

Laser Burglar Alarm

Reading

This alarm uses a simple circuit where everything is hooked up in a series, making a complete circle. The CdS (cadmium sulfide cell) is a special kind of resistor called a photoresistor, which is sensitive to light.

A resistor limits the amount of current (electricity) that flows through it, and since this one is light-sensitive, it will allow different amounts of current through depending on how much light it “sees.”

Photoresistors are very inexpensive light detectors, and you’ll find them in cameras, street lights, clock radios, robotics, and more. We’re going to play with one and find out how to detect light using a simple series circuit.

Overview: This is a laser burglar alarm that will be able to turn on a buzzer by increasing the voltage in the circuit. This type of circuit is a light-actuated circuit. When a beam of light hits the sensor (the “eye”), a buzzer sounds. Use this to indicate when a door closes or drawer closes... your suspect will never know what got triggered.

What to Learn: For an object to be seen, light emitted by or scattered from it must enter the eye. In this case, we’ll be using a detector as the “eye” to see the laser beam.

Materials

- red laser
- 9V Battery
- three alligator clip leads
- buzzer (3-6V)
- cdS Cell

Experiment

1. Take the darkest alligator clip lead that you have and attach it to the negative side of the 9-volt battery. (The larger lead is negative.)
2. Attach the other end of the alligator clip to the darker end of the buzzer.
3. Take another alligator clip and attach it to the other side of the buzzer.
4. Attach the other side of the second alligator clip to the CdS cell.
5. For the last set of connections, attach the CdS cell to the remaining alligator clip. Attach the other end to the positive lead of the 9-volt battery.
6. Shine the laser beam on to the CdS cell. Does the buzzer sound?
7. If the buzzer doesn’t sound, double check all your connections. Make sure everything is connected in a giant loop.
8. To mount the alarm, disconnect everything first.
9. Hot glue the battery and buzzer to the cardboard.
10. DO NOT hot glue the CdS cell. Hot glue each of the alligator clips leading to the CdS cell instead. This will allow the cell to bend and adjust a bit to make sure the laser hits just where it should.
11. Connect everything back up in the circuit.
12. Now you can tape the alarm beside a door and attach the laser beam to the door itself. (To keep the laser beam on, wrap a rubber band around the on/off switch.)

13. When someone closes the door, the alarm should sound. You can also mount the alarm so that the alarm sounds when the door is opened.
14. Draw a diagram of how your wires are connected in this circuit. Include all electrical components, like the battery, buzzer, and CdS cell:

Exercises

1. How is this circuit different from the *Electric Eye* experiment we did previously?
2. Name three other light sources that work to activate your circuit.

Answers to Exercises: Laser Burglar Alarm

1. How is this circuit different from the *Electric Eye* experiment we did previously? (The first circuit is the same as the electric eye circuit: the buzzer sounds when the light hits the sensor. The second circuit, if you chose to make it, works in the opposite way in that the laser keeps the buzzer from sounding.)
2. Name three other light sources that work to activate your circuit. (Sunlight, strong flashlight, and a car headlight.)