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Automatic Broadcast Transmission Control With 8 Relay Channels Based On Arduino

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Abstract. This Automatic broadcast transmission control is a device that functions to replace a manual switch to an automatic switch with a programmed starting timing process. This device consists of an LED VU Display as an indicator of the voice signal input, a monostable multivibrator as a timer, an Arduino Uno as the main control, and an 8 channel relay module as a substitute for a manual switch. This tool works when the voice signal is active, then relays 1 to 8 will be active, but if the voice signal is off, relays 8 to 1 will be deactivated gradually. On off this channel relay is determined by programmed timing. The results of the experiment show that the active and non-active time of the relay can be programmed in stages with a time difference of 1 second for each relay. Automatic Transmission Control with 8 Relays using Arduino Control is able to automate switching from manual switching to programmable automatic switching.

1. Introduction

Nowadays, the development of technology is very rapid to bring humans into the era of modernization. Almost all aspects of human life are very dependent on technology. This is because technology was created to assist humans in completing an activity. A transmitter is a collection of electronic devices that function as an increase in the frequency of the sound signal. The sound signal issued by the mixer has a low frequency then the mixer will be sent to the transmitter unit. In the transmitter unit will be changed from the frequency of a small voice signal to a very high frequency sound signal. Then it will be transmitted in all directions through an antenna with a certain range. In some devices the transmitter still uses the manual method to activate and deactivate the transmitter by manually activating and deactivating the power switch or activating by pressing the manual switch one by one. Aside from being inefficient, it will have a radiation effect on the health of the operator who enters the transmitter room. This is because the power in the transmitter room is very large, causing health problems, ranging from dizziness to the worst, which is infertility. The purpose of this automatic control device is to activate and deactivate the radio transmitter automatically according to the timing that has been programmed using Arduino Uno [1]–[8] so as to minimize the operator for direct contact with the transmitter switch. Arduino is an open-source hardware and software company, project, and user community that designs and manufactures single board microcontrollers and microcontroller kits for building digital devices. Arduino is widely used in research as a hardware controller tool kit that can be programmed as desired. Various researches conducted using Arduino include.

2. Research Method

2.1 System Design

The design of the tool starts from the design of the system by conducting library study, discussion, and drawing the system to be designed. The ideas that have been obtained are then done using the project board. In this stage the tool design will be designed and tested (trial and error) using the project board. Next design the hardware from the previous design. Then the software design is using Arduino [9][10]–[12] [13][14]–[16] as the mainboard to program the transmitter controller.
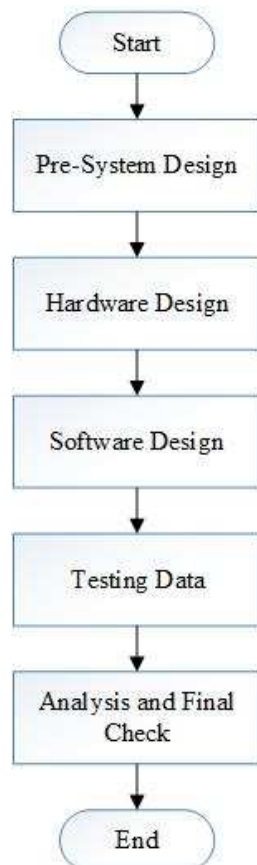

Figure 1. Design Stages   **Figure 2.** Automatic Transmitter Control with 8 Arduino Based Relay Channels

2.2 Design Result

The results of the design of Automatic Transmitter Control with 8 Arduino Based Relay Channels [11], [16]–[27] show in Figure 2. There is a row of LED VU Display lights that function as an indicator of the sound signal input. At the bottom of the LED VU Display there is a monostable multivibrator circuit with 3 regulator ICs that serves as a voltage-lowering, then Arduino [10], [12], [14], [15], [20], [28]–[33]as the main controller and 12 Volt, 5 Amperes switching power supply. Relay module circuit with 8 channels using relays with specification 12 Volt, 30 Ampere. At the front there are panels, AC input ports, 1 Ampere fuse, AC switches, common ports and normally close (NC) as many as 8 pairs, as well as TS counter batteries.

This tool works when there is an input in the form of a sound signal entering the mixer and leading to the LED VU Display circuit as an input indicator. Then the signal enters the monostable multivibrator circuit, then continues to Arduino. After Arduino gets a high signal (1), Arduino will give commands to the relay module to activate the relay one by one. Likewise, the process of deactivating, when the mixer

does not have a sound signal, Arduino will get a low signal (0) then give a command to the relay module to deactivate one by one. Figure 3 show the experiment.

Figure 3. Experiment Process of Automatic Transmitter Control

Figure 3 shows the test tool using a mobile phone as a medium to trigger voice signal input. Visible when music is playing, the VU Display light will turn up and down following the voice signal input. Then when the music is playing, relays 1-8 will live one by one.

2.3 Analysis Method
This tool is tested using a mobile phone that functions as a voice signal input. Mobile phones are connected using a 3.5 mm jack to input this tool. After the voice signal from the mobile phone is activated, Arduino will read the voltage and turn on 8 relays. Data is collected by measuring the voltage, observing whether the relay is functioning or not and recording the active and inactive time of 8 relays.

3. Result and Discussion
3.1 Active Relay Time
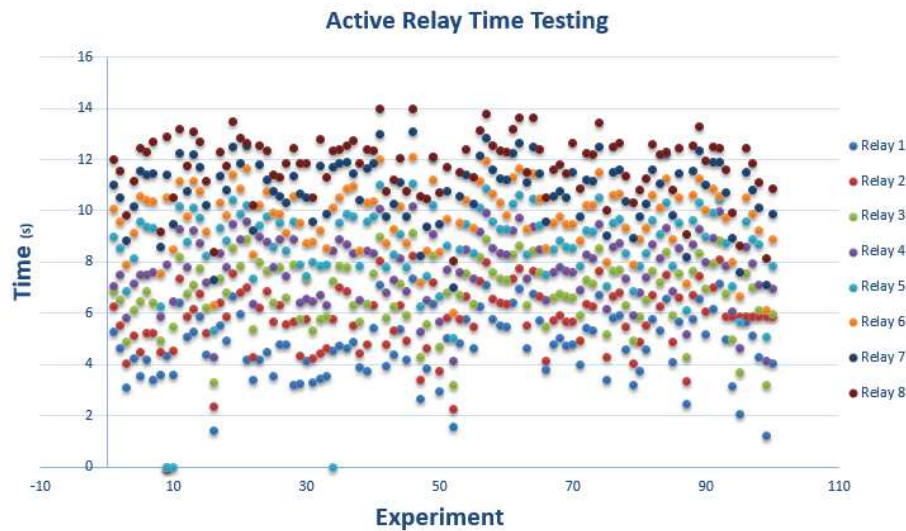Testing the active time of the relay is carried out 100 times.

Figure 4. Active Relay Time Testing in 100 Experiments

Figure 4 shows the distribution of Active Time data from relay 1 to relay 8 during 100 experiments. From the distribution of these data, it can be concluded that the average active relay time is shown in Figure 5.
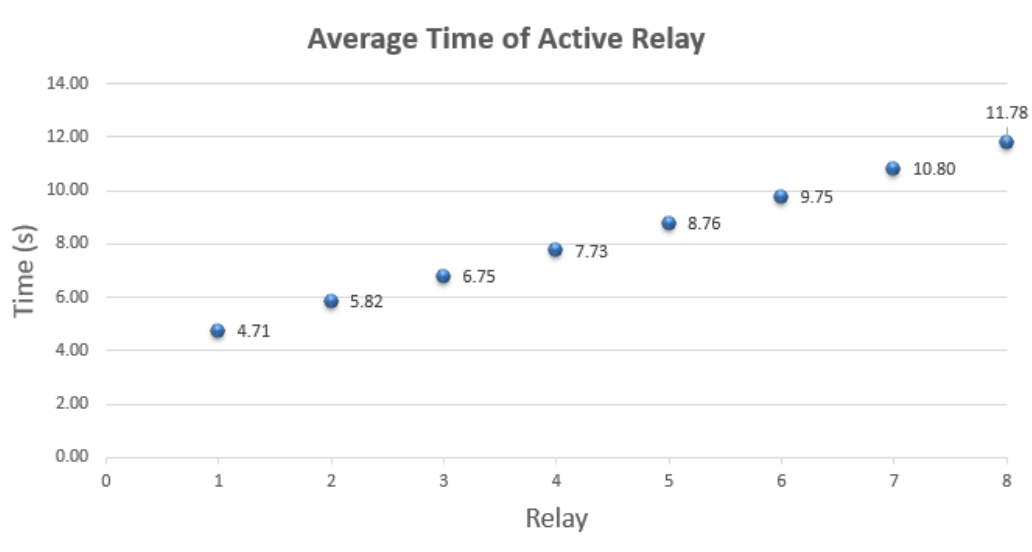

Figure 5. Average Time of Active Relay

Figure 5 shows that the difference in active time of each relay is about 1 second and it is seen that the relay is active in sequence. The active time of the relay is programmed sequentially because the transmitter switch must be active in sequence.

3.2 Non-Active Relay Time
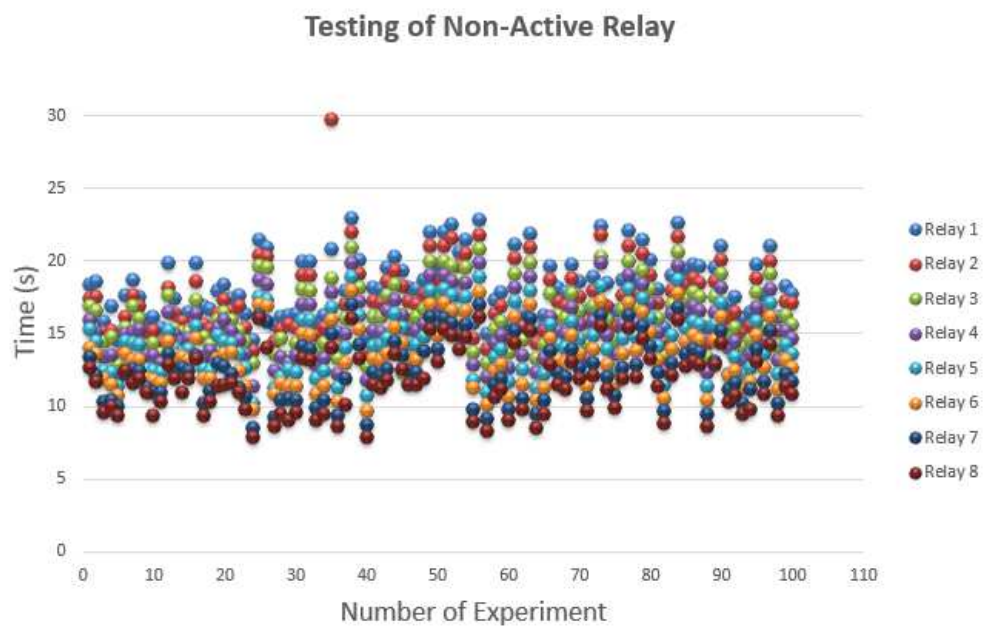Testing the Non-Active time of the relay is carried out 100 times.

Figure 6. Non-Active Time Testing of Relay in 100 Experiment

Figure 6 shows the distribution of Non-Active Time data from relay 1 to relay 8 during 100 experiments. From the distribution of these data, it can be concluded that the average Non-Active relay time is shown in Figure 7.
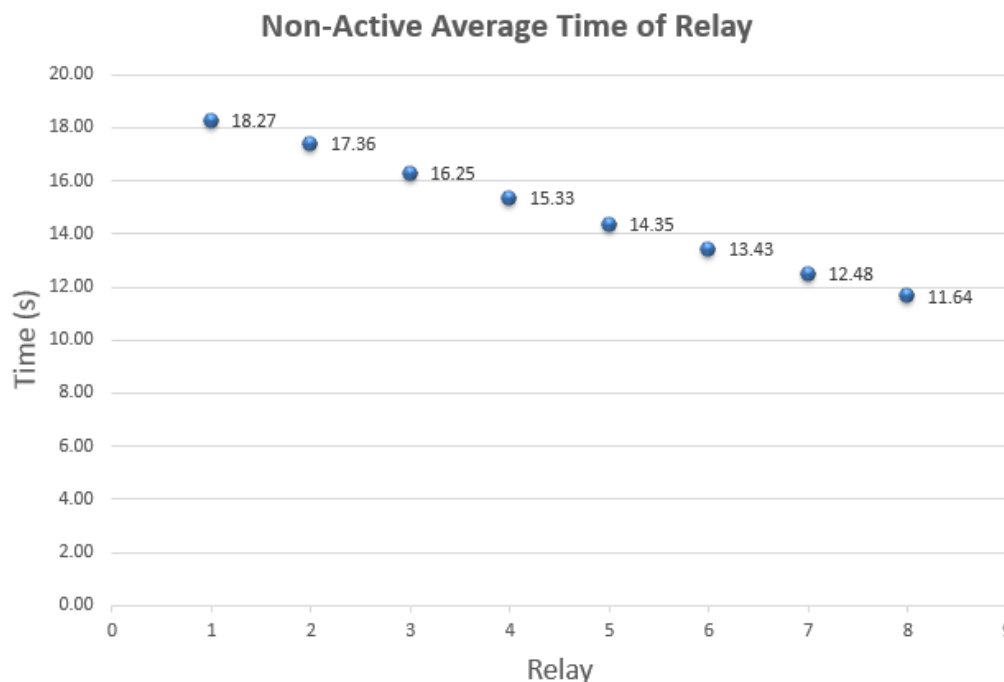

Figure 7. Non-Active Average Time of Relay

In activating or deactivating the transmitter has an SOP (Standard Operating Procedure) that is using time gradually. If the transmitter does not activate or deactivate the transmitter gradually it will suffer damage.

4. Conclusion

The conclusion of this research are:

a. Automatic Transmission Control with 8 Relays using Arduino Control is able to automate switching from manual switching to programmable automatic switching

b. The results of the experiment show that the active and non-active time of the relay can be programmed in stages with a time difference of 1 second for each relay

c. This device can be applied to all radio transmitters.

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