Journal of Sisfotek Global

Versi Online: http://journal.stmikglobal.ac.id/index.php/sisfotek
ISSN (Online): 2721 - 3161, ISSN (Print): 2088 – 1762
Vol. 11, No. 2, September 2021, pp. 121-126

Internet Of Things Based Home Electrical Control Device Using Google Assistant

[1]Rachmat Agusli, [2]Rahmat Tullah, [3]M. Ali Akbar Jufri

[1,2,3]Global Institute, Tangerang, Indonesia, 15114
E-mail: [1]rahmatagusli@stmikglobal.ac.id, [2]rahmattullah@stmikglobal.ac.id, [3]aliakbarjfri@gmail.com

ARTICLE HISTORY

Received : 20 August, 2021
Revised : 1 September, 2021
Accepted : 15 September, 2021

KEYWORDS

Internet of Things
NodeMCU
Android
Arduino
Voice Assistant

ABSTRACT

The increasing use of the internet has resulted in innovations in control systems. Internet of Things or IoT is an innovation where several electronic devices can be controlled remotely by utilizing the internet to obtain a more efficient and time-saving control system. This research uses IoT to control several electronic devices that are usually used in homes, such as lights, fans, and many more. The system built based on the Internet of Things uses Google Assistant or voice by utilizing the NodeMCU device as a control system. With the construction of this application, it is hoped that it can make it easier for people to turn on and turn off lights remotely. Users are only asked to press the voice commad or button on the Android application that was built to carry out the command to turn on and turn off the lights by using an internet connection. Based on the test results, the system can work properly to turn the lights on and off in a long distance.

1. INTRODUCTION

Technological advances continue to grow very rapidly until now and create various kinds of tools to help complete human tasks. Internet of Things (IoT) is a term that has recently begun to be crowded, but few people understand the meaning of this term. In general, it can be interpreted as objects around us that can communicate with each other through the internet.

IoT has a concept that aims to expand the benefits of being connected to the internet network continuously. For example, electronic objects such as lights, fans and much more. These objects can be implanted with sensors that are always active and connected to the internet. Electronic equipment because it uses an electric power source as its power source. The higher the use of electronic objects, the higher the number of electricity usage in the household [1].

This condition is directly proportional to the excessive use of electrical energy in everyday life. The problem that often occurs is that users forget to turn off the power [2]. So that the electrical energy used is not useful and is very susceptible to short circuits.

Therefore, from the problems related above, it is necessary to design an electrical control system using IoT-based technology [3], offering interesting potential such as home devices that can be controlled or monitored via the internet network as the main link in interaction and informing the current conditions, while humans can control and monitor this device by simply connecting to the internet using a smart phone or android smartphone.

To make this tool, a NodeMCU (Microcontroller Unit) ESP8266 V3 device is needed. NodeMCU ESP8266 V3 is a microcontroller [4] that has been integrated with the Wi-Fi module and belongs to the ESP8266 type, the type used is ESP-12E based on eLua firmware. So this tool can be used by homeowners to control lights and fans remotely [5] using an Android smartphone.

2. METHODS

Based on the problems above, the alternative problem solving from homeowners are as follows, including:

1. Designing an electrical control device using NodeMCU V3 and Relay [6] based on the Internet of Things m, the design is made so that stakeholders make it easier to control electronic devices such as lights, fans, etc.
2. That's why the researcher raised the Internet of Things, as his research. Therefore, with the

Internet of Things, electronic devices at home can be controlled via an Android smartphone [7].

3. Thus, an alternative to solve the problem above, it is necessary to make an electrical control device at home based on the Internet of Things using Google Assistant/voice [8].

After conducting research and analysis of the running system, several problems were found, namely the system that was running was still not optimal because the process of controlling the electrical or electronic device that was running at this time was still carried out manually where stakeholders still had to come to the place or walk to the location [9]. light switch and fan to press the on/off switch. As for the design of the system that is being proposed, the design of an electrical control device or electronic fan and light parallel device based on the Internet of Things is made using Google Assistant / voice as a control device or control on an Android smartphone [10] and NodeMCU as a control component of the proposed tool.

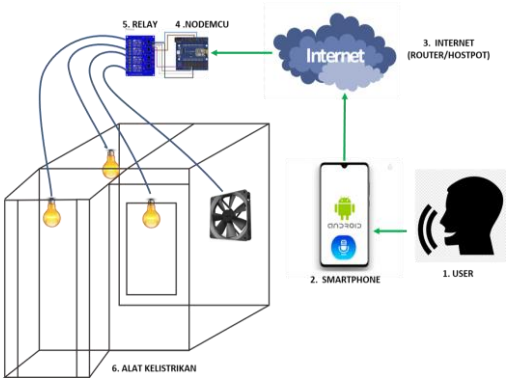


Figure 1. Hardware Architecture of the Proposed System in General

Table 1. Information on Figure 1. Proposed System Hardware Architecture

Information	description
NodeMCU	NodeMCU is the main tool needed by the system as a microcontroller and access capability to Wifi.
NodeMCU Base	NodeMCU Base for on board power indicator.
Adaptor	An adapter is a device for connecting an electric current to a system appliance.
Socket DC	DC socket is an electrical connector for inputting direct current power.
Socket Power	Socket Power is a device that connects alternating current power supplies.
Resistor	Resistor to convert the sine voltage on AC into 5v and 0v pulse voltages which will be input to the NodeMCU interrupt pin.
Push button	Push button switch is a switch where this component serves to connect or disconnect the electric current.
Cable dupont arduino	Arduino dupont cable is a jumper cable (Female) which is used for electronic component circuit projects that are done using a breadboard. Product Functions: Dupont cables are commonly used to connect cables with PCBs and also electronic components in breadboard projects.
LED	LED as an indicator when the charity box is opened.
Cable Serabut	Fiber Cable as a connector for electronic devices to relays.
Relay Modul 4 Channel	The 4 Channel Relay Module is an electronic-switch that can be used to control ON/OFF high-power electrical equipment. Relay Module 4 Channel 5V is commonly used by microcontrollers to control devices with AC voltage (lights, fans, etc.).
Fan 12 Volt	NodeMCU is the main tool needed by the system as a microcontroller and access capability to Wifi.
Lamp DC 12	NodeMCU Base for on board power indicator.
Smartphone Android	An adapter is a device for connecting an electric current to a system appliance.

System Workflow Flowchart Using Google Assistant/Voice.

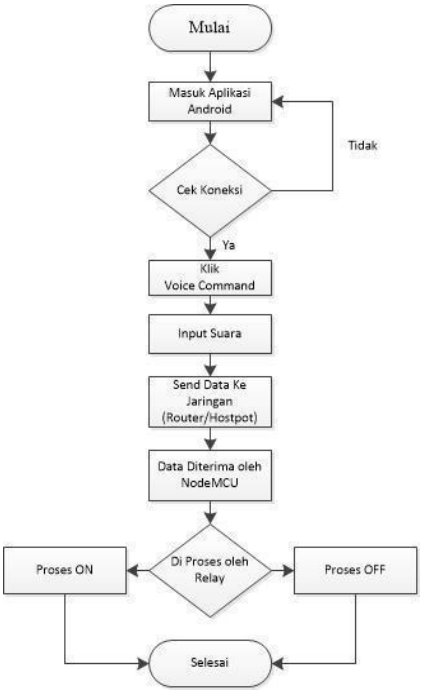


Figure 2. Flowchart of System Workflow Using Google Assistant/Voice

From the picture above, the following is a System Workflow Flowchart Using Google Assistant/Voice.

1. To control electrical equipment, the first step is to open the IoT application.
2. Check the connection or NodeMCU IP is the same as the device in NodeMCU.
3. Next, click Voice Command and then input the standard voice in the application programming or on the NodeMCU tool.
4. From the voice input, data will be sent to the network (Router/Hostpot).
5. The data is received by the NodeMCU tool, then forwarded to the Relay for the ON/OFF process.
6. After success, the electronic device will turn on or off according to the voice command earlier or according to the data sent by the smartphone over the network and received by the NodeMCU.

2.1. Proposed Design System

The whole circuit is an amalgamation of NodeMCU ESP8266 v3, NodeMCU Base 1.0, Adapter, DC Socket, Power Socket, Resistor, Push Button Switch, Arduino Dupont Cable (Jumper: Famale), LED, Fiber Cable, 4 Channel Relay Module, 12 Volt Fan and 12 Volt DC Lamp. All these parts have been designed in one package known as the overall suite of tools. The picture of the whole series of tools can be seen in Figure 3.

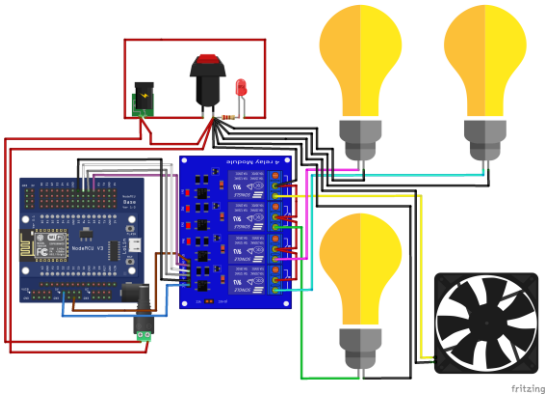


Figure 3. Overall Design of the Tool

Based on Figure 3, the Overall Design of the Tool explains that after the design of the electronic device, it is continued with the overall design of the device in which the Relay is attached with a fiber cable to Normally Close (NC): the initial condition before being activated will always be in the CLOSE position (closed). After the fiber cable is inserted into the NC contact where K1-NC is connected to the Power ON/OFF Socket as well as electronic devices are connected together with K1-NC on the Relay to the Power ON/OFF Socket.

In order to avoid excessive electric current voltage, a resistor is used on the power button as an inhibitor / limiter of electric current flowing into the circuit. For the mains voltage to be able to turn on the Overall Design of the Tool using a 100-240V Adapter.

Based on Figure 3, the process flow from the prototype design is as follows:

1. The user gives a voice command/clicks the ON/OFF button on the smartphone.
2. The smartphone will give commands in the form of data to the NodeMCU device via the internet network.
3. After the data is received on the NodeMCU device, it will be processed by the Relay to an electrical or electronic device.

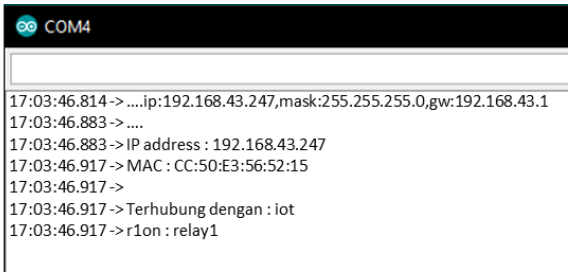


Figure 4. The ON Process Runs On Relay1

2.1. Prototype Design

The prototype design is used as the basic material for making an application, before the application is made a prototype design will be carried out first.

The application software used in making image display or mockups on Android smartphones is Balsamiq Mockup 3. The following is an overview of the prototype design for the system to be implemented.

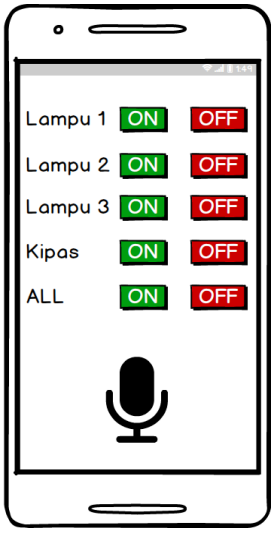


Figure 5. IoT Smart Control Prototype

3. RESULTS AND DISCUSSION

3.1. Tool View

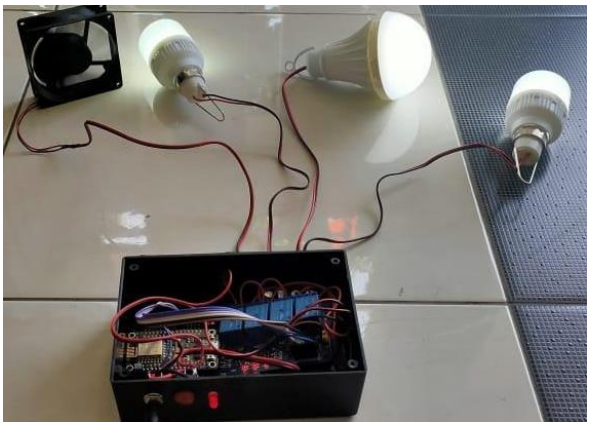


Figure 6. The Prototype Physical Form

Figure 6 shows the display of the results of the design of the electrical control device in an internet of things-based home using Google Assistant/voice.

3.2. Display of Applications on Android smartphones

Figure 7. Physical Form of the Proposed Prototype

Figure 7 shows that the application runs if the IP is a network on the NodeMCU.

3.3. Tool Testing on NodeMCU

To test all the tools, the first step is to make sure that the NodeMCU is connected to the network (Router/Hostpot). Before trying the tool, first check whether WiFi is connected to the specified AP (Access Point) after the program is run or reset and make sure the AP is turned on. See in figure 8 when the wifi has been connected to the AP.

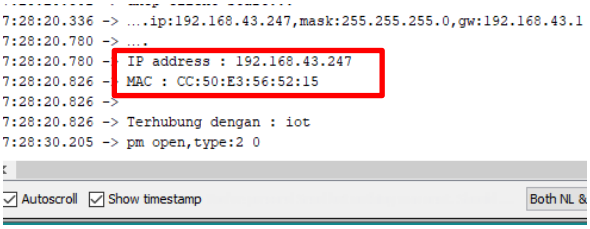
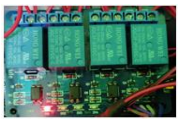
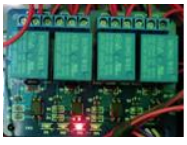
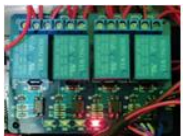


Figure 8. IP Search to Connect

3.4. Testing on Electronic Devices and Applications

Table 2 Testing Conditions on electronic/electrical devices

Electrical and electronic equipment	Indicator of Relay	Description
		The condition of the electrical equipment is off and the relay indicator is not lit
		The condition when light 1 is on and the red relay 1 indicator light is on
		The condition when light 2 is on and the red relay 2 indicator light is on
		The condition when light 2 is on and the red relay 2 indicator light is on
		The condition when light 4 is on and the red relay 4 indicator light is on
		The condition when light 1 is on and the red relay 4 indicator light is on

3.5. Testing on button voice command

Table 3 Testing on the Voice Command Button

Voice Command	Electronic Device	Description
One	Lamp 1 On	when saying one will be replied by the voice 'OK'
Two	Lamp 1 Off	when saying two will be replied by the voice 'OK'
Three	Lamp 2 On	when saying three will be replied by the voice 'OK'
Four	Lamp 2 Off	when saying four will be replied by the voice 'OK'
Five	Lamp 3 On	when saying five will be replied by the voice 'OK'
Six	Lamp 3 Off	when saying six will be replied by the voice 'OK'
Seven	Lamp 4 On	when saying seven will be replied by the voice 'OK'
Eight	Lamp 4 Off	when saying eight will be replied by the voice 'OK'
On	All device On	when saying On will be replied by the voice 'OK'
Off	All device Off	when saying Off will be replied by the voice 'OK'

In table 3 describes the test on the Voice Command Button where the IoT application on an Android smartphone is run by way of the command according to the table. For example, when the user or the stackholder wants to turn on lamp 1 with a command or say "one", the command will send data to the internet network and be received by the NodeMCU tool directly processed by Relay to turn on lamp 1. Voice Commad will answer "OK" if data is received by the NodeMCU tool.

3.6. Test Results

After testing, the application that was built runs as expected, but the measurement of the delay time on each data input by the user/stakeholder experiences a very fast delay, as shown in the table below:

Table 4 Results of Testing Time Delay on Button Voice

Electronic Device	Voice Command	Delay (s) Average	Description
Light 1 is on	One	1 s	Data Sent
1 light off	Two	1 s	Data Sent
Light 2 is on	Three	1 s	Data Sent
2 lights off	Four	1 s	Data Sent
3 lights on	Five	1 s	Data Sent
3 lights off	Six	1 s	Data Sent
Fan On	Seven	1 s	Data Sent
Fan Off	Eight	1 s	Data Sent
All tools are on	On	1 s	Data Sent
All tools off	Off	1 s	Data Sent

4. CONCLUSIONS

By applying the concept of the Internet of Things at The results of the implementation of tools and tests carried out on electronic devices and applications. First shows NodeMCU working and in sync with gadget devices via ping data. Electronic devices and applications run well with appropriate response. Meanwhile, testing on the Google Assistant voice command also worked well. The tool can work well to support the development of human activities in using sound responses to turn on the lights.

The ease with which users can use technology to help turn on lights, fans and enable other household electrical devices to work with less energy. Homeowners who find it difficult to take care of many members at the same time need better performance with technology being very helpful.home, the house can be controlled by electrical or electronic devices rarely remotely through networks such as routers and hotspots. The design of this electrical control device uses the NodeMCU as the main system which is programmed to control electrical devices via an Android smartphone in a manner such as Google Assistant which is instructed to turn on and turn off electrical appliances at home. No need to use a lot of energy just by controlling electrical devices on the Android application makes work at home efficiency.

The challenge in operating electronic devices such as lights is actually not too difficult, but in the current era, improvements need to be made with smart home technology that is integrated with full security so that it becomes a technology unit that can be controlled remotely and has real-time data.

REFERENCES

[1] I. Alfannizar and Y. Rahayu, “Perancangan dan Pembuatan Alat Home Electricity Based Home Appliance Controller Berbasis IoT,” *FTEKNIK*, 2018..

[2] M. P. T. Sulistyanto, D. A. Nugraha, N. Sari, N. Karima, and Wahid Asrori, “Implementasi IoT (Internet of Things) dalam pembelajaran di Universitas Kanjuruhan Malang,” *SMARTICS*, 2015

[3] Iswanto and Gandi, “Perancangan dan

Implementasi Sistem Kendali Lampu Ruangan Berbasis IoT," *Teknol. Inf. dan Komun.*, 2018.

[4] D. Suhartono and A. Goeritno, "Prototipe Sistem Berbasis Mikrokontroler untuk Pengkondisian Suhu pada Analogi Panel dengan Analogi Sistem Air Conditioning Jurnal EECCIS Vol. 13, No. 1, April 2019 pp 22-30.

[5] S. Papantoniou, et. al. "Adaptive lighting controllers using smart sensors". International Journal of Sustainable Energy, Volume 35, 2016 - Issue 6.

[6] A. Junaidi, "Internet of Things, Sejarah, Teknologi dan Penerapannya," *JITTER*, 2015.

[7] M. Chowdhury, et. al. "Remote phone controller: An application to control smart phone". 2014 9th International Forum on Strategic Technology (IFOST).

[8] Shoba M, Pushpa Mohan. "AI Based Device Control using IoT and Google Assistant. International Journal of Advanced Science and Technology", 29(9s), 603 - 611.

[9] Ajib Hanani and M. A.Hariyadi. "Smart Home Berbasis IoT Menggunakan Suara Pada", Jurnal Ilmiah Teknologi Informasi Asia Vol. 14, No.1, Tahun 2020.

[10] R. Tullah, R. Setiyanto and M. R. Maghfaluti3, "Alat Penyeduh Kopi Tubruk Otomatis Berbasis Arduino". Jurnal Sisfotek Global, Vol. 11, No. 1, Maret 2021.