

DESIGN OF LAMP CONTROL LONG DISTANCE USING VIA BOT WHATSAPP BASED IOT NODEMCU

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ABSTRACT

An electronic lamp is a lighting source for both inside and outside the house. One of the key components to carrying out daily tasks is the extensive use of lighting. Lights can be used for more than just illumination; they can also be utilized for décor, as a sign that the owner is at home, and to increase security. The Internet of Things (IoT), which is defined as a system of networks that may be connected to a machine or other object that serves as a receiver or sends data using a network connection, is essential for enabling the light control system and is the key to success in remote light control. The Internet of Things is another technology that necessitates a process and the cooperation of supporting hardware. Researchers will create a tool for controlling lights using Whatsapp as the media controller, NodeMCU as a support tool, Wifi as the internet network, and the Arduino IDE application as the controller in this study. As technology advances, so do the demands for lighting control, particularly in terms of energy savings and ease of monitoring. Based on this context, this study will employ Whatsapp as the media controller, as there is still very little light control found in Whatsapp, despite the fact that almost everyone, particularly in Indonesia, uses Whatsapp as a chat application. It is intended that the model device created by this researcher will be used to monitor lights as well as save electricity when the lights are not in use. This lamp controller is built with NodeMCU V3 CH340 and Relays that are linked together with Jumper Cables and other supporting components. This tool is created as part of an effort to advance technology and provide comfort and convenience in controlling lights. Based on the results of testing the designed equipment, the system built on the tool is capable and successful in controlling lights via Whatsapp by typing commands set in the Arduino IDE. The presence of a light control feature via Whatsapp will be a new breakthrough that anyone can use to save electricity and make it easier for lamp users to control lights remotely.

Keywords: IoT, Lamp, NodeMCU V3 CH340, Relay, Whatsapp

INTRODUCTION

A lamp is a type of lighting that many people need to use at night. Lights are widely used in terms of lighting, decoration, and signaling. The use of the Internet of Things system to control lights that can be controlled remotely is quite limited in this modern era. This is due to

the fact that very few people understand the IOT system and the internet. When IoT and the Internet are linked, they can create a light control system, specifically for the use of lights in the home.

Lights, in addition to serving as a lighting device, can also be used to mark indicators of homeowners' whereabouts

and as security against crime. It's unfortunate that so few people understand how remotely controlled light automation works in this modern era, where homeowners still have to manually press a switch to turn the lights on or off (Wafi et al., 2020). This is inefficient, especially if the homeowner forgets to turn off the lights during the day, and it is also a waste of electricity, which contributes to global warming (Hamdi & Thamrin, 2021).

Lights that are left on without being turned off pose a significant risk, such as an electric short circuit or a fire. In terms of environmental friendliness and safety, this condition is extremely dangerous, as it poses a significant risk (Efendi & Chandra, 2019). The authors of this study felt that they needed to make a new breakthrough in terms of saving electricity while also minimizing the risks caused by human error when manually controlling lights. As a result, the author attempts to design a remote light control system that only uses the Whatsapp application as the primary medium for remote control, because, as we all know, almost all Indonesians use the Whatsapp application as a daily chat feature. so that the light control system using the Whatsapp bot makes it possible for humans not to forget or make it easier to control the lights remotely by simply typing a code or chatting to the Whatsapp bot, so that the WhatsApp bot can perform according to the performance given by humans based on the script or code that we settings into the WhatsApp bot.

The internet is also an important part of the Internet of Things system process, because it is required to develop inter-network communication so that it can be connected to the internet network, so that data can be exchanged with each

other, and so that the data that has been received can be converted into information (Baskoro et al., 2019). When it comes to the internet, we all know that it has many features, such as game applications, browsing applications, and so on. One of them is chat features like Whatsapp, which researchers will discuss as the primary medium in the process of designing remote light control that is supported by the NodeMCU microcontroller tool, a 2 Channel Relay Module, and a 100mm Female to Female Breadboard Wire Jumper Cable.

In a journal, an analysis of "Application of IOT for Light Control Using Web-Based Arduino Uno" was successful in producing a new system in light control using only the Internet of Things in its application, particularly in light control using the website as the medium. Another study, "Application of Smart Home for IOT-Based Light Control in Taman Cikarang Indah 2 Housing," was also successful in developing an Arduino Uno-based automatic lamp prototype with the same goal, namely to save lights and make humans more instant in controlling lights.

Interaction between humans is, in theory, a common occurrence and is widely practiced. Similarly, human-machine interaction is quite common, such as the discovery of computer systems, internet networks, and so on as a medium to assist humans in doing various things (Novelan et al., 2020). According to a scientific paper published by the McKinsey Global Institute, IOT (Internet of Things) is a powerful technology that allows us to connect machines, other physical objects, and equipment with network-based sensors in order to obtain data and manage their own performance so that they can

collaborate with each other and do what humans order. Because this light control design can be run without us having to manually press the on/off button on the light switch, it can be said that everyone can easily access the light control system wherever that person is in the concept of making this design (Herdianto, 2018)

Based on the aforementioned issues, the authors developed the thesis title " **DESIGN OF LAMP CONTROL LONG DISTANCE USING VIA BOT WHATSAPP BASED IOT NODEMCU** ".

LITERATURE REVIEW

Researchers can obtain information from previous research for comparison and reference in this study, which not only concerns existing weaknesses or strengths, but also allows research to run smoothly, requires a strong theoretical foundation, and various references. As the foundation for variable descriptions. More emphasis on the past. The following is the theoretical foundation of the research used by researchers:

2.1 NodeMCU

NodeMCU is an open source Internet of Things (IoT) development platform and tool that uses the Lua programming language to create IoT prototypes and can be used with sketches in the Arduino IDE. At first glance, the NodeMCU microcontroller appears to be nearly identical to the Arduino board connected to the ESP8266. The ESP8266 board incorporates NodeMCU, which includes a microcontroller and WiFi capabilities. NodeMCU also has a micro USB port, which is typically used for programming and powering. NodeMCU's perspective is more favorable in terms of cost and space (Khang, 2021).



Picture 1 NodeMCU

Source : The Processed Data by Researcher, 2022

NodeMCU is a tool derived from the ESP8266 family that is quite easy to use, already has the processing power required to run applications, and can connect directly without using Wi-Fi, as well as other Arduino-type devices, without the need to install new devices, unlike the Arduino Uno, which does not have this feature and requires a different connection (Bento, 2018).

2.2 Whatsapp

WhatsApp, also known as WA, is the most popular chat media among Indonesians, accounting for approximately 83% of all internet users in Indonesia, or approximately 124 million registered WhatsApp application users (Pustikayasa, 2019).

WhatsApp is one of the app features that allows you to send instant messages (Instance Messenger). Aside from that, it can exchange data, videos, and talk using the voice feature.



Picture 2 WhatsApp

Source : <https://api.time.com/wp-content/uploads/2021/09/whatsapp-fined-data-transparency.jpg>

WhatsApp is very similar to a number of SMS (Short Message Service) applications that are commonly used on older cellphones. WhatsApp does not use direct credit, as SMS does, to exchange data; instead, it uses internet services. Users can send messages as long as their phones are connected to the internet. Users can also send soft files with PDF extensions, documents, and other types of documents (Pustikayasa, 2019).

2.3 Relay

A relay is a tool that, with the help of a microcontroller, can automatically regulate the entry and exit of electric current at specific times. The relay's operation is similar to that of the lamp's on/off switch (Nopriadi, 2020).

Relays use the electromagnetic principle of moving the switch contacts to allow a lower current (low power) to transmit a higher voltage electric current (Saleh & Haryanti, 2017).



Picture 3 Relay

Source : The Processed Data by Researcher, 2022

Because a relay is a type of switch, the terms Pole and Throw, which are used in ordinary switches, also apply to relays. The terms Pole and Throw are defined below:

1. Pole: The number of contacts (Contact) that a relay owns.
2. Throw: The number of conditions a Contact possesses (Contact)

2.4 ThingESP

ThingESP for Arduino is a simple client library for connecting IoT devices to the ThingESP Cloud Platform.



Picture 4 ThingESP

Source : The Processed Data by Researcher, 2022

ThingESP is a library specifically designed to support the performance of the Arduino IDE, so researchers can easily install it anywhere and at any time by connecting the device to be set up in a few minutes. It supports a variety of

network interfaces, including Wifi (Howedi & Jwaid, 2017).

2.5 Twilio

Twilio is a communication platform in the cloud. Cloud Communications Platform Services is one of Twilio's cloud services (Cpaas).



Picture 5 Twilio

Source : <https://blog.axway.com/wp-content/uploads/2017/07/blog-572x320-twilio-sms.jpg>

Applications can use Twilio to integrate or enhance communication capabilities such as telephony, SMS, chat, MMS, video services, and programmable meetings. (Kurniawan et al., 2021)

2.6 Software Arduino IDE

Arduino is also a platform that combines hardware, a programming language, and an integrated development environment for physical computing (IDE). It is a concept for comprehending the interaction of interactive software and hardware. That is, the researcher can receive and respond to impulses from the natural environment between the analog and digital worlds (Silvia et al., n.d.).



Picture 6 Arduino IDE

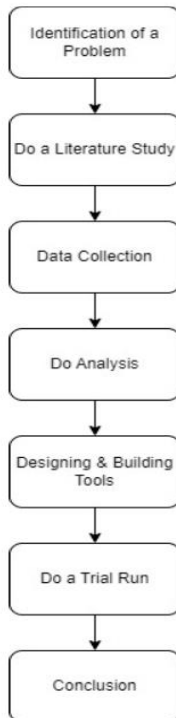
Source : The Processed Data by Researcher, 2022

Using the Arduino IDE (Integrated Development Environment) software application, the Arduino program is written in the C programming language. The Arduino IDE has two features:

1. Function to Cancel Setting (Void)
The void setup function is used to configure the input data type, the pin used, and the output pin.
2. Primary program function
When receiving data input, the main program is a loop function that is the Arduino IDE source code.

METHOD

A research method is a method or methods used in current research. The methods used to obtain the truth will be traced in various ways to find the truth, depending on the actual research situation. The method's structure and implementation steps are as follows from the beginning to the end of the research:



Picture 7 Research Stages
Source : The Processed Data by
Researcher, 2022

A detailed description of each research step is as follows:

1. Identification of a Problem
The researcher identifies a problem that exists and occurs in everyday life, namely the problem of wasting electricity and not being instantaneous in turning off/on the lights, which results in an increase in electricity costs, and there are risks that, if the lights are left on continuously.
2. Doing a Literature Study
At this stage, the researcher conducts literature research in order to use it as a reference in collecting data or

sources related to NodeMCU and Module Relay material.

3. Data Collection
In the third stage, the researcher's data collection is important enough to dig up existing information about the Internet of Things so that the researcher's material needs are met and the tool can be designed.
4. Do Analysis
After successfully completing data collection techniques, researchers must conduct research on the collected data so that it can be categorized based on which tools will be used. Researchers were able to obtain several things as a result of this grouping, including:
 - 1) Component data about NodeMCU;
 - 2) Jumper Cable Arrangement Data to be connected;
 - 3) Data on the use of the Relay Module;
 - 4) Data implementing tools;
 - 5) Data on the design of the Arduino IDE program using Twillio, ThingESP, and Whatsapp.
5. Designing & Building Tools
The researchers were successful in creating two types of designs to be used in the light control using Whatsapp, namely:
 - 1) Hardware Design
In designing this light control system, some hardware is needed, including:
 - a) NodeMCU, which can be used as an Internet of Things (IoT) based microcontroller.

- b) Relay Module, which is used to be a connector/breaker of electric current.
- c) Some additional tools to support the light control system using Whatsapp.

2) Software Design

The researcher uses a laptop as a tool to support the performance of programming (coding) that will later be compiled into NodeMCU, and the process of making the coding programming will be aided by the Arduino IDE Software.

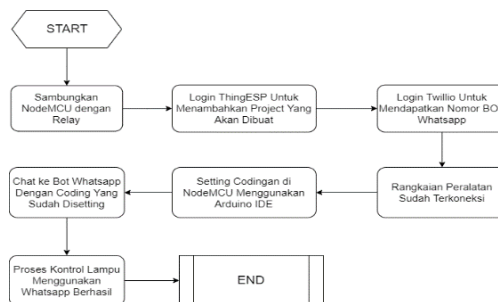
6. Do a Trial Run

During the testing phase of the tool that the researcher has built, the researcher will perform several tests to ensure that the tool can function properly without any irregularities in the process. Before performing the test, a check of the tools built must be performed to ensure that the tools built are correct in design. This trial is very important because trials of the tools built allow researchers to determine whether the designed tools are functioning properly as expected by researchers.

7. Conclusion

The design conclusion is the end of a successfully designed stage, and it contains a statement of the problem as well as answers to questions about how to use the tool being built.

This software's design aims to run the mechanical working system of the designed tool. The research program flow is to control electronic equipment using the program algorithm.



Picture 8 Flowchart

Source : The Processed Data by Researcher, 2022

A Jumper cable will connect the NodeMCU, which is already connected to the Internet, to the Relay Module. After connecting all of the tools, the next step is to create a Twillio account in order to obtain a Whatsapp Bot number. ThingESP was used as a connecting medium between Twillio and the Arduino Software so that we could carry out the coding process based on what we were going to do, namely coding for controlling lights via Whatsapp. Whatsapp's function is to act as a connecting bridge or disconnecter for the light controller, so that the lights are no longer turned on/off manually, but rather via Whatsapp by typing the commands that we have programmed in the Arduino Software.

RESULT

Mechanical and electrical design are based on the results of the device design that will be created by researchers. The mechanical design is the physical form of the tool to be made, whereas the electrical design includes the electrical design of the tool to be made.



Picture 9 Front Look

Source : The Processed Data by
Researcher, 2022



Picture 10 Side View

Source : The Processed Data by
Researcher, 2022

This system design employs the Arduino IDE software based on the results of the Software design. The Arduino IDE application contains coding or commands that researchers have configured to control lights via the internet network.

```
sketch_oct17a.ino
1 #include <ESP8266WiFi.h>
2 #include <ThingSP.h>
3
4 ThingSP8266 thing("kelvin", "skripsikelvin", "12345678");
5
6 #define relay 0
7
8 unsigned long previousMillis = 0;
9 const long INTERVAL = 6000;
10
11 void setup()
12 {
13   Serial.begin(115200);
14   pinMode(relay, OUTPUT);
15   thing.setWiFi("Cieee Gratisan", "123456788");
16   thing.initDevice();
17 }
18
19
20
21 String handleResponse(string query)
22 {
23
24   if (query == "hidupin lampu") {
25     digitalWrite(relay, LOW);
26     return "oke bro";
27   }
28
29   else if (query == "matiin lampu") {
30     digitalWrite(relay, HIGH);
31     return "dih.. nyuruh trs, yaudah dimatiin ya";
32   }
33
34   else if (query == "coba cek lampunya")
35     return digitalRead(relay) ? "udh mati kok" : "masih hidup nih";
36
37   else if (query == "bro")
38     return "Lya bro, ada apa?";
39
40   else if (query == "skokok")
41     return "to the point aja bro wkok";
42
43   else if (query == "thanks bro")
44     return "sip broo..";
45
46   else return "aku ga ngerti bro..";
47
48 }
49
50 void loop()
51 {
52   thing.handle();
53 }
54 }
```

Picture 11 Program in NodeMCU

Source : The Processed Data by
Researcher, 2022

It is necessary to test the tools that have been built in order to complete the design of the system used to control lights using Whatsapp. The purpose of this test is for researchers to determine whether the tools they have built will function properly as expected.

a. Testing the ON Relay on the Lamp

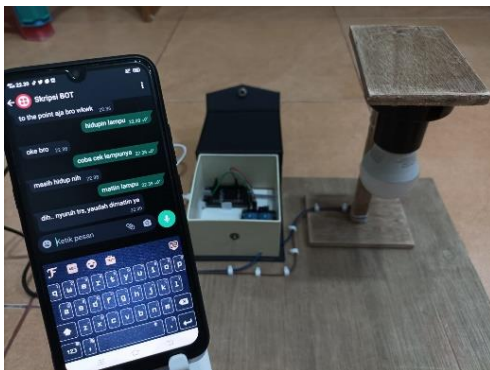
When researchers chat with WhatsApp bots, the results of the ON lamp test. The response from the Whatsapp bot indicates that the light has been turned on successfully. Then it is accompanied by a light that turns on by itself as a result of the researcher's command.



Picture 12 Light ON

Source : The Processed Data by Researcher, 2022

b. Testing the OFF Relay on the Lamp
When researchers chat with WhatsApp bots, the results of the OFF lamp test. As a result, the whatsapp bot's response will also indicate that the light has been successfully turned off. Furthermore, it is accompanied by a lamp that is already in a dead state as a result of the researcher's command.



Picture 13 Light OFF

Source : The Processed Data by Researcher, 2022

Table 1 Test Table Data

ON Command	OFF Command	Results
Hidupin Lampu	Matiin Lampu	Succes
Status State of The Lamp (In On Condition)	Status State of The Lamp (In Off Condition)	Succes

Source : The Processed Data by Researcher, 2022

CONCLUSION



Based on the findings of the researcher's research, the researcher can draw the following conclusion:

1. The remote light control system using Whatsapp as the media controller can function as expected.
2. The existence of Internet of Things technology is extremely beneficial in the process of controlling remotely, particularly in terms of controlling lights, which is easier and can be done from anywhere as long as the device is connected to the internet.
3. The use of lights can then be remotely monitored using this light controller system by checking the condition of the lights, whether they are on or off.
4. Operated by chatting to the WhatsApp bot via the Whatsapp feature, and the bot will respond to commands ordered by the user.

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