# AUTOMATICALLY CONTROL LIGHT INTENSITY WITH GOOGLE VOICE ASSISTANT COMMANDS

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**Abstract**

Everyday light is the most important part to support human activity. Inadequate light quality can harm visual function, thinking, productivity, and human work activities. Therefore we need a tool that can adjust the intensity of light. This research realizes several human activities that can adjust the light intensity with google voice assistant commands using a smartphone. ESP32 is used as a connecting device between the Google voice assistant and the AC light dimmer module. In addition, this tool can be controlled remotely to all corners of the world because it uses the blynk API and is connected to the internet network. Based on the results of the tests that have been carried out, on the command "mati" the lamp voltage is 3.6 volts with a light intensity of 0 lux, on the command "sleep" the lamp voltage is 107 volts with a light intensity of 1604.4 lux, on the command "Santai" the lamp voltage is 161, 8 volts with a light intensity of 2416.4 lux and on the command "learn" the lamp voltage is 216.6 volts with a light intensity of 3603 lux.

**Keywords: Light, ESP 32, Google Voice Assistant, AC Light Dimmer Module**

## PENDAHULUAN

Light is an absolute part of life, so human life is very dependent on light. Without light, human life cannot develop properly. Lighting is one of the most important factors in the continuity of human activity. Inadequate light quality adversely affects visual function, mind, work activity, and productivity. Excellent lighting makes it possible to see the object being worked on clearly and quickly[1].

The light in question is in the form of a lamp. In the current era, various types of lamps can be found, ranging from slightly bright to very bright lamps, ranging from cheap to expensive. When studying, of course, bright lights are needed to make it easier to see[2]. In addition, the light of the lamp affects sleep quality[3].

In previous studies, a tool was made using a pat sensor to turn off and turn on the lights[4]. After that, a device was developed that can turn on lights with voice commands with an Arduino UNO microcontroller and an HC-05 *Bluetooth* module connected to a *smartphone*[5]. After that, a tool was also developed using the HC-05 Bluetooth module as a light intensity regulator connected to a *smartphone* and a Bluetooth voice application to turn on and off the lights and Arduino Uno as a microcontroller which is used for people with special needs and the elderly with a maximum control distance of the *Bluetooth* connection 10 meters long with a wall thickness of 10 cm[6].

Based on this problem, there is already a light-intensity control device that can be controlled via a smartphone connected to the HC-05 Bluetooth module. Therefore this study, created "Automatic Control of Light Intensity with ESP32-Based Google Voice Assistant Commands". Where this tool can adjust the light intensity of the lamp using a smartphone through a *google voice assistant*. In addition, this tool uses the ESP32 board as a link to the internet with a *smartphone*. So that it can be

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used with various sounds of the wearer and can be connected with several people to be able to control this tool with remote control.

## LANDASAN TEORI

Pengacuan pustaka dilakukan dengan menuliskan [nomor urut pada daftar pustaka] mis. [1], [1,2], [1,2,3]. Sitasi kepustakaan harus ada dalam Daftar Pustaka dan Daftar Pustaka harus ada sitasinya dalam naskah. Pustaka yang disitasi pertama kali pada naskah [1], harus ada pada daftar pustaka no satu, yg disitasi ke dua, muncul pada daftar pustaka no 2, begitu seterusnya. Daftar pustaka urut kemunculan sitasi, bukan urut nama belakang. Daftar pustaka hanya memuat pustaka yang benar benar disitasi pada naskah.

## METODE PENELITIAN

The method used in this study is *Research and Development.* A subsequent design of the testing process of the tool was carried out.

*Block System Diagram*

Voice commands are executed using Indonesian on *google voice assistant* on android connected to the internet. *The Google voice assistant* converts voice commands to text. The text will then be passed from google *voice assistant* to *webhooks* by IFTTT *(If This Than That). Webhooks* will request the *blynk* API. The *blynk* API uses *the cloud* which will then be sent to ESP32. *Google home* is used as an *interface* between IFTTT and *google voice assistant*. ESP32 as a microcontroller connected to the internet receives a command from the *blynk* API to send an ADC signal on the AC *light dimmer module* to regulate the light intensity of the lamp. Here is the block diagram of the system used in Figure 3.

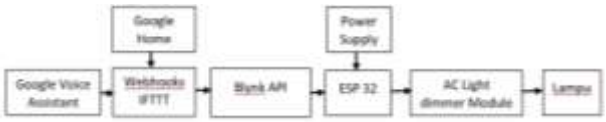


Figure 3. Block System Diagram

*Flowchart System*

*The flowchart system* describes the sequence of working procedures of this tool. It starts with inputting voice commands on the *smartphone*. Then the command is changed in the form of text on IFTTT which next webhooks will make a web request on ESP32. If the voice command is the same as "my applets" IFTTT, then the AC *light dimmer module* changes the light intensity of the lamp. The following is the flowchart system used in Figure 4.

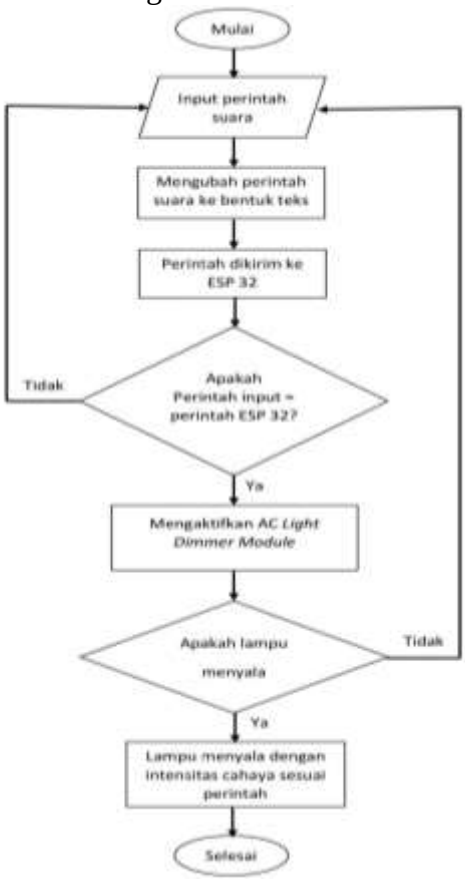


Figure 4. *Flowchart System*

*Software Design*

Software design is used to explain the stages of creating a program so that it can run the system on the tools that have been created, from these stages it is explained as follows:


Figure 5. *Blynk* API template

Figure 5. is the cloud creation stage in *the blink* API. It starts with logging in on the blynk website. Then create an account or log in if you have one. Create a template according to this study to get the blynk *template id, blynk device name,* and *auth token.*

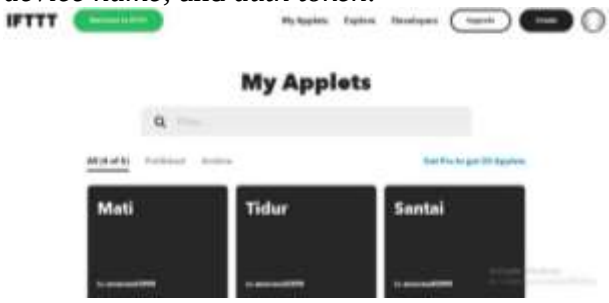


Figure 6. *Form Applet* on IFTTT

Figure 6. This is the stage of making voice commands in *Google Voice Assistant* into text integrated with *webhooks*. The initial step is to open the IFTTT website in a *browser*. Then *sign up* or *log in* if you already have an account. Create an *applet* by filling in "if that" with the word trigger on *google voice assistant* and "*then that"* with *the cloud blynk API* for *web requests* on *webhooks.*

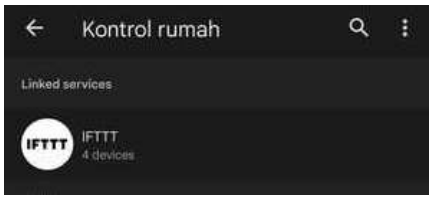


Figure 7. Controls on *Google Home*

Figure 7. is the stage of integrating IFTTT with the google *voice assistant account* on *google home.* The initial stage is to *download google home* on *a smartphone* and *log in* to the same account on IFTTT and *blynk API*. Next, it is compatible with *google* and searches for IFTTT until "*4 devices*" appears.

*Hardware Design*

In designing the research hardware this time, please pay attention to the circuit scheme that has been made.

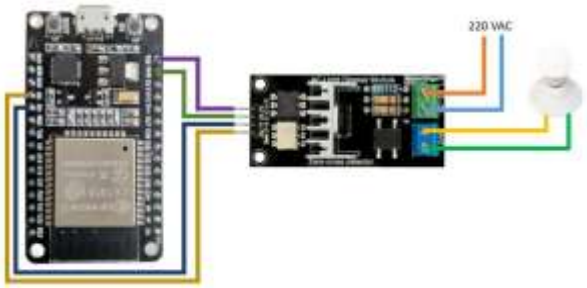


Figure 8. Circuit Schema

Figure 8. is a circuit schematic of the system created in this study. AC light dimmer module is connected to the VIN, GND, D2, and D4 pins on the ESP32. Meanwhile, for the output of the AC light dimmer module, it is connected to a voltage of 220 VAC for its input and a lamp for its output

## HASIL DAN PEMBAHASAN

The tests are carried out on a per-block basis to create a perfect study. Starting with testing google voice assistant, google home, blynk API with ESP32, AC light dimmer module, remote and light intensity.

*Google Voice Assistant testing*

Google voice assistant testing was done to find out how quickly *google voice assistant* changes the text.


Fig. 9 Pronunciation of Voice Commands in *Google Voice Assistant*

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From the results of taking 4 samples of spoken voice commands, an average *delay* of text change of 2.25 seconds was obtained. *This delay* is relatively fast in converting voice to text in *google voice assistant*. The *delayed* jug time affects the internet network used at the testing site.

Table 1. *Google Voice Assistant* testing

| No. | Spoken Voice Commands | Text results on *Google Voice Assistant* | *Delay* (seconds) |
|---|---|---|---|
| **1.** | Turn Off | Turn Off | 2 |
| **2.** | Enable Sleep | Enable Sleep | 2 |
| **3.** | Enable Casual | Enable Casual | 3 |
| **4.** | Enable Learning | Enable Learning | 2 |
| **Average *Delay*** | | | 2,25 |

*Google Home testing*

The google *home* test is used to find out which *google* account can control this tool.

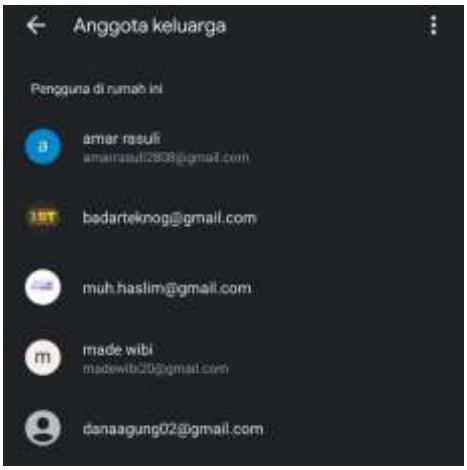


Fig. 10 *Google* accounts linked to *google home*

The test was conducted 5 times on Google accounts with different locations. It was found that the five accounts could be connected to control this tool. This method is efficient because it can be controlled by 5 different people and can be controlled from different locations.

Table 2. Google Home testing

| No. | Linked Google Account | Location | Status |
|---|---|---|---|
| **1.** | amarrasuli2808@gmail.com | Pasuruan, East Java | Connected |
| **2.** | badarteknog@gmail.com | Depok, West Java | Connected |
| **3.** | muh.haslim@gmail.com | Enrekang, South Sulawesi | Connected |
| **4.** | madewibi20@gmail.com | Central Lampung, Lampung | Connected |
| **5.** | danaagung02@gmail.com | Hungary, Europe | Connected |

*Blynk API Testing with Serial Monitor Arduino IDE*

The *blynk API* tester for sending *web requests* on the ESP32 is used to determine the delivery speed. This test can be done on a laptop or *smartphone browser*.

Fig. 11 *Blynk API web request*

There were 4 samples from the *blynk API* used in this study, which obtained an average delay for data transmission of 1 second. *This delay* is faster than in the *google voice assistant* test. The result corresponds to the serial monitor.

Table 3. *Blynk API* Testing with *Serial Monitor Arduino IDE*

| No. | URL API Blynk | Text results on serial Arduino IDE monitors | Delay (seconds) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1. | https://sgp1.blynk.cloud/external/api/?token=vlxTsDT9YglOwk5_niddP-GAHWY5BXge&v0=mode_mati | mode_mati lamp value = 0% | 1 |
| 2. | https://sgp1.blynk.cloud/external/api/update?token=vlxTsDT9YglOwk5_niddP-GAHWY5BXge&v0=mode_tidur | mode_tidur lamp value = 40% | 1 |
| 3. | https://sgp1.blynk.cloud/external/api/update?token=vlxTsDT9YglOwk5_niddP-GAHWY5BXge&v0=mode_santai | mode_santai lamp value = 60% | 1 |
| 4. | https://sgp1.blynk.cloud/external/api/update?token=vlxTsDT9YglOwk5_niddP-GAHWY5BXge&v0=mode_belajar | mode_belajar lamp value = 90% | 1 |
| **Average Delay** | | | 1 |

*Remote Testing*

Remote testing was conducted to see how far this tool could be controlled. It is proven that this tool can work as far as Hungary. In this case, this tool can be controlled anywhere as long as it gets an internet network. There were 5 samples controlled from various places by saying all four voice commands, obtaining an average delay to control this lamp from 5 places for 3.1 seconds.

Table 4. Remote Testing

| No. | Location | Lamp Value(%) | | | | AverageDelay per location (seconds) |
|---|---|---|---|---|---|---|
| | | M | T | S | B | |
| **1.** | Pasuruan, East Java | 0 | 40 | 60 | 90 | 3 |
| **2.** | Depok, West Java | 0 | 40 | 60 | 90 | 3,25 |
| **3.** | Enrekang, South Sulawesi | 0 | 40 | 60 | 90 | 4 |
| **4.** | Central Lampung, Lampung | 0 | 40 | 60 | 90 | 2,75 |
| **5.** | Hungary | 0 | 40 | 60 | 90 | 2,5 |
| **Average *Delay*** | | | | | | **3,1** |

Description: M = Enable Off
T = Enable Sleep
S = Enable Casual
B = Enable Learning

*Light Intensity Testing*

Light intensity testing uses a lux meter measuring instrument to determine the lux of lamps and multitesters directed at VAC. This test used a 5-watt filament incandescent lamp with a lamp lux of 4000 and a room area of 4 $m^2$. In this test, every voice command is performed, namely, turn off the switch, enable sleep, enable relaxation, and enable learning.

Fig. 12 Measurement Using *Multitester* on *AC Light Dimmer Module*

Fig. 13 Measurement using a lux meter

In the light intensity test, the voice command activates off with a *lamp value of* 0% using 5 experimental samples. The average incoming voltage is 219.8 volts, the load voltage is 3.6 volts and 0 lux.

Table 5. Light Intensity Testing with the "Unlock Off" Voice Command

| No. | Measurement Results | | |
|---|---|---|---|
| | Multitester V in (V) | Load (V) | Lux Meter (lux) |
| **1.** | 219 | 2 | 0 |
| **2.** | 221 | 7 | 0 |
| **3.** | 220 | 4 | 0 |
| **4.** | 220 | 2 | 0 |
| **5.** | 219 | 3 | 0 |
| **Flat** | 219,8 | 3,6 | 0 |

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In the light intensity test, the voice command activated sleep with *a lamp value of* 40% using 5 experimental samples. The average incoming voltage is 219.6 volts, the load voltage is 107 volts and 1604.4 lux.

Table 6. Light Intensity Testing with "Enable Sleep" Voice Command

| No. | Measurement Results | | |
|---|---|---|---|
| | Multitester V in (V) | Load (V) | Lux Meter (lux) |
| **1.** | 218 | 106 | 1606 |
| **2.** | 219 | 108 | 1601 |
| **3.** | 221 | 110 | 1602 |
| **4.** | 221 | 105 | 1607 |
| **5.** | 219 | 106 | 1606 |
| **Flat** | 219,6 | 107 | 1604,4 |

In the light intensity test, the voice command activated casually with *a lamp value* of 60% using 5 experimental samples. The average incoming voltage is 220 volts, the load voltage is 161.8 volts and 2416.4 lux.

Table 7. Light Intensity Testing with "Enable Casual" Voice Commands

| No. | Measurement Results | | |
|---|---|---|---|
| | Multitester V in (V) | Load (V) | Lux Meter (lux) |
| 1.. | 220 | 162 | 2415 |
| 2. | 221 | 162 | 2420 |
| 3. | 221 | 164 | 2414 |
| 4. | 219 | 160 | 2416 |
| 5. | 219 | 161 | 2417 |
| Average | 220 | 161,8 | 2416,4 |

In the light intensity test, the voice command activates learning with *a lamp value* of 90% using 5 experimental samples. The average incoming voltage is 218.8 volts, the load voltage is 216.6 volts and 3603 lux.

Table 8. Light Intensity Testing with "Enable Learning" Voice Commands

| No. | Measurement Results | | |
|---|---|---|---|
| | Multitester V in (V) | Load (V) | Lux Meter (lux) |
| 1 | 218 | 216 | 3603 |
| 2 | 218 | 217 | 3607 |
| 3 | 219 | 217 | 3600 |
| 4 | 220 | 216 | 3601 |
| 5 | 219 | 217 | 3604 |
| Average | 218,8 | 216,6 | 3603 |

In the light intensity test, the average result of the incoming voltage on the device was 219.55 volts.

## PENUTUP.

### Kesimpulan

Based on the results of tests that have been carried out, this tool can be controlled remotely in Hungary because it is connected to the internet network. The delay on the device is affected by the internet speed of the smartphone. The average incoming voltage on the device is 219.55 volts. In the "off" command the lamp voltage is 3.6 volts with a light intensity of 0 lux, in the "sleep" command the lamp voltage is 107 volts with a light intensity of 1604.4 lux, in the "relax" command the lamp voltage is 161.8 volts with a light intensity of 2416.4 lux as well as in the "learn" command the lamp voltage is 216.6 volts with a light intensity of 3603 lux.

### Saran

Saran-saran untuk untuk penelitian lebih lanjut untuk menutup kekurangan penelitian. Tidak memuat saran-saran diluar untuk penelitian lanjut.

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HALAMAN INI SENGAJA DIKOSONGKAN
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