# LIGHT DETECTOR USING NAND GATE

## A PROJECT REPORT

*Submitted by*

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*in partial fulfillment of*

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## ELECTRONICS AND COMMUNICATION ENGINEERING

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## ABSTRACT:

The Light Detector Using NAND Gate is an innovative and cost-effective electronic circuit designed to detect light intensity and generate a corresponding output signal. The circuit combines the unique properties of a Light Dependent Resistor (LDR) with the logical operation of a NAND gate to create a reliable and efficient light-sensing system. The LDR's resistance varies inversely with the amount of light falling on it, which enables the circuit to sense changes in ambient light. The output signal from the NAND gate switches states based on the light intensity, making it suitable for diverse applications such as automatic streetlights, burglar alarms, and industrial systems.

This project highlights the simplicity and versatility of digital logic gates in practical applications. By leveraging the truth table of a NAND gate, the circuit processes the voltage generated by the LDR to determine the presence or absence of light. Furthermore, its adaptability allows it to control output devices such as LEDs or relays, enabling real-time action based on light conditions.

## WORKING PRINCIPLE

The light detector circuit primarily relies on the properties of an LDR and the logical functionality of a NAND gate. An LDR is a photoresistor whose resistance decreases with increasing light intensity. In this circuit, the LDR forms a voltage divider with a fixed resistor. The voltage across the LDR changes based on the ambient light.

The output of the voltage divider serves as an input to the NAND gate. Depending on the light intensity, the voltage level at the input of the NAND gate transitions between logical HIGH and LOW. The NAND gate processes these signals according to its truth table:
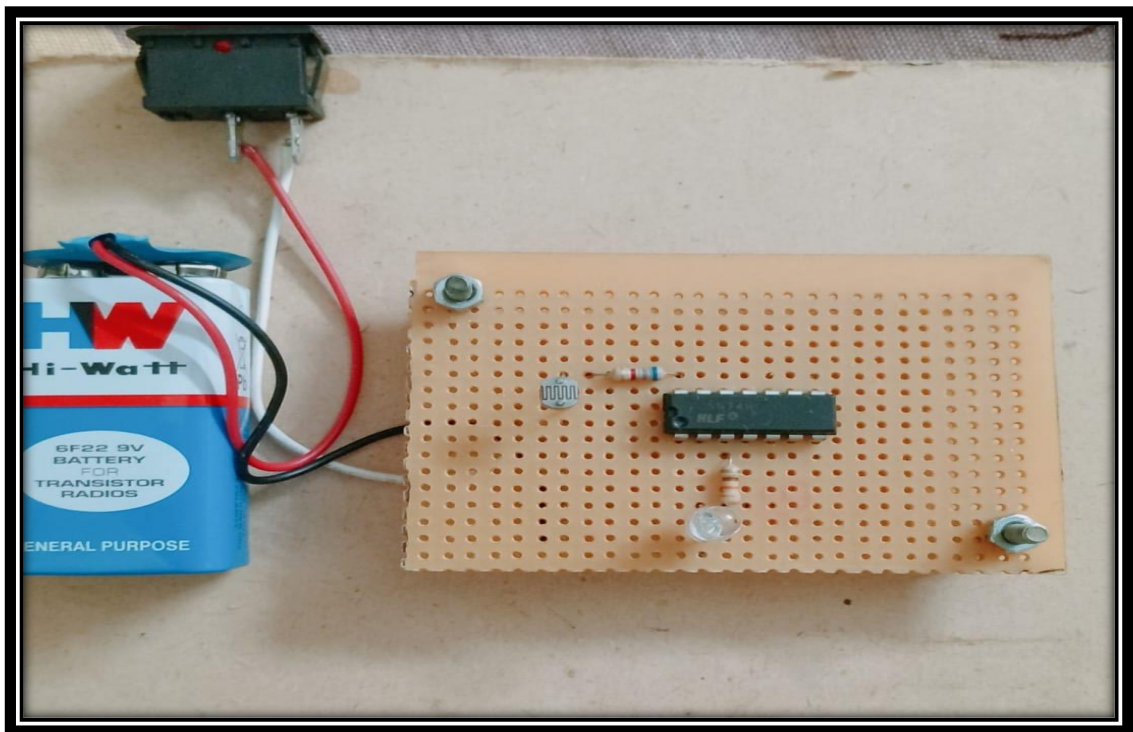
- If both inputs are HIGH, the output is LOW.

- Otherwise, the output is HIGH.

By carefully selecting resistors, the circuit can be designed to switch states at a specific light threshold.

## CIRCUIT DIAGRAM:
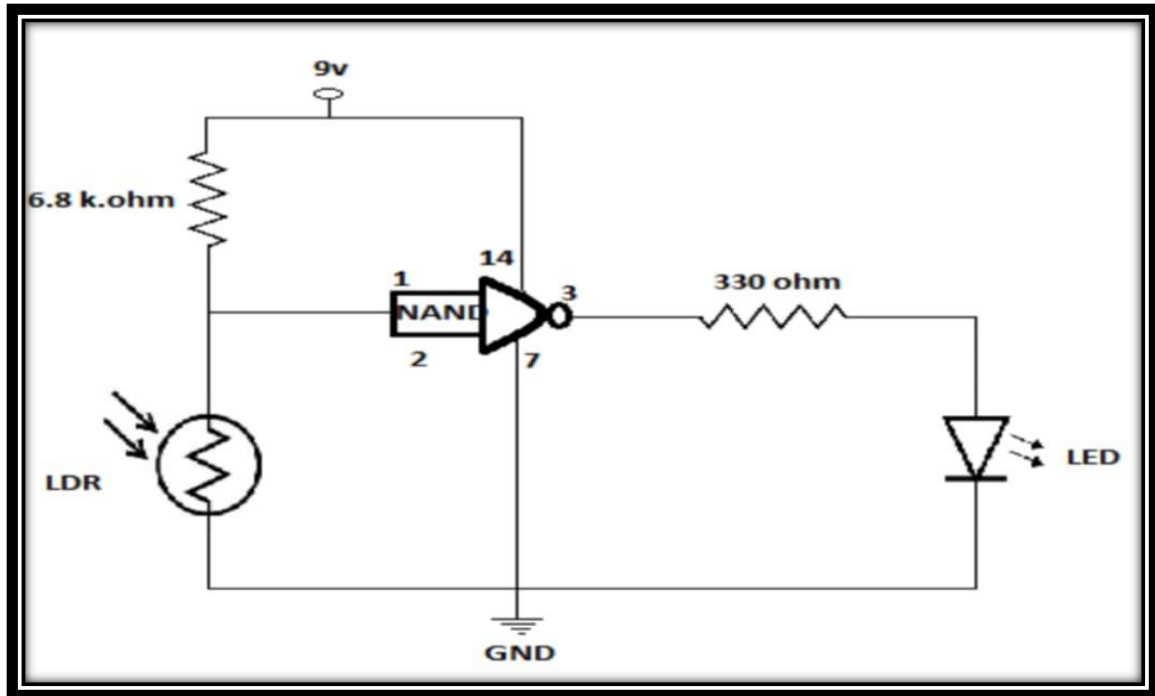


## WORKING MODEL:

## RESULT:

➢ The light detector circuit using a NAND gate was successfully implemented and tested. The following observations were made:

➢ Under high light intensity, the resistance of the LDR decreased, causing a higher voltage input to the NAND gate.

➢ When the light intensity was low, the LDR resistance increased, resulting in a lower input voltage to the NAND gate.

➢ The output state of the NAND gate reliably switched between HIGH and LOW based on the light intensity, successfully driving the LED or connected device.