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Automatic Smart Light With Sound Detection and Fingerprinting Based on Arduino UNO

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Keywords

ATMega328, Microcontroller, Sound Sensor

Abstract. Lights are one of the important components in lighting indoors and outdoors. Lights provide enormous benefits, especially at night. Light technology in providing lighting today has helped many people's activities in daily life. making other alternatives such as automatic smart lights that use modern technology so that the lights can turn on and off by utilizing an automatic light device by detecting Google's voice and Arduino Uno-based finger picking which can be received directly without having to touch the switch of the lamp. Because the lamp device is connected using a sound sensor which will be a parameter for the lamp and the Arduino UNO microcontroller as the brain of the process connected to the switch. The relay also functions so that the incoming electricity can be disconnected and connected automatically. If the input entered is read by the Arduino, the lamp can turn on based on the sound of finger picking and Google's voice. The purpose of this tool is to make it easier to turn off the lights, want to turn off the lights in a different way and save time without having to press the switch.

1. INTRODUCTION

Lights are one of the important components in lighting indoors and outdoors. Lights provide enormous benefits, especially at night. Lamp technology in providing lighting

Currently, it has helped many people's activities in carrying out their daily work. An example of technology in the field of lighting is turning on or off lights with the voice of Google and the snap of a finger. The purpose of this tool is to make it easier to turn off a lamp and want to turn on a lamp in a different way and time efficiency without having to press a switch. The development of microcontroller-based equipment is increasing and you must be able to make the best use of it. With microcontroller technology and utilizing lights as its output, a tool called an automatic lamp by detecting Google's voice and arduino uno-based finger picking can be a solution to make it easier to turn off the lights which are usually always centered on the switch without any other technological developments to make it easier to turn off the lights. The use of manual switches is usually not efficient in saving time.

Therefore, another alternative was made, namely Automatic Smart Lamps By Detecting Sounds And Fingerprints Based on Arduino Uno, so that the lights can turn on and off by utilizing a sound from the movement of the human body that can be received directly without having to touch the switch of the lamp. Because in the lamp device, it uses a sound sensor which will be a parameter for the Arduino UNO lamp and microcontroller as the brain of the process that is connected to the switch and to the relay so that the incoming electricity can be disconnected and connected automatically. If the input entered is read by the Arduino, the lamp can turn on based on the sound of finger picking and google voice.

Microcontroller as a "one chip solution" is basically an integrated circuit (Integrated Circuit-IC) which contains a complete variety of components that make up a computer. In contrast to the use of a microprocessor which still requires additional external components such as RAM, ROM, timer, and so on for the microcontroller system, the additional components above are practically not needed anymore. This is because all of these important components have been planted together with the processor system into a single IC of the microcontroller concerned. For that reason the microcontroller system is also

known as the popular term the real Computer On a Chip, the computer is intact in a single chip, while the microprocessor system is known as the more limited, namely Computer on a Chip-computer in a single chip.

The sound sensor is a device that is able to convert sound sinusoidal waves into sine waves of electrical energy (Alternating Sinusioda Electric Current). The sound signal detector works on the principle of filtering the sound heard by the microphone component. The analog signal from the microphone reading will be filtered using a bandpass filter unit that passes analog signals.

The way the sound sensor works is to change the amount of sound into electrical quantities. The incoming signal will be processed so that it will produce one condition, namely condition 1 or 0. Sound sensors are widely used in everyday life. Examples of this sensor application are those that work on robotic systems. The sound received by the microphone will be transferred to the mic pre amp, the function of this mic pre amp is to amplify the sound signal that enters the component.

After the sound signal is received by the mic pre amp, it is then sent back to the conversion circuit where this circuit functions to convert the voice signal in the form of a digital signal into an analog signal so that it can be read by the microcontroller. If the signal is received by the micro controller, it will be processed according to the program made, whether the robot will run or stop.

The incoming sound is recorded by the component and will then be stored by memory. for example, if you clap once, it will be recognized as condition 1 or on so that the robot can walk. If you clap 2 times then the robot will die or get a signal condition 0. The use of the signal depends on the user how to use it.

The sensitivity of the sound sensor can be adjusted, the more condensers used in the pre amp, the better the sensitive power of the sound sensor. Likewise, when using sound, it must be under certain conditions, because if there are other sounds that enter it will not be recognized by the sensor, as well as the frequency used must match the initial sound input and voice input when running the program.

Relay is an electronic component in the form of an electric switch or switch that is operated using electricity. Relays are also commonly referred to as electromechanical or electromechanical components which consist of two main parts, namely a coil or electromagnet and a switch or mechanical contact. The relay component uses the electromagnetic principle as a switch contact driver, so that by using a small electric current or low power, it can deliver an electric current that has a higher voltage. Relays are widely used in controls that require high voltages and strong currents. A relay usually has only one coil but has many contacts. The relay functions as an electrical switch.

When no current is passing through the coil, the spring tension will cause the arm to move away from the coil core. Meanwhile, when the current hits the coil it will produce a magnetic field and cause the arm to approach the coil core. The movement of the arm is caused by the magnetic field generated by the coil when current is flowing. The movement of the arm causes the contact points of the relay to open and close.

In life we need a light source in our daily activities. If during the day we get the light source from the sun, then at night we get it from the lamp. A lamp is an electronic device that converts electrical energy into light.

A mobile phone or mobile phone is an electronic telecommunication device that has the same basic capabilities as a fixed line telephone, so that it is conventional but can be carried everywhere (portable) and does not need to be connected by cables (wireless, wireless). Bluetooth testing is done by applying a voltage of 3.3V to the Bluetooth Module so that the Bluetooth Module is active, then scanned using an android phone to find out whether the Bluetooth Module is detected or not.

In the journal Richie Estrada, Faculty of Engineering and Computer Science majoring in Electrical Engineering, entitled Clap Switch to Control Room Light, which is a circuit that utilizes acoustic energy to control the switching process. The switching process can be achieved by converting the sound energy produced by "clapping" into electrical pulses to drive an electronic circuit in the form of a relay. Clap switch is composed of main components, namely transducer, amplifier, multivibrator, electret condenser microphone and relay. In what I made using a main component, namely a sound sensor, 2 channel relay, jumper, Arduino uno, power cable, lamp holder, lamp cable, breadoard, HC06 Bluetooth module and lamp. Where the system of this tool, humans can be made easier in the business

of turning off and turning on the lights and can be another alternative if you want to turn off the lights in a unique way. This method can save users time without having to press the switch of the lamp.

When the Bluetooth Module is scanned using an Android phone, the result is that the Bluetooth Module is detected with the name HC-06. Without obstructions the Bluetooth Module is detected up to a distance of 10 meters, while with no obstructions (the walls of the house) the Bluetooth Module is detected up to a distance of 5 meters. The results of this test indicate that the Bluetooth Module is functioning properly.[4]

Limitations The problem in this study is to design and explain how the automatic light tool works by detecting the sound and finger pickings based on the Arduino Uno so that it can function as desired and in making this tool it is only limited to 2 conditions, namely consisting of google voice and finger picking. , where the state will turn on and off.

2. METHOD

Research plan or design in the sense of narrowly interpreted as a process of collecting and analysis of research data. In the broadest sense as research design includes the planning process and research implementation.

Preparation steps in making tools to turn on lights using voice command is as following:

Literature Study, The author examines the references obtained from several scientific works such as thesis journals. The library method, namely data collection and information by reading references, websites, documents. This includes research that has been appointed, related articles and journals with the object of research.

Done in consultation with the lecturer mentor to solve problems encountered during device manufacture software and hardware manufacturing. This is done by experimenting testing modules as well as integrate the module with program to control the agar system become a unified whole and obtained maximum possible results.

3. RESEARCH RESULTS AND DISCUSSION

3.1 Block Diagram Circuit Analysis

The design of this automatic light device by detecting sound and finger picking based on the Arduino Uno serves to make it easier to turn off the lights, want to turn off the lights in a different way and save time without having to press the switch. To understand the workings of this series of item identification systems, the authors make based on a block diagram which is categorized into several blocks, namely activator block, input block, media block, process block and output block which can be seen from Figure 1 below.

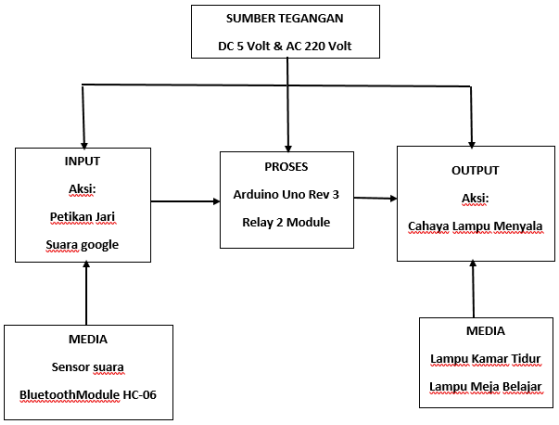

Figure 1. Block Diagram

3.1.1 Voltage Source Block

In electronic circuits, the role of the activator is very important because every component used requires an activator as an energy source so that the component can function properly, in everyday

life. The role of the activator itself can be likened to food. We will not be able to do anything without the intake of food that is processed into energy. The activator here is in the form of a voltage of 5 volts.

3.1.2 Input Block

A good system must have an input, without the input a device or electronic object becomes less useful. The input function is to make the user or users interact directly with an electronic equipment or robot. The input to this tool is that the sound sensor will detect the digital signal sound given by finger picking and the Bluetooth module will detect a digital signal voice command given by the voice (turn on and off the sleep light).

This sound sensor and Bluetooth module work by converting sound wave vibrations into a series of numbers. These numbers are then stored and read back. If the sound that is converted into numbers is as desired, then a device such as an automatic light detects voice and finger picking based on Arduino Uno.

3.1.3 Arduino UNO Process Block

The Process Block is a component that functions to manage data from input and will send the process results to the output block. In this series of tools, Arduino is a microcontroller that functions as a processing input signal that has been received by the Sound Sensor and received by the Relay and the input signal that has been received by the bluetooth module. Just like microcontrollers in general, Arduino needs to be programmed first so that it can function according to the desired output. If in everyday life, Arduino is like a human brain that is able to process and think automatically.

3.1.4 Relay Module Process Block

Relay is a device that works on an electromagnetic basis to move a number of arranged contactors or an electronic switch that can be controlled from other electronic circuits by utilizing electric power as an energy source. In this process block using a 5 volt relay, the relay voltage comes from the Arduino power which is connected to AC current on the study table lamp and night lamp so you have to be very careful when touching it.

3.1.5 Output Blocks Study Lights And Sleep Lights

A lamp is a device that produces light. The word "Lamp" also means a light bulb. The lamps on this block are used to light the Study Table and Bed Lamp. Where in the study lamp if we want to turn it on then we have to pluck our finger once and turn it off too by picking one finger on the sound sensor. And on the night light if we want to turn it on by means of a command, namely, "turn on the sleep light" but if we want to turn it off with the command "turn off the sleep light with a command to the bluetooth sensor.

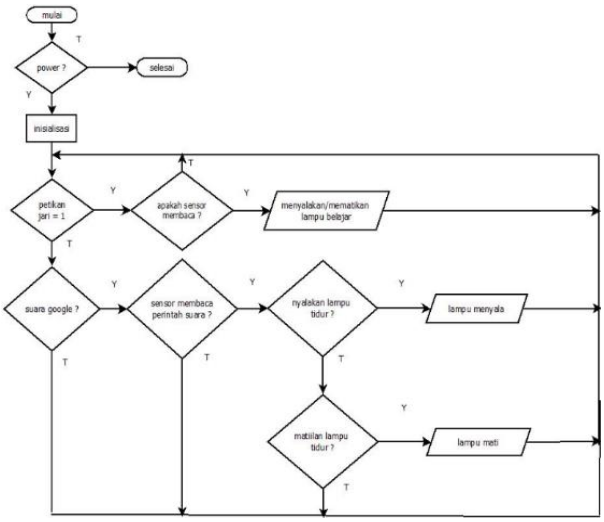

Figure 2. System Flowchart

3.2 System Flowchart

Starting from the start termination, then going to power to state whether the tool is on or off, if the power is not on then the process will be completed but if it is on it will go to initialization which indicates that we are ready to blame the study lamp and sleeping lamp. When we pluck our finger 1 time, does the sound sensor read the finger pluck, if not then we have to pluck the finger again 1 time so that the sound sensor reads the digital signal from the finger pluck. If the sensor manages to read the sound on the fingertip, then the light will turn on through the active switch from the relay. Next, do you want to turn off the learning light, if yes, then the process is to start plucking your fingers again once. If not, it will go to the next process, which is whether you want to turn on the sleep light, then we will give a voice command where the Bluetooth sensor can read the command, namely "turn on the sleep light" if yes, the bluetoothmodule has succeeded in reading the voice on the command, the sleep light will turn on. through a smartphone (HP) and then if you want to turn off the sleep light, if yes then the process is to start again doing the voice command "turn off the sleep light" if you don't want to turn on the sleep light then the next process will always loop until there is a next command or the power is turned off and the process is complete.

4. CONCLUSION

So the conclusion of the tool that I made is a study lamp and a sleeping lamp in two different ways. Where what I do is what I want, which is to turn on and off the study light with a finger pluck 1 time with a distance of 1-3 cm, but it can still be reached up to 15 cm with clapping. Then on the sleep light with a google voice command "turn on / off the sleep light" with Bluetooth up to a maximum distance of up to 10 m the sensor is still able to read the command provided that it is not blocked by a wall and the light is on/off.

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