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Application of LDR on Automatic Street Lights Using Electronic Workbench Simulation

Siti Nuraeni*

Department of Computer Science, University of Informatics and Business, Bandung, Indonesia

**Corresponding author email:*

Abstract:

LDR or Light Dependent Resistor is a resistor whose resistance value is influenced by the type of light received. In addition to having to be designed ON and OFF automatically and save electrical energy and human labor, the lighting of the street system is also monitored regularly, to ensure that there is no need for lights to be turned on, light sensors are needed. An example of its use is in garden lights and street lights that can turn on at night and turn off during the day automatically. Or we can also use it in our own room. This article will discuss the effect of the LDR light sensor on lamp control. Sensors are designed in conjunction with transistors. This transistor is used as a comparison of light entering the LDR sensor.

Keywords: Electronic Workbench, LDR, Automatic Street Light, simulation

1. Introduction

Light resistors are electronic components whose resistance will decrease if there is an increase in the intensity of light hitting them. Resistor can also refer to LDR (light dependent resistor). Applications that often use this sensor are applications in garden lights and street lights that can turn on at night and turn off during the day automatically. (Saputra, 2022; Tambe and Nemade, 2021; Tawfik et al., 2012; Haripriyono et al., 2021)

LDR is a form of component that has a change in resistance whose magnitude depends on the light, the LDR electronic component consists of a semi-conducting language plate with two electrodes on its surface, the brighter the light hits the surface, the more free electrons are available, and the lower the electrical resistance value of this semiconductor material. (Ibrahim et al., 2019; Rathore et al., 2017; Hazarika and Pegu, 2013; Novelan and Nababan, 2020)

This series of Automatic Garden Lights can also be used as automatic lights outside the home, by adding a few very simple circuits and utilizing the LDR as a light sensor can make garden lights turn on automatically without having to turn off or turn on the lights manually, where the lights turn on based on sunlight that received by the LDR sensor. (Ananda and Amin, 2021; Mayub et al., 2019; Kuppusamy, 2016; Shingala and Patel., 2017)

Testing of automatic garden lights is not only carried out directly, but can also perform simulations in advance or simulations of electronics, some of the advantages of doing simulations using Workbench Simulation are being able to take measurements virtually, Saving costs and also time because we can simulate a circuit without buying electronic components, no need to master mechanical work such as soldering, installing in making electronic circuits, and easy display so that in the use of software so that anyone can use it.

2. Methodology

The method in this study was carried out by simulation using the Electronic Workbench application. This system was created to detect and send notifications to relevant officers if there are public street lighting that does not work normally.

3. Results and Discussion

3.1. Measurement of the Effect of Light on the Resistance Value of LDR Components

The equipment used to provide light on the LDR component is a flashlight from Macis Gas. The lumen of the flashlight is not measured because there is no measuring instrument to support it, but in observing the light intensity it is quite strong and focused.

Table 1. Table of observations of light effects

LDRComponents	Resistance Value (without beam)	Resistance Value (hit the flashlight at a distance of + 2 cm)	Resistance Value (hit the flashlight at a distance of + 5 cm)	Resistance Value (hit the flashlight at a distance of + 10 cm)
LDR1	3.49kΩ	0.45kΩ	0.81kΩ	1.36kΩ
LDR2	16.5kΩ	0.58kΩ	1.12kΩ	2.62kΩ
LDR3	19.6kΩ	0.56kΩ	0.8kΩ	2.15kΩ

3.2. Measurement of the Effect of Heat on the Resistance Value of LDR Komponen Components

The equipment used to heat the LDR component is a small candle. The lumen of the candle light is not measured because there is no measuring instrument to support it, but in observing the light intensity it is quite strong and focused.

Table 2. Table of observations of the heat effect

NTC Components		Not close to the candle	Close to the candle at a distance + 1cm)	brought close to the candle at a distance of + 2 cm)	Close to the candle at a distance of + 5 cm	Bring it close to the candle at a distance of + 10 cm
NTC	**Temp (Fahrenheit)**	85	98	95	88	86
	Resistansi	28 Ω	24.5 Ω	26 Ω	26.1 Ω	26.2 Ω

3.3. Measurement of Smoke Effects on Smoke Sensor Components

The equipment used to provide a heat effect to the LDR component is two lit cigarettes. Smoke density is not measured because there is no measuring instrument to support it.

Table 3. Table of observations of the effects of smoke on

Smoke Sensor Circuit	Tested with TEST tombol button	Tested by lighting a cigarette	Tested by lighting two cigarettes
The alarm goes off?	Yes	No	Yes
Observation result	If the TEST button is pressed for about 5 seconds, the Led light will flash and the alarm will sound loudly	It takes a long time for the sensor to detect smoke because the cigarette smoke produced is not sufficient to sound the alarm	In a not so long time, because the smoke collected is quite a lot and thick, the detector circuit will detect the incoming smoke, and sound an alarm.

Based on observations at the time of the study, an analysis was carried out, the smoke sensor component will sound if it detects a large amount of smoke. The buzzer sound is very loud and beeps in tone. The buzzer will not stop sounding even if the test button is pressed, unless the battery is removed.

3.4. Sensor Circuit Design, Manufacturing and Testing

It is hoped that the results of this research can produce an electronic sensor that can function as a light sensor, heat sensor, and smoke sensor. Thus, the characteristics of the three sensor components will be combined to produce the desired function.

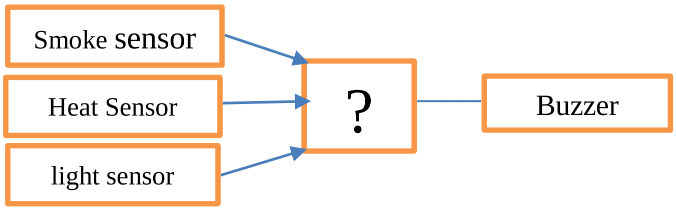


Figure 1. Block diagram of electronic sensor circuit design

To combine these three components, it is designed to add an AND logic gate component as a liaison between the sensors and the buzzer component.

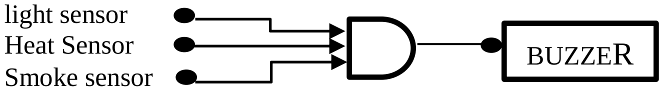
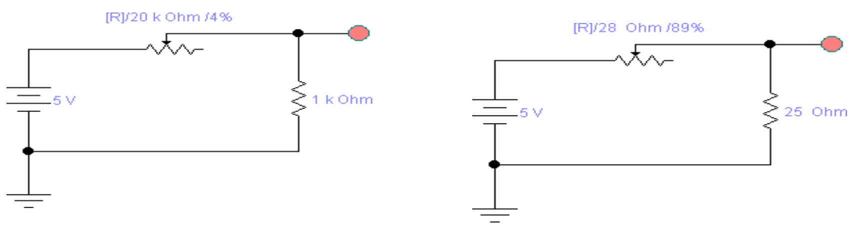


Figure 2. Block diagram of electronic sensor circuit design using AND . logic gates

3.5. Circuit Simulation

To get accurate results from the design concept that has been made, the circuit is simulated using Electronic Workbench software



(a) Light sensor (LDR) (b) Temperature sensor (NTC)

Figure 3. Sensor Circuit Simulation

Table 4. Table of results of measured voltage observations

Supply Voltage (volts)	**Sensor State**	**Rated output voltage (volts)**
4	LRD is closed with insulation (not exposed to light)	0.02
4	LRD is not closed with insulation	0.22
4	LDR is given a flashlight	2.5

3.6. Measurement of Output Voltage on the Effect of Light Sensors and Temperature Sensors

Measurement of Output Voltage on Effect of Light Sensor and Temperature Sensor LDR and NTC components are connected in series with a 1.5 kohm resistor. Measure the voltage across the resistor to get the output voltage. From the observations, it was found that if a flashlight is subjected to light, the voltage will be around 2.5 Volts. This is sufficient to generate a logic 1 input on the AND gate.

4. Conclussion

An electronic sensor that functions as a light, heat, and smoke sensor, can be designed by combining the characteristics of a light sensor, heat sensor, and smoke sensor. The LDR components that experience the most significant decrease in resistance value when exposed to light are those with a large surface area. The resistance value of the NTC component will decrease quite quickly if it is brought close to heat, and it will take a long time to return to normal temperature and its characteristic resistance value. The electronic sensor in this study can be developed into an intelligent sensor based on a low-power microprocessor, this sensor can measure several variables simultaneously.

References

Ananda, R., & Amin, M. (2021). Utilization Of Booster Circuit Joule Thief For Garden Lighting Source Of Voltage From The Sun. *Jurteksi (Jurnal Teknologi dan Sistem Informasi), 8*(1), 103-110.

Haripriyono, A. A., Ahmed, Y. A., & Hannan, M. A. (2021). Impact of Wind-Assisted Technologies on Resistance and Stability of Commercial Ship. *CFD Letters,* 13(11), 95-115.

Hazarika, D., & Pegu, D. S. (2013). Micro-Controller based air pressure monitoring instrumentation system using optical fibers as sensor. *Optical Fiber Technology, 19*(2), 83-87.

Ibrahim, H., Mohammed, A. A., & Aliyu, I. A. (2019). Design and Implementation of an Arduino Based Light Dependent Alarm System. Arid Zone Journal of Engineering, *Technology and Environment, 15*(2), 259-267.

Kuppusamy, P. (2016). Smart home automation using sensors and internet of things. *Asian Journal Of Research In Social Sciences And Humanities, 6*(8), 2642-2649.

Mayub, A., Fahmizal, F., Oktiawati, U. Y., & Rosyid, N. R. (2019). Implementation smart home using internet of things. *TELKOMNIKA (Telecommunication Computing Electronics and Control), 17*(6), 3126-3136.

Novelan, M. S., & Nababan, A. A. (2020). Designing Energy Saving Home Lights Using Microcontroller Based Solar Panels: Designing Energy Saving Home Lights Using Microcontroller Based Solar Panels. *Jurnal Mantik,* 3(4), 642-648.

Rathore, M. N. H. K. M., & Channi, C. B. H. K. (2017). Modeling and Simulation of Automatic Street Light Controller using LDR and Micro-Controller. *Internasional Journal for Scientific Research and Development,* 5(8), 274-277.

Saputra, R. S. (2022). Development of Learning Media Simulation of Automatic Garden Lights Using the Proteus Application. *International Journal of Research in Community Services*, 3(2), 71-77.

Shingala, K., & Patel, J. (2017). Automatic home appliances and security of smart home with RFID, SMS, Email and real time algorithm based on IOT. Int. Res. J. Eng. *Technol, 4*(4), 1958-1964.

Tambe, Y., & Nemade, P. (2021). Efficacy of palm oil fuel ash as filler on mechanical properties of aerated concrete. *Innovative Infrastructure Solutions*, 6(2), 1-8.

Tawfik, M., Sancristobal, E., Martin, S., Gil, R., Diaz, G., Colmenar, A., ... & Gustavsson, I. (2012). Virtual instrument systems in reality (VISIR) for remote wiring and measurement of electronic circuits on breadboard. *IEEE Transactions on learning technologies,* 6(1), 60-72.