Utilization of Arduino Uno on DikaTron TV Trainer Kit

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Abstract. This study aims to design Android-based TV trainer with DikaTron app on smartphone is an innovation from previous TV trainer. TV trainer is designed by connecting TV circuit path through the relay to the system that will be controlled, such as a sound circuit, image, color, power supply, tunner, and more. This TV trainer combines Arduino UNO, relay, Bluetooth modules, and TV circuit, with DikaTron application software that installed in smartphone. The Arduino Uno, relay and Bluetooth modules are located in a box separate from the TV set, so it can be developed to control other devices. Through the trial obtained results in accordance with the desired, this means that the function on the television set can work properly and can be controlled from the smartphone via Bluetooth network. From the research conducted can be concluded that Android-based TV trainer with DikaTron app on smartphone can work in accordance with the desired specifications and can be used to support the lab activities.

1. Introduction

The widely used TV Trainer kits are still manually operated through many switches as controllers. To be more easily understood and operated with more efficient use of time, required innovation TV trainer models [1]. This research provides a new innovation in the form of DikaTron application on smartphone combined with Arduino Uno module, relay module, and Bluetooth module are located in a box separate from the TV set, so it can be developed to control other devices [2]. With this innovation, TV trainer can work in accordance with the desired specifications and can be used to support the teaching activities [3].

2. Material and Methods

This research was conducted by experimental method through 4 stages, that is to create DikaTron apps, create Arduino coding, control systems, and test runs. DikaTron application creation using App Inventor by online. Making this application begins by designing the appearance of the application as shown in figure 1.
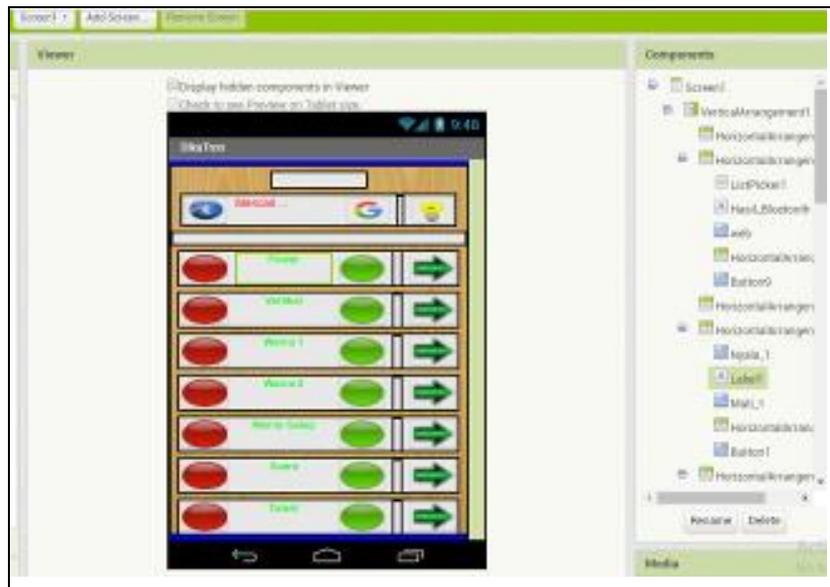
Figure 1. DikaTron application display creation process.

When finished creating the DikaTron app, proceed to create the arduino coding and match the coding with coding on App Inventor because it is interconnected as shown in figure 2 [4].

Figure 2. Coding on Arduino Uno.

In DikaTron application there are 16 buttons that are designed as needed. Before changing lines on a TV machine, first learn the parts on the TV machine, how it works, function, and take measurements [5]. If you already understand it can be continued by changing the path as needed. The disconnected circuit line is connected to the relay. After all connected, it can be tested by connecting the TV machine to the control box via the connector cable [6]. Then create various paths in the Proteus software to make the control box neater and set the control box using acrylic as shown in figure 3 and 4.
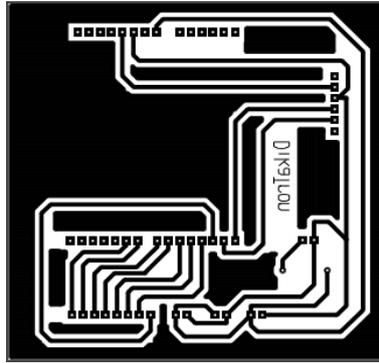
Figure 3. PCB board.

Figure 4. Control box.

The TV trainer design is based on the following specifications:
- Control system via bluetooth network on smartphone;
- Available a content of learning about colour TV and troubleshoot of colour tv
- One trainer can be accessed by more than one user via smartphone;
- Instructors are only required when in complex circumstances;
- The material on color TV troubleshoot is obtained directly from experienced TV technicians.

3. Result and Discussion
Experimental results show that TV trainers can work according to the desired specifications, that is combination of TV machines, control boxes, and connected smartphones. Table 1 is a comparison between conventional TV trainer and DikaTron TV trainer.

Table 1. Comparison.

No	Spesification	Conventional	DikaTron
1	Control system	Using the switch	Using the Smartphone
2	Material content	Not available	Available on smartphone
3	Access trainer	One control many users	One control one users
4	Instructur	Need at all times	No need at all times

In table 1 point 1, the results of the system control section show the performance in accordance with the desired specifications as in table 2.

Table 2. Performance in table 1 point 1.

No	Variable	Function	Does not work
1	Power	✓	-
2	Vertikal	✓	-
3	Colour 1	✓	-
4	Colour 2	✓	-
5	Dark Image	✓	-
6	Sound	✓	-
7	Antenna Tunner	✓	-

In table 1 point 2, the results of the system control section show the performance in accordance with the desired specifications as in table 3.

Table 3. Performance in table 1 point 2.

No	Variable	Function	Does not work
1	Power	✓	-
2	Vertikal	✓	-
3	Colour 1	✓	-
4	Colour 2	✓	-
5	Dark Image	✓	-
6	Sound	✓	-
7	Antenna Tunner	✓	-

In table 1 point 3, the results of the system control section show the performance in accordance with the desired specifications as in table 4.

Table 4. Performance in table 1 point 3.

No	Variable	Function	Does not work
1	Power	✓	-
2	Vertikal	✓	-
3	Colour 1	✓	-
4	Colour 2	✓	-
5	Dark Image	✓	-
6	Sound	✓	-
7	Antenna Tunner	✓	-

In table 1 point 4, the results of the system control section show the performance in accordance with the desired specifications as in Table 5.

Table 5. Performance in table 1 point 4.

No	Variable	Function	Does not work
1	Power	✓	-
2	Vertikal	✓	-
3	Colour 1	✓	-
4	Colour 2	✓	-
5	Dark Image	✓	-
6	Sound	✓	-
7	Antenna Tunner	✓	-

The displays of TV machine, control box and DikaTron application can be seen in figure 5, 6 and 7 respectively.

Figure 5. TV machine.

Figure 6. Control box.

Figure 7. DikaTron App.

DikaTron application has 7 ON / OFF switch, 7 hyperlink buttons to color TV troubleshoot content, 1 piece of bluetooth button, 1 piece google button, and 1 piece of content and matter content. Each has a function in accordance with the needs. Here is the DikaTron application key function shown in figure 7.

- The Bluetooth button functions to connect the smartphone with the control box;
- Google button serves to look for other references;
- The light button contains the material;
- Red and green buttons as control switches;
- The arrow keys contain specific material / explanations according to the key pressed.

Figure 8 shows DikaTron application code and can be downloaded at link: http://ai2.appinventor.mit.edu/b/15qg.
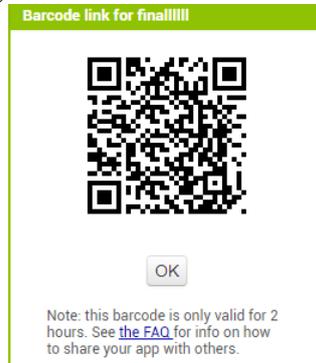
Figure 8. DikaTron App barcode.

At the time of the test, the TV trainer had little disturbance. When the TV is still in normal condition, the TV can work optimally without any noise. After the TV is used as a trainer there is a little noise due to the waste of current flowing on the cable connector to the control box. This can happen because the flowing current is damping along the length of the cable [7].

This research can be developed to be simpler, does not require TV trainer and control box, only need one smartphone only. TV trainer is only shaped audio visual on the smartphone screen.

4. Conclusion
From the research conducted it can be concluded that Android-based TV trainer kit with DikaTron app on smartphone can work in accordance with the desired specifications and can be used to support practical activities. This DikaTron TV trainer kit can be developed again to be more complex, and the use of the control box can be developed its utilization to control other devices.

References
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