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Design For Monitoring Current And Voltage In Battery Charger Using NodeMCU Esp8266 Microcontroller And The Blynk Appdi Silampari Airport Lubuk Linggau–South Sumatra

Muhammad Caesar Akbar[1], Mikael Angripa Saragih[2]
[1,2]Medan Aviation Polytechnic, Medan, North Sumatera, Indonesia

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NodeMCU microcontroller
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ABSTRACT
At Silampari Airport there are frequent power outages not only 1 to 2 times a day and even experienced up to 4 blackouts. During the second blackout on the same day, the 550 kVA generator failed to start due to a voltage drop in the generator battery. This condition could result in disruption of the operational system at Silampari Airport.. Dbecause Silampari airport does not have a spare battery, so the voltage and current values of the battery must be detected, so that the generator does not fail to start. To monitor the battery and to find out the value of the battery input voltage, battery power and remaining battery power, a voltage and current monitoring design for the 550 generator battery charger is required. Kva.Presearch This method uses descriptive analysis and a qualitative approach. The result of this research is that a control system for regulating voltage and load current using NodeMCU ESP8266 based on the Internet of Things with the Bylnk platform has been realized. The design of the tool has been realized as a tool for monitoring battery charger voltage and current using the IoT concept by utilizing the main components, namely the voltage sensor, ACS712 current sensor, NodeMCU data processor equipped with an IoT module in the form of ESP8266.

Corresponding Author:
Mikael Angripa Saragih
Medan Aviation Polytechnic
mikaelangripa03@gmail.com

INTRODUCTION

Paln the modern era like today, transportation is one of the things that is very important for human survival. This is because transportation is one of the factors that determines state income, besides that, transportation is also one of the determinants of people's success in earning income. There are three types of land transportation, sea transportation, and air transportation. Recently, air transportation has become more popular with passengers for traveling long distances, because the destination area cannot be accessed by land or sea, apart from that, air transportation is also considered more efficient, less time consuming, and seen from In terms of comfort, air transportation is much more comfortable than other forms of transportation. Air travel is one way people can travel long distances these days. Consequently, to support the air transportation process, services and facilities must be further improved in terms of technology, standard operating procedures, human resources

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and appropriate infrastructure. Similar to air traffic, in an effort to improve air traffic services, all additional aspects must be taken into account (Akbar, Saputra, & Sonhaji, 2022).

With the increase in air transportation services, it is not enough to just rely on sophisticated and adequate technology. There is another important thing apart from the equipment, namely human resources, so the Indonesian government has carried out a series of educational programs to produce human resources with competence and insight into the world of aviation. One of these educational institutions is the Medan Aviation Polytechnic which is an educational institution under the auspices of the Transportation Human Resources Development Agency.

The Medan Aviation Polytechnic has the main task of carrying out professional education diploma programs in the fields of aviation engineering and safety expertise which are open to the public. Where the Medan Aviation Polytechnic holds training and skills for cadets starting from semester one to semester six. Cadets are taught how to work competently, skillfully, agilely, quickly, safely, and be able to analyze technically and find solutions to problems.

In response to the ICAO audit, the Indonesian government began working on a draft government regulation in September 2009 called Government Regulation No. 77 of 2012, which was ratified on September 13 2012. This regulation relates to the establishment of a public company (Perum) Indonesian Aviation Navigation Service Provider Institution (LPPNPI), also known as AirNav Indonesia. Starting January 16 2013, Air Navigation (AirNav) Indonesia assumed responsibility for supervising flight navigation throughout the country. Because aviation navigation services were previously provided by a number of organizations, including UPT Directorate General of Civil Aviation, PT Angkasa Pura I (Persero) and PT Angkasa Pura II (Persero), and specialized airports, there were differences in the quality of these services and a lack of attention to aviation navigation providers .

According to the results of the International Civil Aviation Organization (ICAO) audits from 2005 and 2007, which indicated the need to create an organization or institution dedicated to providing aviation navigation services or a single ATS provider, the formation of Perum LPPNPI cannot be separated from the developing situation in the Indonesian aviation sector (Akbar & Sinaga, 2022). As a result, the establishment of AirNav Indonesia has enabled the implementation of proper aviation safety and navigation services.

The aim of establishing this company is to standardize Indonesia's aviation safety framework. The basis of ensuring aviation safety is effective, comfortable, organized and safe service; it must also be supported by facilities that comply with ICAO requirements (Akbar & Mulyana, 2023). Thus, Perum LPPNPI is tasked with managing all aircraft navigation systems (Akbar & Simamora, 2022).

BaSilampari Airport has several equipment to support smooth flight operations which are useful for ensuring flight safety and comfort for consumers (passengers) and crew and the aircraft itself. Therefore, it is very important to pay attention to these safety factors. Apart from that, every airport must also be supported by aviation facilities. Please be aware, aviation accidents have increased recently. This is evident when one considers the fact that

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there have been direct or indirect instrument neglects that have affected flight safety. If high-quality services are provided together, aviation safety can be achieved. If competent staff are available to help, this quality can be achieved (Akbar, 2021).

An airport is a place where planes can land and take off. Rotating beacons are one of the most important landing aids seen in airport infrastructure. One of the lights that functions to indicate the location of the airport is a rotating beacon. Usually used at night as the main need for city flight traffic. Rotating beacons emit rotating light in green and white by mounting two opposing light sources on rotating axles (Hutasoit & Akbar, 2022). Flashing lights that can be seen from land are called strobe lights. When the plane is in the air, the light we often see flashes white. The purpose of strobe lights is to alert air traffic control (ATC) of aircraft activity (Akbar & Legian, 2022).

Even the most basic airports have runways, but larger airports usually have a variety of additional facilities for airline service providers and passengers. The flight crew can be warned by the Mach Airspeed Warning System, which is a Mach Airspeed Warning when an aircraft approaches or exceeds the airspeed limit and is about to enter Mach speed (Andre Wahyudi Sihombing, 2022). Airport Electrical Engineering is the study of airport electricity, which includes airport lighting and airport lighting. Furthermore, the curriculum covers operation and maintenance of airport electrical systems, as well as analysis and repair of electrical faults (Pasaribu & Akbar, 2022).

At Silampari Airport there are frequent power outages not only 1 to 2 times a day and even experienced up to 4 blackouts. During the second blackout on the same day, the 550 kVA generator failed to start due to a voltage drop in the generator battery. This condition could result in disruption to the operational system at Silampari Airport. The generator at Silampari Airport is used as a back up for AFL, ATC Tower, navigation equipment, the BMKG office and all equipment in the terminal. If a power outage occurs, all of these loads cannot operate. Based on KP 326 of 2019, the maximum switching time from primary to secondary power supply is 15 seconds, because Silampari airport does not have a spare battery, the voltage and current values of the battery must be detected, so that starting failure on the generator does not occur. To monitor the battery and to find out the value of the battery input voltage, battery power and remaining battery power, a voltage and current monitoring design for the 550 generator battery charger is required. Kva.

METHODS

The writing in this research uses descriptive analysis methods and a qualitative approach, there are several characteristics and steps that are usually followed to ensure comprehensive and in-depth results.The qualitative method in this research focuses on in-depth understanding of the phenomenon under study through collecting non-numerical data such as interviews, observations and text analysis. This method allows researchers to explore the complexity of human behavior, experience, and social interactions in specific contexts. Systematic literature review is a research method that is often used in qualitative

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research. This review is conducted with the goal of identifying, evaluating, and interpreting all research relevant to a particular research question, topic area, or phenomenon of interest.

RESULTS AND DISCUSSION

Penproblem solving

PeTesting this system consists of several stages, starting from testing each supporting part of the system to testing the system as a whole. From the test results, the performance of each interacting part of the system can be analyzed so that a microcontroller-based voltage and current monitoring system via Blynk IoT is formed. Testing the entire system is useful to find out how the system performs and the level of success.

PerSoft lift

PeThe software needed in this design is the Blynk application, in this system the author uses the Blynk application to control the tool. Blynk is a platform with an Android / iOS application for controlling Arduino. Then the software used to create programs on the NodeMCU Esp8266 is the Arduino IDE, known as sketch, which will later be uploaded to the EFPROM IC contained in the NodeMCU Esp8266 itself. The Esp8266 NodeMCU will receive instructions from the Esp8266 chip module that is installed in the NodeMCU and then control it via the Blynk application. So if the system detects a certain command, the system will notify the software and provide instructions to carry out the given command automatically. The software needed to create a home door monitoring and control tool using an IoT-based Micro Controller includes components and modules. The software components used in making this tool are:

Arduino IDE

PeThis software is a series of applications or programs that help complete certain tasks. Applications are the most frequently used software, this software is used to translate and upload to NodeMCU.

Figure 1. Arduino IDE programming language

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Wifi or hotspot

Wifi or hotspot is a wireless network that provides access to the internet. The NodeMCU is useful as a network so that it can operate, without a network it cannot operate.

Figure 2. Wifi or hotspot

blynk app

The blynk application plays a role in controlling equipment by connecting to the internet.

Figure 3. Blynk application

1. SeDHT11 sensor
   PaIn this design, the sensor used is the DHT11 sensor for sensing temperature and humidity objects which has an analog voltage output which can be further processed using a microcontroller.
2. NodeMCU ESP8266
   PaIn this design, the NodeMCU tool is used, which is an IoT platform that can connect projects being carried out to the internet. It could be said that NodeMCU is an ESP8266 board (Arduino). The temperature data produced by the DHT11 sensor is sent to the NodeMCU ESP8266 microcontroller via the SPI (Serial Peripheral Interface) interface on pin D2 (OUT), pin 3V (VCC) and pin G (GND). After the data is received by the NodeMCU ESP8266 microcontroller, the data is processed and then forwarded to the Blynk application.

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3. ACS
   PaIn this design, the ACS712 device is used. The sensor will detect the amount of current and provide a voltage output that is proportional to the current drawn. In addition, because it is integrated into the module.

Results of system discussion

1. Bloc Design Diagram

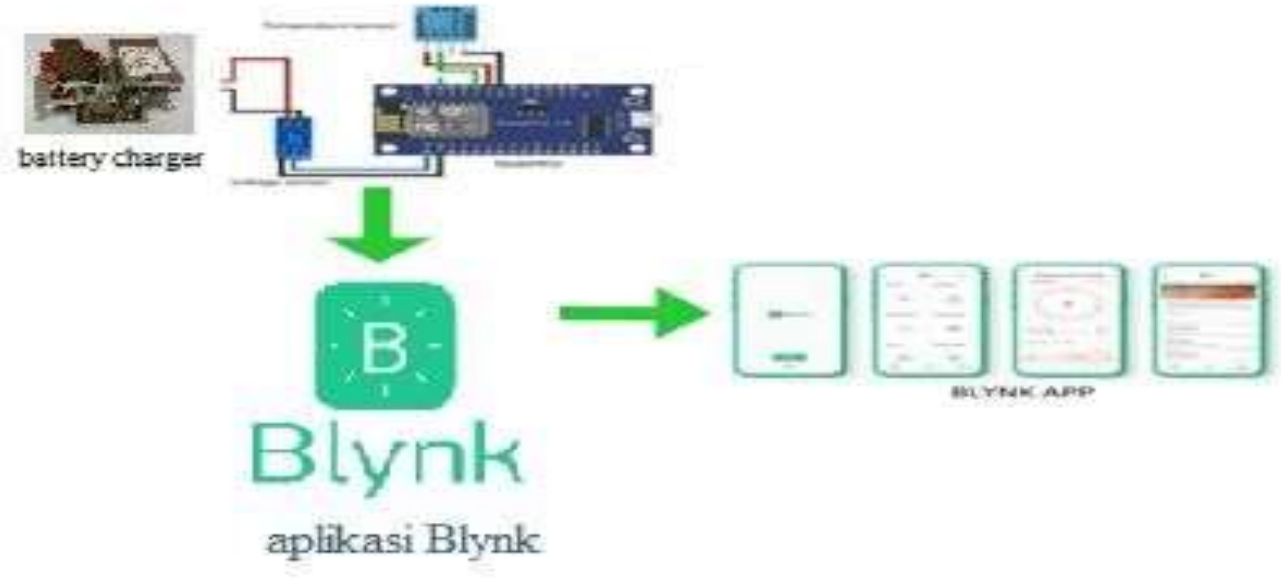

Figure 4. Design Block Diagram

The tool above is designed using the DHT11 sensor and Voltage sensor, the NOdeMCU ESP8266 processes sensor data sent from the DHT11 sensor, Voltage sensor and stored in the database. The Blynk server functions to connect the Blynk application with the NodeMcu which has been connected to the internet network.

2. Monitoring Plan

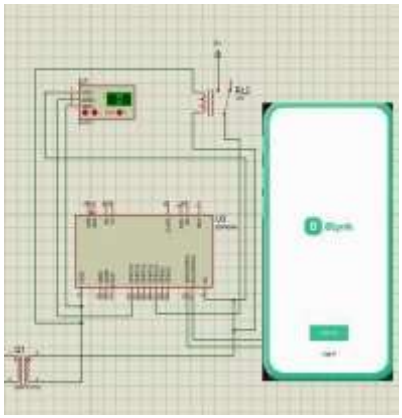

Figure 5. Monitoring design

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This circuit contains several hardware components and has its own function, which uses the NodeMCU ESP8266 v3 microcontroller which is equipped with WiFi as a control circuit which receives several inputs from sensors such as the DHT 11 sensor which sends digital signals to the microcontroller for data processing and the Out pin from Sensor, this voltage sensor goes to the input pin and pin out of the D2 sensor, where the sensor data is processed on the microcontroller and integrated with the blink platform.

3. How the equipment works

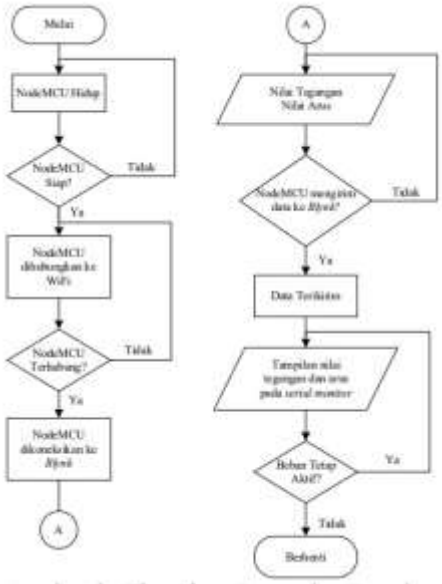

Figure 6. Flowchart of how the tool works

*flow chart*The above function is for monitoring voltage and current. The sensors displayed via the Blynk application, there is an ESP8266 connected to the NodeMCU which functions to connect to the WIFI network, then the DHT11 sensor data is sent or saved to the database so that the sensor data can be displayed remotely in real time using the Blynk monitoring website.

Pentool test

Figure 7. Displayon the Blynk Application

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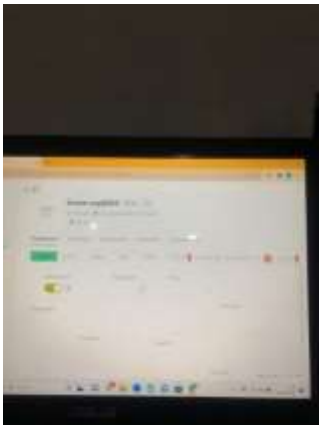

Figure 8. Display using Website Blink

PaThe image above shows the display of the voltage and current monitoring design connected via the Blynk website or the Blink application.

CONCLUSION

ToThe conclusions in designing and manufacturing voltage and current monitoring tools for IoT-based battery chargers are as follows: Realized control system for regulating load voltage and current using NodeMCU ESP8266 based on the Internet of Things with the Bylnk platform. PeThe design or design of the tool has been realized as a tool for monitoring battery charger voltage and current using the IoT concept by utilizing the main components, namely a voltage sensor, ACS712 current sensor, NodeMCU data processor equipped with an IoT module in the form of ESP8266. In handling a problem in the field, an initial analysis of the problem that occurs is required, so that the problem can be handled with the right time efficiency.

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