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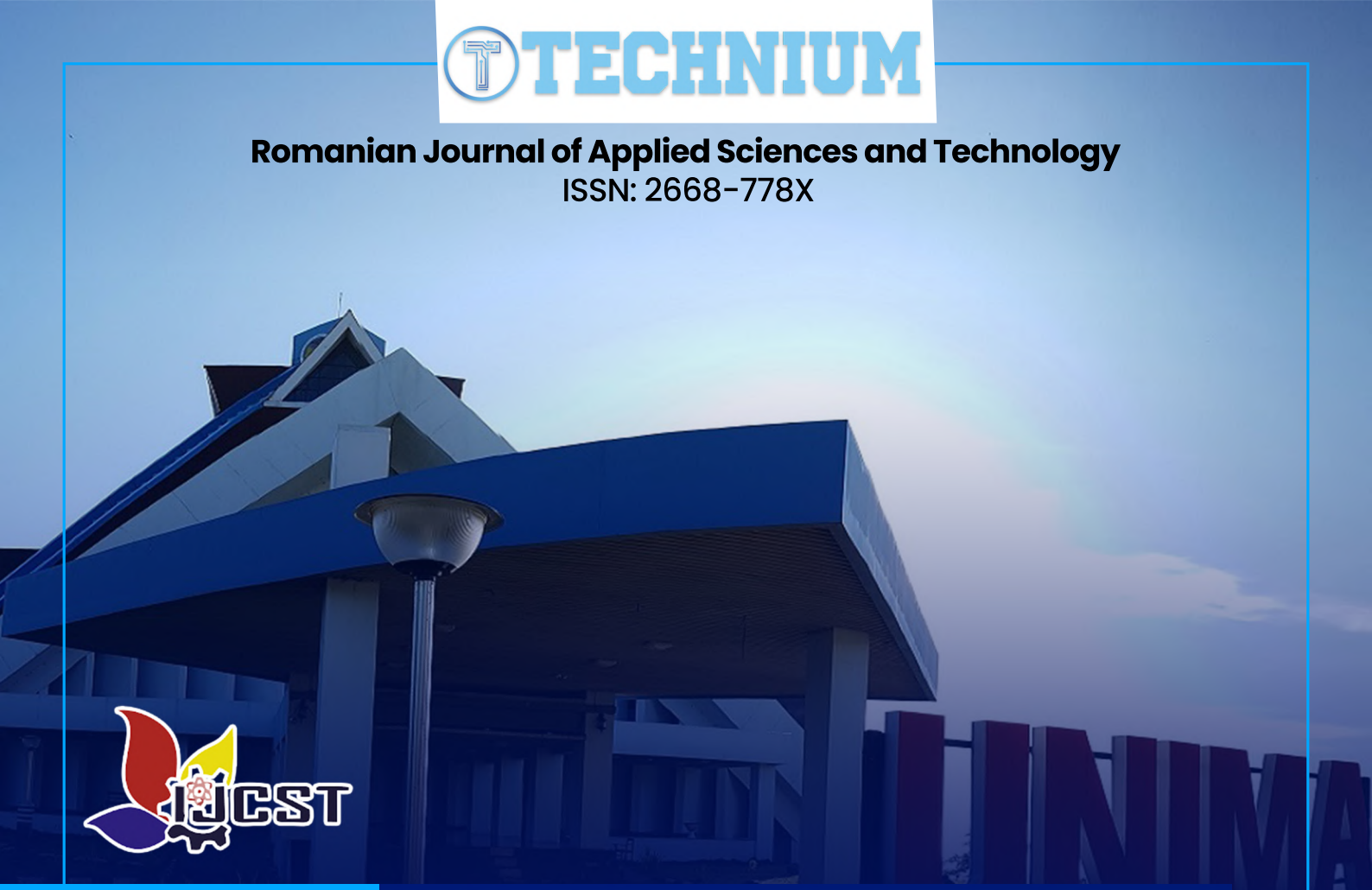

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Lighting Intensity Controller Design Using Node Mcu Esp-8266

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Abstract. Controlling lights using the Internet is one of the uses of the Internet of Things concept. This light intensity control system is an alternative to saving electricity. Currently, the use of smartphones is no stranger to the broader community as well as the use of messaging applications such as Whatsapp. This research develops a prototype that applies the concept of remote control to a light control system and monitors light intensity that utilizes the NodeMCU ESP8266 microcontroller and is also a wifi module and uses a relay instead of a switch and also a servo that maintains light intensity. System control uses a smartphone and Whatsapp application to send commands to the microcontroller. The results of testing this prototype can work and function properly, realizing a remote light control system turns off and turns on the lights and adjusts the light intensity through commands sent via the Whatsapp application.

Keyword : *lighting Control, NodeMCU, Dimmer, Servo, Whatsapp*

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1 Introduction

Technological developments are currently growing very rapidly. Various implementations of technology also accompany our daily activities. Starting from ordering food online, buying necessities online, online motorcycle taxis, long-distance communication, etc. Today's society is no stranger to technology, and few people are interested in technology, especially remote control. One of the habits of wasting electricity that most people still do is turning on garden lights or porch lights when traveling long distances for a long period. Long. With remote control using WhatsApp, of course, this problem can be overcome [1]

Previous research [2][3][4]used a microcontroller to build a remote light control system that helps with distance problems in the process of controlling house and garden lights.

NodeMCU ESP8266 is an electronic board based on the ESP8266 chip, capable of running microcontroller and Internet connection (WiFi) functions. There are several input and output pins so that it can be developed as a monitoring and controlling application for IOT projects. Several studies have utilized and tested MCU nodes as microcontrollers in developing several prototypes of automated systems and the Internet of Things [5][6][7][8].

This research will create a prototype that applies the concept of remote control to a light control and light intensity monitoring system that utilizes the NodeMCU ESP8266 microcontroller, which is also a Wifi module and uses a relay instead of a control switch. This system can be done from a smartphone using the Whatsapp application.

2 Recent Related Work

Several researchers have carried out research using NodeMcu as a microcontroller on light control for energy saving. The previous study [6] utilised the Internet of Things concept to create a smart home that connects the microcontroller with the Telegram application. Other research aims to save on the use of electrical energy by utilising a microcontroller with the blink application on a smartphone to control lights remotely [8]. Subsequent research uses a web application as a light controller so that it can be accessed via a web device or a mobile device. In addition, this study provides features that make it possible to schedule the operation of lights in classrooms [9].

3 Material and Method

3.1 Node MCU

NodeMCU is a device capable of functioning as a microcontroller, and an embedded WiFi module is available. In addition, the NodeMCU has several I/O pins, making it very possible to develop the Internet of Things concept. NodeMCU can be programmed using the Arduino IDE compiler.

3.2 Dimmer

AC dimmer is an additional device for adjusting the speed of a tool such as a drill or dynamo. The dimmer in this study acts as a simple lamp controller where the user can adjust the intensity of the light emitted by a light.

3.3 Servo

Servo has a control system that allows feedback to be rotated from 0 to 180 degrees. The neutral position on the servo is at the same potential rotation clockwise and vice versa 10]. This study uses a servo motor to rotate the dimmer to adjust the light intensity.

3.4 Block Diagram

The block diagram is seen in Figure 2. The voltage input comes from the Power Supply with an output voltage of 5 volts DC; then the voltage will be supplied directly to the MCU node; after the MCU node, the voltage will be provided again to the relay, and servo, as voltage input, of these components. After the input voltage, the tool can be used. Then, at NodeMCU, a data indication process will be processed based on the program written and uploaded to the NodeMCU board; after the data indication process is complete, the data will be sent to the relay as output. In this design, the relay functions as an automatic switch. Then to adjust the intensity of the light here, we use Servo and Dimmer; for remote control, we use the WhatsApp Bot, which, later from the WhatsApp Bot, we will control the servo's rotation to adjust the light's intensity via the Dimmer.

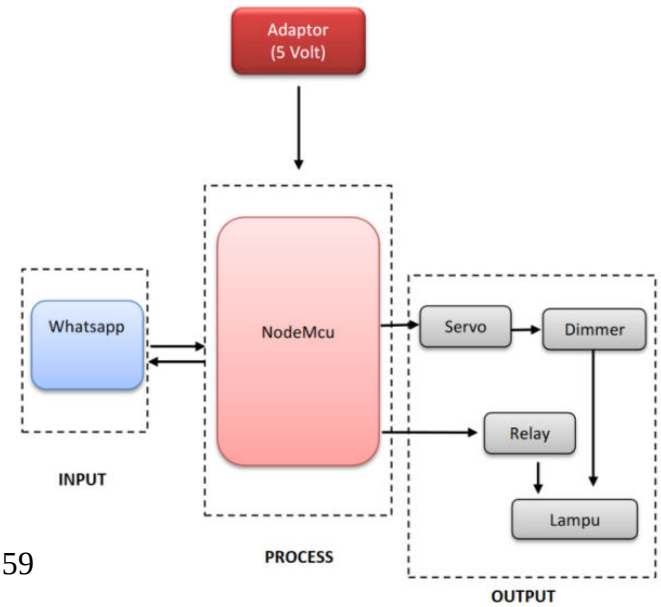

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Fig 1. Block Diagram

4 Result and Discussion

4.1 Relay Design

In this design, the GND pin of the MCU node is connected to the GND Relay pin, the VIN pin of the MCU node is connected to the power relay pin, and the D7 node pin of the MCU is connected to the signal relay pin. Then for the design of relays and loads (lamps), pin C of the relay is connected to the input PHASE pole and the NO relay pin is connected to the output PHASE of the load.

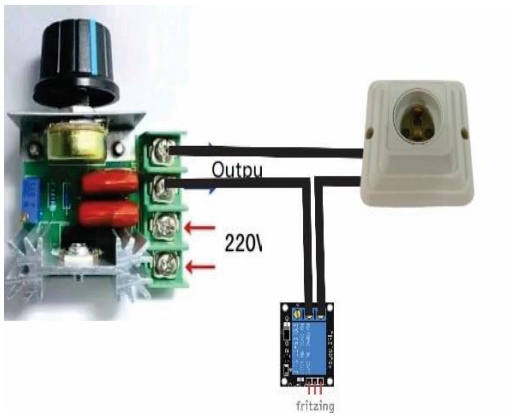

Fig. 2. Relay Design Scheme.

4.2 Servo Design

In this design, the VIN pin on the nodeMCU is connected to the 5V+ Servo pin, the D8 pin of the MCU node is connected to the SIG Servo pin, and the GND pin of the nodeMCU is connected to the GND Servo pin.

Fig. 3. Servo Design Scheme

4.3 Circuit Schema

In designing this tool, several components are used, namely Node MCU esp 8266, Servo 180°, AC Dimer, and Power Supply to convert AC voltage to DC voltage. Then connected to NodeMcu. NodeMCU is an electronic board based on the ESP8266 chip with the ability to perform microcontroller functions and an internet connection (WiFi) to process data to the servo to control the AC dimer. The circuit schematic is shown in Figure 1.

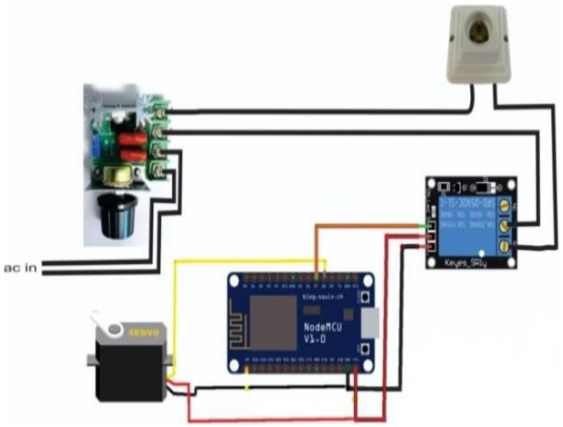

Fig. 4. Circuit Scheme.

4.4 Testing

Testing of this tool is carried out after the circuit (hardware and software) has been completed and without any errors. Tool testing aims to analyze and test the tools (hardware) that have been made, namely to find out whether the tool works as expected. Testing results are shown in table 1.

Table 1. Testing Result

No	WhatsApp	Intensity	Servo
1.	Cahaya 0	Padam	0°
2.	Cahaya 50	Redup	90°
3.			

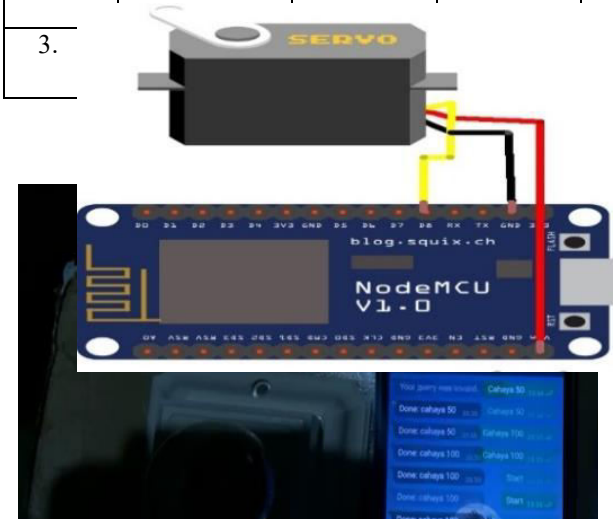

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Fig. 5. Servo 0°

Figure 3 shows the command "cahaya 0" The servo rotation is at 0°, and the light is off. Figure 4 shows a dim light when the command given is "cahaya 50".

Fig. 7. Servo 90°

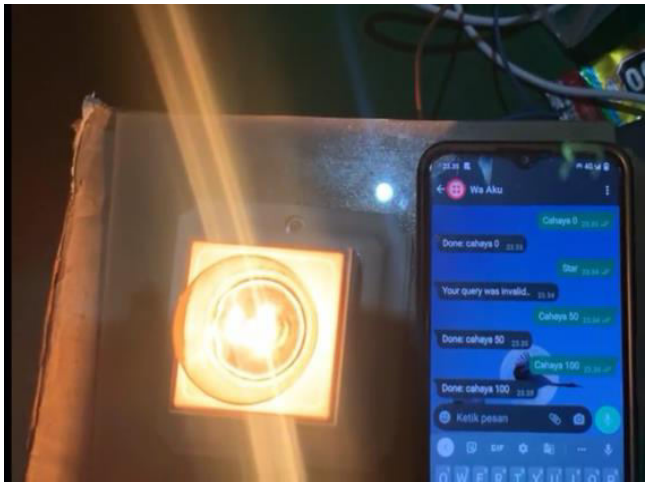

Fig. 8. Servo 180°

Figure 5 shows a bright light when the command given is "light 100"

5 Conclusion

Based on the results of the design and testing of a light intensity control device design using WhatsApp-based NodeMcu Esp-8266. Then it can be concluded as follows Controlling the light intensity of the light is carried out based on testing the Internet of Things (IoT) from the design of this light control prototype that has been implemented and successfully carried out with control conditions, namely being able to turn on, dim and turn off the lights according to commands or data creamed from WhatsApp to NodeMcu Esp-8266.
In making this lamp controller, deficiencies still need to be developed. Suggestions that can be conveyed to future researchers can be developed with innovations that are easier to operate.

References

[1] S. S. Pakadang, "Pengendali Lampu Taman Dan Pemantauan Intensitas Cahaya Menggunakan Bot Telegram," 2022.

[2] Q. Y. Wang and H. F. Lv, "Intelligent lighting control system based on Internet of things technology," *J. Phys. Conf. Ser.*, vol. 2310, no. 1, 2022.

[3] A. Shafitri, Suhardianto, A. Mashuri, and A. Aditya, "Perancangan Pengendali Lampu Kantor Berbasis Internet of Things," *PROSISKO J. Pengemb. Ris. dan Obs. Sist. Komput.*, vol. 9, no. 1, pp. 53–59, 2022.

[4] Y. Athallah Muhammad Yazid and R. Agung Permana, "Rancang Bangun Prototype Monitoring Lampu Jalan Secara Otomatis Menggunakan Mikrokontroller ESP32 Dan Api Bot Telegram," *J. Tek. Inform.*, vol. 8, no. 1, pp. 12–19, 2022.

[5] A. Alfith and R. A. Dirni, "Internet Of Things (IoT) Sistem Pengendalian Lampu Jarak Jauh Menggunakan Nodemcu Amica CP2102 Berbasis Mobile," *J. Tek. Elektro*, vol. 10, no. 2, 2021.

[6] M. Nega, E. Susanti, and A. Hamzah, "Internet of Things (IoT) Kontrol Lampu RUmah Menggunakan Nodemcu dan ESP-12E berbasis Telegram Chatbot," *J. Scr.*, vol. 7, no. 1, pp. 88–99, 2019.

[7] A. M. Ibrahim and D. Setiyadi, "Prototype Pengendalian Lampu Dan Ac Jarak Jauh Dengan Jaringan Internet Menggunakan Aplikasi Telegram Berbasis Nodemcu Esp8266," *Infotech J. Technol. Inf.*, vol. 7, no. 1, pp. 27–34, 2021.

[8] A. H. M. Nasution, S. Indriani, N. Fadhilah, C. Arifin, and S. P. Tamba, "Pengontrolan Lampu Jarak Jauh Dengan Nodemcu Menggunakan Blynk," *J. TEKINKOM*, vol. 2, pp. 93–98, 2019.

[9] F. J. Montalbo and E. Enriquez, "An IoT Smart Lighting System for University Classrooms," *Proc. - 2020 Int. Symp. Educ. Technol. ISET 2020*, pp. 3–7, 2020.

[10] A. R. Mandalawangi and H. Habibullah, "Rancang Bangun Sistem Pengendali CCTV Berbasis Node MCU Menggunakan Smartphone Android," *JTEIN J. Tek. Elektro*

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Indones., vol. 3, no. 1, pp. 136–146, 2022.