Sound-Based Households Control System Using Android Smartphone Application and Microcontroller Arduino UNO R3 Though Bluetooth

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Abstract
Controlling household electrical appliance-based voice using android smartphone applications and microcontroller Arduino UNO R3 via Bluetooth is designed to help us in the process to turn it on/off electrical appliances in the house. With this tool, then controlling the electrical equipment in the home can be done with voice commands and use the Indonesian language. The technology used is the speech recognizer feature on Android smartphones, Bluetooth and microcontroller Arduino UNO R3. To make the application on your Android smartphone to use App Inventor programming block, and to control the life and death of the electric load used Arduino IDE 1.0 program.

Keywords: voice recognizer; Android, Arduino

INTRODUCTION
Electrical energy is a necessity for every house hold. To use the electric energy of the many ways that can be done, for example by pressing the on/off switch, or by using the remote control so that equipment that uses electricity can operate in accordance with its function.

Smartphone or smart phones are now popular in the community, almost everyone has a smartphone. With our smartphones can make calls, send messages, browse the web, and play games. Smartphone practically like a small computer with a variety of features that can help everyone in the works. Through a smartphone, we can send an email, send a message, telephone, internet, and other things. Smartphones make our work much more efficiently and effectively. Therefore, everyone is trying to find a smartphone that can assist them in completing their work.

Android is an operating system for mobile phones based on Linux. Android provides an open platform to developers for creating their own applications for use by a variety of mobile devices. Initially, Google Inc. bought Android Inc., newcomers who make software for mobile phones. Then to develop Android, formed the Open Handset Alliance, a consortium of 34 companies for hardware, software, and telecommunications, including Google, HTC, Intel, Motorola, Qualcomm, T-Mobile, and Nvidia. Arduino is an electronic kit or open source electronic circuit board in which there is a major component of which is a chip microcontroller with the type of firm Atmel AVR. The microcontroller itself is a chip or IC (integrated circuit) that can be programmed using a computer. Interest embed the program in microcontroller is that electronic circuits can read input, process the input and then generate output as desired. So microcontroller served as a “brain” that control the input, process and output an electronic circuit.
EXPERIMENTAL SETUP
Because the main component is the Arduino microcontroller, the Arduino can be programmed using a computer according to our needs. Arduino usefulness depends on us that makes the program.

![Internal Architecture Applications App inventor](image1)

**Fig. 1:** Internal Architecture Applications App inventor

In architectural applications, App Inventor has an internal structure that must be understood in advance that can be made effectively. One way to understand the inside of an application is to break it into two parts, components and behavior. The second part is a window interconnected that will be used to develop applications with App Inventor. Then by using the designer component can be made a component of an application that will run in accordance with the command of the block system that has been designed.

![Flow chart system](image2)

**Fig. 2:** Flow chart system
RESULTS AND ANALYSIS
The results of the control system hardware design household electrical appliance-based voice using android smartphone applications and microcontroller Arduino Uno R3 via Bluetooth.

![Control Systems Electric Appliances](image1)

In general, the above series divided into 4 groups of the circuit, the circuit works as: 1) Android smartphone, serves to interpret voice commands received from the microphone, and then sends the data to an intermediary circuit with a Bluetooth module Arduino shield transmitted over connections on smartphones controller. 2) Arduino Bluetooth module and shield. Bluetooth shield serves as a media receiver data. The output from this module is serial data. While Arduino module serves as Controller for the system are made. 3) the circuit relay which serves as a circuit breaker and connecting the electricity to light, according to the data obtained from the module Arduino Uno R3. 4) the series of fluorescent lamp (fluorescent) AC.

![Block Diagram System Design](image2)

This circuit serves as the load to be controlled by the system are made.
1. TX (Smartphone Android). This section serves as the sender of the command (TX), which comes from the sound and converted into data in text form to control the lights by utilizing the internal Bluetooth on android smartphone
2. RX (Bluetooth Shield) Serves as a receiver circuit (receiver) text data transmitted by Bluetooth available on android smartphone (part TX), and then forwards it to the Arduino Uno R3 modules via serial communication
3. Module Arduino Uno R3 as a controller that serves to convert text data received from Stackable Bluetooth Shield and then forwarded to the control relay with
4. using the output of the pins are used. In this system Arduino pin modules are used to control the relays are pins 3 and 4. If the pin 3 = high, then the TV will live, if pin 3 = low, then the TV will die, if pin 4 = high, then the light will live, if pin 4 = low, then the light will die, if pins 3 and 4 = high then the TV and the lights will live, if pins 3 and 4 = low then the TV and the lights will die
5. Relay circuit breaker and junction serves as the electricity to light, according to the data obtained from the module Arduino Uno R3. Pin 3 and 4 module Arduino connected with parts NO (normally open) relay.

To make the program on the module Arduino, the author uses the Arduino IDE 1.0 program on the laptop. After the Arduino IDE 1.0 program appear, then made a new program that we want. Once the program has been written on the Arduino IDE 1.0, then the program must be tested to make sure there are no errors or mistakes when writing program. The trick is to click the "sketch" and tab "verify / compile". The results are as shown below:
Fig. 5: Results of Testing Program on the Arduino IDE 1.0

Before the Bluetooth connection is implemented on the system that created it, it takes a test to make sure the connection is already able to send and receive data. Testing connection Bluetooth android smartphone with Bluetooth Stackable, shield using a serial program monitors the program Arduino IDE 1.0: Module Arduino Uno R3 after being given commands via Android smartphone can be retrieved using oscilloscopes.

From the results of measurements on the oscilloscope can be seen that the module uses the Arduino Uno R3 Start Bit of value 0 or low and Stop Bit are worth 1 or high. Start and Stop Bit useful to distinguish between characters that are sent. Arduino Uno R3 does not use parity bits to differentiate between characters that are sent and received. With the difference in the character sent by smartphones to the Arduino Uno R3 module, the module Arduino Uno R3 can distinguish the command to turn the "light" or "TV". Module Arduino Uno R3 will match any character data in memory with the character that it receives from the Smartphone. If it fits, then the relay will be activated and the lights on the load to be alive, if not match, then the relay will not

CONCLUSION

Of the final project controlling household electrical appliance-based voice using android smartphone applications and microcontroller Arduino Uno R3 via Bluetooth can be deduced

1. If we give the command "light of life", the tool created will turn on the lamp by activating the relay for the lights. If we give the command "lights off", then the device will turn off the lights by turning off the relay for the lights
2. If we give the command "live TV", then the device will turn on the TV made by activating the relay for TV. If we give the command "TV off", then the device will turn off the TV by turning off the relay for TV
3. If we give the command "all on", the tool created will turn on the lights and TV by activating the relay for the lights and TV. If we give the command "all off", then the device will turn off the lights and TV by turning off the relay for the lights and TV
4. With this system, the electrical home appliances can be centrally controlled
5. Visual programming App Inventor can be used to create android apps that are used to control household electrical appliances

REFERENCES


