

Automatic Curtain Prototype Design Based on Arduino Uno

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ABSTRACT

Natural lighting has an important role in a building because it provides various benefits both visually and physical health for its residents. The activity of opening and closing curtains needs to be done every day. However, this simple activity is often also neglected due to various reasons such as activities that are too busy, forgotten and others. With the existence of automation technology is able to replace humans to carry out these activities. Therefore, researchers designed automatic curtains based on Arduino Uno in the form of a prototype. After testing the prototype design, it was tested that using 1 LDR sensor based on the Arduino uno microcontroller could work well.

Keywords: *Automatic Curtain Prototype, Arduino Uno, LDR Sensor*

1 Introduction

Lighting in buildings consists of natural lighting, which comes from sunlight and artificial lighting comes from lamps (Arinta et al., 2022). Natural lighting can provide visual comfort and provide psychological effects for building users (Jannah, 2022). Visual comfort is related to natural light that enters helping human vision according to needs. Natural lighting can be used to save electrical energy, therefore the house needs openings to get a source of solar energy as a substitute for electrical energy (Amin et al., 2021). Windows as house openings have curtains as a means of entering light into the room and house (Irawan et al., 2023). Therefore, it is important for us to ensure sunlight to enter our homes, for example by opening the curtains every day when sunlight has begun to appear and closing the curtains when sunlight is no longer visible.

The activity of opening and closing curtains is still negligent to be done manually using human labor because they forget when in a hurry to travel (Nusyirwan et al., 2020)(Saktioto et al., 2021). The occurrence of opening curtains at night is often found in big cities where homeowners go home at night due to busy work. Houses with curtains are always closed due to being forced to leave the owner for a long time so that the potential for crime in the uninhabited house. In addition, other problems are seen in homeowners who have health problems that limit their movement causing the activity of opening and closing curtains is difficult to do (Qadar et al., 2019). The activity of opening and closing curtains is sometimes considered a small problem even though the impact can be a source of disease. This is due to the inaccuracy of time to open and close the curtains so that the room of the house becomes damp which is a source of disease, makes discomfort and makes mold multiply (Asizan et al., 2023)(Saktioto et al., 2020). Therefore, we need technological innovations that can facilitate human work to open and close curtains, one of which is by using automation technology.

Automation technology is needed in today's progress that demands effective and efficient human work (Ali & Irawan, 2023). Automation is the implementation of automated work procedures and procedures by providing comprehensive utilization so that it is more efficient (Delviandri & Irawan, 2023). Automation is the process of automatically controlling engineering or electronic operations and equipment that can replace humans in observing and making decisions (Shafitri et al., 2022).

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Advances in automation technology can be used to solve the above problems, therefore researchers made a prototype design of automatic curtains with LDR sensors based on Arduino uno.

2 Research Methodology

This type of research is research and development which is a research method used to produce new products, test the effectiveness of existing products and develop and create new products (Asmaleni et al., 2020). The research method used is a 4D model with four stages, namely 1) Define, 2) Design, 3) Development, and 4) Dissemination (Muhardini et al., 2023).

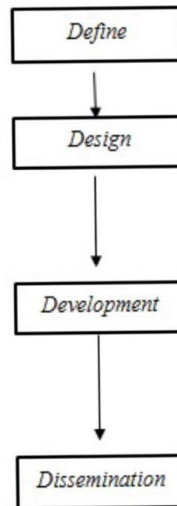


Figure 1: Stages of a 4D Model

3 Results and Discussion

The design stage is made a scheme of electronic circuits that will be designed to move automatic curtains as shown below.

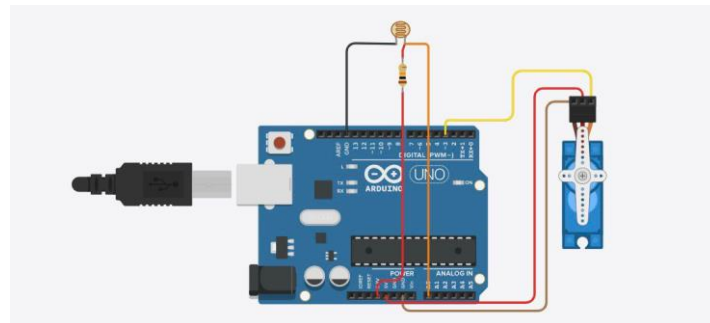


Figure 2: Automatic Curtain Electronic Circuit Scheme

Based on the picture, it can be seen that the electronic components used include 1) Arduino Uno, 2) Resistors, 3) LDR sensors, and 4) Servo Motors. The final result of development of the prototype that shown on Figure below.



Figure 3: Prototype front view



Figure 4: Prototype side view

This prototype uses an Arduino Uno microcontroller as the brain of the system. There are several other electronic devices that are items of this prototype, namely the LDR sensor as a light sensor which is then forwarded to the microcontroller to give instructions to the servo motor to close or open the curtains according to the instructions of the sensor.

The following are the results of prototype testing using the Black Box method. Testing this tool is carried out thoroughly to find out whether the components on the prototype designed can work properly or vice versa. The testing phase can be seen in Table 2 below.

Table 2: Prototype Testing Phase

No	Testing	State of the Curtains		Time	
		Open	Shut	Open	Shut
1	First	√	√	1 second	
2	Second	√	√	1 second	
3	Third	√	√	1 second	
4	Fourth	√	√	1 second	
5	Fifth	√	√	1 second	

Based on the table above, it can be seen that with black box testing, all components on the prototype can work according to their functions where the curtains can open automatically when there is light and close automatically when there is no light and the time to open and close the curtains is always consistent.

4 Conclusion

Based on the design and testing of the Arduino Uno-based automatic curtain prototype, it can be concluded that the prototype using 1 LDR sensor based on the Aduino Uno microcontroller can work well, this is shown by opening and closing the curtains automatically by the servo motor. Therefore,

automatic curtains based on Arduino Uno can be used as an automation technology innovation that can replace human work in opening and closing curtains.

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