consists of the stages of needs analysis, system design, prototype testing, testing the tool directly

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