PENUMBRA DETECTOR

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PRESENTATION OVERVIEW

- OBJECTIVE
- COMPONENT USED
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- WORKING PRINCIPLE
- ADVANTAGES AND DISADVANTAGES
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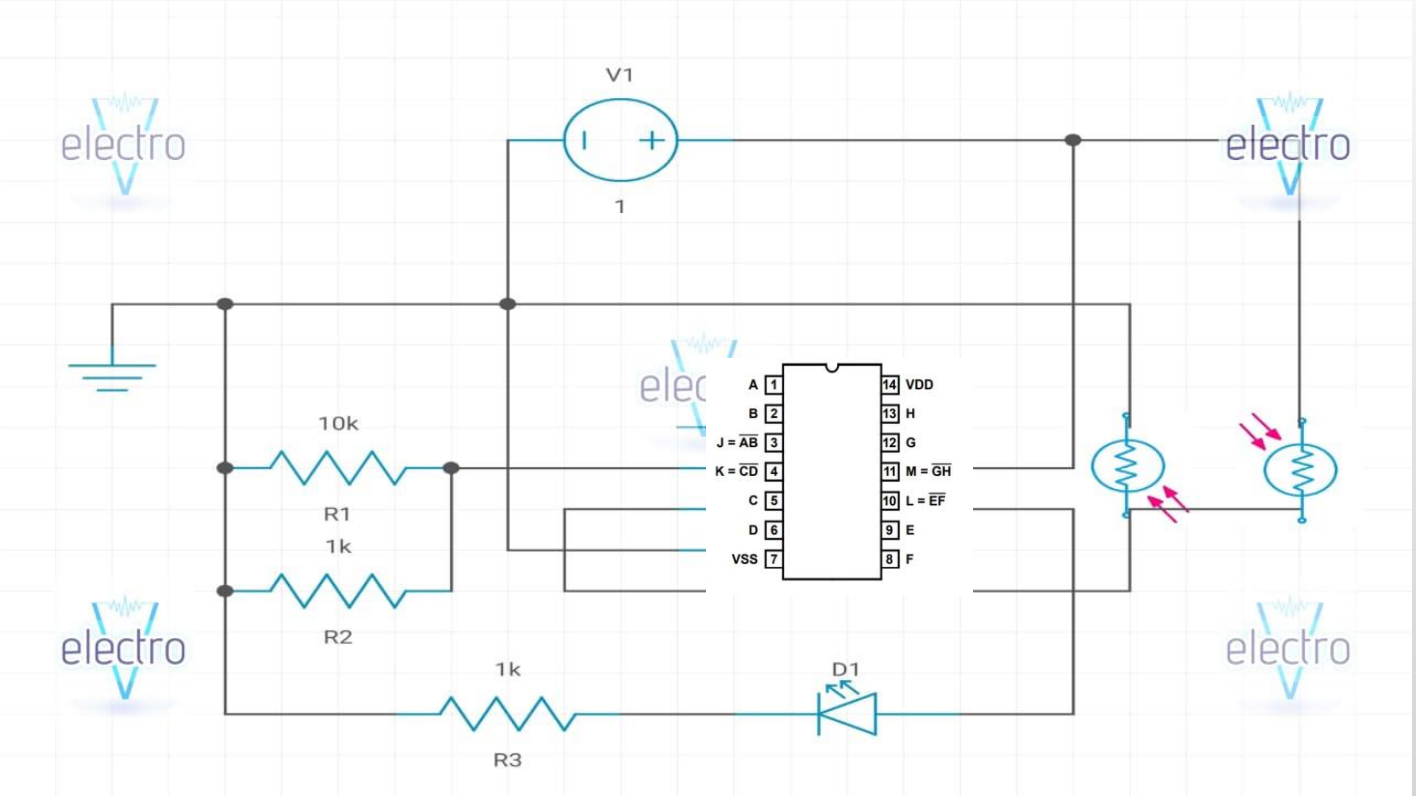
OBJECTICVE

- A Detect partial shadows where light is partially blocked, such as in areas of partial eclipse or dimly lit environments.
- Measure gradients in light intensity, distinguishing between full shadow (penumbra) and partial shadow (penumbra
- Improve accuracy in optical and imaging systems by detecting subtle variations in lighting conditions.
- Enable precise object tracking in environments with complex lighting, such as robotics or automated systems.

COMPONENTS USED

- Breadboard
- 9 volt battery & Connector
- LED Light
- 10k Resistor
- 1k Resistor
- IC CD4011
- LDR
- Connecting Wires
- BUZZER

CIRCUIT DIAGRAM



WORKING PRINCIPLE

- **Light Emission**: The LED light shines on the LDR, which is sensitive to changes in light intensity.
- **Detection**: As the light intensity varies (e.g., due to shadows or partial shading), the resistance of the LDR changes, affecting the voltage across it.
- **Signal Amplification**: The IC 4N25 operational amplifier amplifies the voltage change from the LDR, making it easier to detect.
- **Threshold Alert**: If the voltage change indicates a significant drop in light intensity (i.e., due to a shadow), the circuit triggers the buzzer to provide an audible alert.

ADVANTAGES AND DISADVANTAGES

Advantages

- Simple and Cost-Effective
- Real-Time Detection
- Versatile
- Easy to Assemble

Disadvantages

- Limited Sensitivity
- Environmental Factors
- Fixed Threshold
- Not Suitable for Complex Applications

CONCLUSION

- The penumbra detector effectively detects changes in light intensity and partial shadows using simple, cost-effective components.
- It provides real-time alerts via a buzzer and is easy to assemble. However, its sensitivity and accuracy are limited, making it less suitable for complex or highly precise applications.

Thank You