DESIGN AND DEVELOPMENT OF ELECTRICAL POWER MONITORING AND ELECTRONIC EQUIPMENT CONTROL BASED ON ARDUINO NODEMCU ESP8266 AND INTERNET OF THINGS (IoT)
Case Study : RO.NDE CARBON GRESIK

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ABSTRACT

The number of jobs in the Ro.nde carbon workshop makes the electricity consumption in the workshop is also large, and also the lack of awareness in the use of electricity in the workshop makes the electricity cost in the workshop large and unstable because of the lack of monitoring of power consumption can not be avoided , sometimes forget to turn off the lighting workshops, ovens, and everyday tools when not in use . That way the researchers made a tool that could monitor the use of electric power and can also control several load points that can be disconnected through the android application using the Internet of things. The method used is monitoring and controlling the use of electric power in the workshop so that things do not happen that are not planned I want to use the Android application using the Internet of Things that has been connected to the Arduino NoeMCU ESP8266 module. This research aims to reduce the risk that might occur due to negligence in the use of electrical loads in the workshop. Researchers hope that this tool can help stabilize electricity consumption in the workshop and avoid things that can harm the workshop itself.

Keywords : *Internet of Things (IOT), Power monitoring and electronic control, Arduino NodeMCU ESP8266, Ro.nde Carbon Gresik Workshop*

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PRELIMINARY

The power consumption in the Ro.nde Carbon workshop is very large and the electronic equipment used also varies. The amount of electricity used in the workshop is also a lot of people who use it carelessly, for example the use of hand drills, ovens , spotlights that have been used but forget to remove from the socket which can cause hot sockets and burn which can cause fires in the workshop. the. The large and unmonitored usage also results in the use of electricity costs in the workshop being uncontrolled. That way the author designed a tool that can control and monitor power consumption in an Arduino-based workshop as the main tool designed by the

author and an electric power sensor as a means of checking electrical power. Arduino Node MCU ESP8266 is used as the main component in this tool which functions as a programmable command center and receiver of signals from smartphones via wifi on the Arduino.

LITERATURE REVIEW A

The components that will be used here are:

1. Arduino NodeMCU ESP8266
   The microcontroller used to control each module is Arduino NodeMCU ESP8266. Functionally, this module is similar to the Arduino module platform, except that it is dedicated to the topic "Connecting to the Internet".
2. PZEM 004T . Sensor
   This BLE module works on Bluetooth 4.0 technology and can work as a master or slave according to user needs,
3. IoT
   Here the role of IoT (Iternet Of Things) as a network of applications on mobile phones with tools to connect via the internet.
4. 6x12 . LCD
   This LCD displays the readings from the sensor so that it can be used to monitor electricity consumption directly.
5. Relay
   Relay is an intermediary tool for connecting electronic devices to Arduino.
6. Android
   Android is an operating system based on Linux for smartphones and tablet computers. The source platform is used by developers to create their own applications that are applied to all types of mobile devices designed for mobile devices.

RESEARCH METHODS

Pe r a n ca n g a n _ The tool includes the design of the outer shape that will be built as desired. This section covers the mechanical and electrical designs that are interconnected to carry out a step-by-step design process .

Figure 3.1 *Flow Chart* .

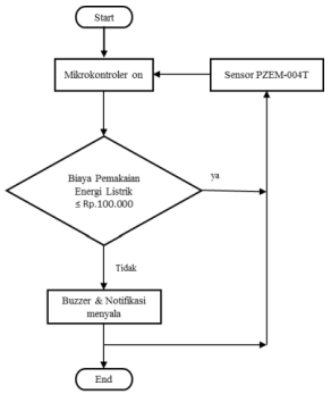

Figure 3.2. Tool Design.

Generally, the monitoring tool used for electricity costs is by reading PZEM-004T with a microcontroller and sending the reading data to the LCD and mobile phone application using an internet connection connected to the E sp8266.

RESULTS OF DATA ANALYSIS AND DISCUSSION

Data collection is the most important part of any report or research. The results of the report contain data to

provide information contained in the report (Dr. Bambang Widjanarko Okto, 2016). After obtaining the data, it is usually in the form of a table. In this research project, the presentation of data from the system will be described, namely the results of monitoring the power and working of the relay to function properly or not.

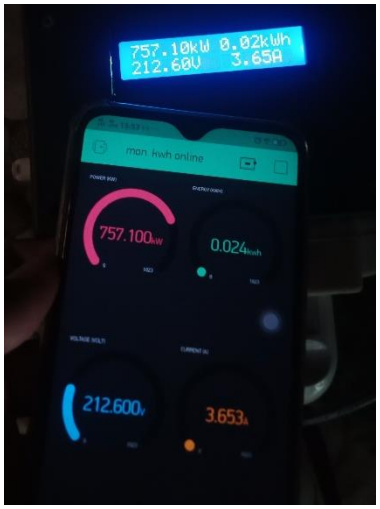

Figure 4.3 Testing sensor readings and android and device connections

The first experiment is the PZEM 004t sensor reading which functions to read the load voltage that is used whether it is functioning and is able to send data to the Arduino properly without any reading errors. Then the connection between the android application and the tool to make sure it is connected properly.

Figure 4.4 relay testing using android off condition

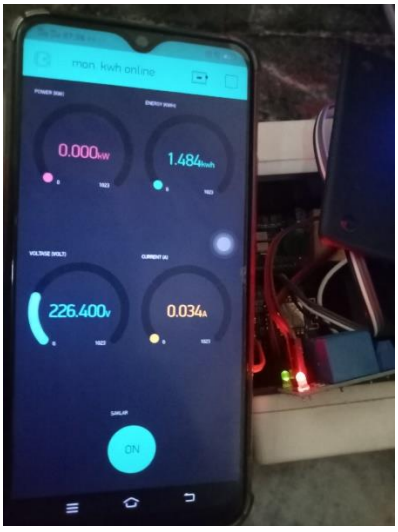

Figure 4.4 relay testing using android O . condition

This test is carried out in order to find out that the Arduino is functioning properly as a command center to display sensor readings to the LCD and the relay controller as an electric circuit breaker at the socket that has been set. To find out that the relay is functioning or not, there is a yellow indicator light on the relay and a "click" sound is heard on the relay.

No.	Alat elektronik	Alat monitorng			Alat Ukur		
		Volt	Watt	Ampere	Volt	Watt	Ampere
1.	Lampu pijar	220V	50W	0,28A	220V	47,5W	0,26A
2.	Lampu sorot LED	220V	35W	0,27A	220V	36,3W	0,29A
3.	kompresor	220V	650W	3,24A	220V	657,4W	3,28A
4.	Kipas Angin	220V	47W	0,27A	220V	48,2W	0,29A
5.	Solder	220V	57W	0,31A	220V	55,5W	0,29A
6.	Gerinda	220V	495W	2,24A	220V	500,3W	2,25A
7.	Bor tangan	220V	339W	1,10A	220V	339,8W	1,12A

Based on the table of monitoring results from several electronic device data using monitoring tools and measuring instruments, it can be concluded that the readings of the monitoring tools and measuring instruments are slightly different. It can be concluded that this monitoring tool has almost 90% reading accuracy.

CONCLUSIONS AND RECOMMENDATIONS

Based on the final project research, there are things that can be concluded in this final project, namely:

1. This monitoring design will keep the reading of the power consumption sensor (Kwh) even if there is a power outage, so the reading will still take place when the electricity is back on.
2. This tool can be controlled for power consumption at an outlet that has been set via Android, one of which is when a body paint service provider needs artificial heating at night which must be on overnight and then in the morning we can turn it off via Android.
3. The Arduino used is NodeMCU ESP8266 which is already equipped with wifi to facilitate connectivity on Android.

Based on the research that has been done in the project, there are things that can be suggestions for the improvement of this final project, namely.

1. The development of this tool can still be improved by adding a "Reset" button on the Android display and a manual reset button on the tool.
2. Improved the design of the tool to make it look simpler and more attractive.
3. Added program code to calculate rupiah power consumption in days and months

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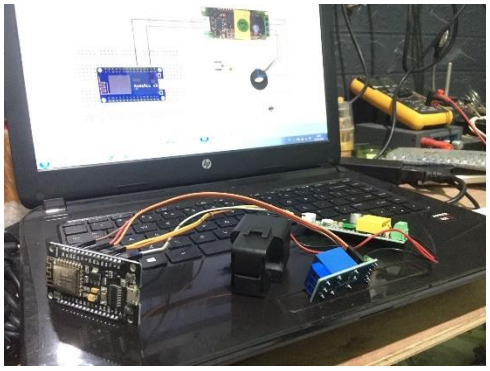
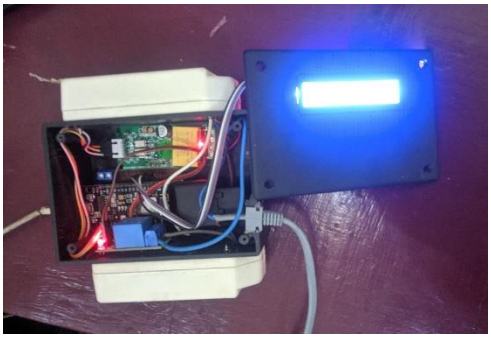
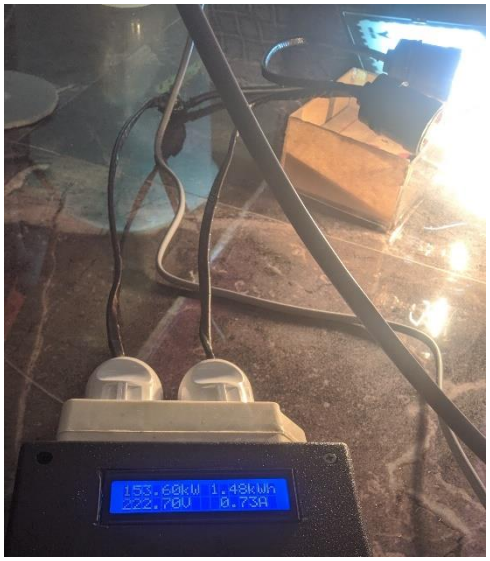
L APPENDIX – APPENDIX






153.60kW 1.48kWh
222.70V 0.73A