

Burglar



Alarm

Introduction

Have you ever had a brother or sister “borrow” something from your room? Did you ever wonder if someone had “rummaged” through your locker? Well, today is your lucky day!! We are going to build a burglar alarm to keep this from ever happening again.

Principles

You will be building a simple electrical circuit. It is composed of three parts:

1. Power Source (Battery)
2. Noise Device (Mini-Buzzer)
3. Switch (Clothes Pin)

Since a single wire path connects all the components of the circuit, it is called a **Series Circuit**.

When all the components are joined together by wires, the circuit is “closed” and devices on the circuit turn on. If any part of the circuit is not joined together, it is “open” and devices on the circuit turn off. You can think of this like a light switch in your house. When the light switch is “on” or “closed”, the lights come on. When the light switch is “off” or “open”, the lights turn off.

For this project, the switch is a clothes pin. When the switch is “closed”, a mini-buzzer turns on. When the switch is “open”, the mini-buzzer turns off.

Materials

- 2 Strands of Gauge 22 Wire
- 3 Wire Nuts
- 1.5 Volt AA Battery
- AA Battery Holder
- 1.5 Volt Mini-Buzzer
- Wooden Clothes Pin
- Cardboard Square
- String
- Plywood Square
- Electrical Tape
- Super Glue

Instructions

Attaching the Power Source:

1. Place the AA battery into the battery holder.
2. Place the battery holder on the top left corner of the plywood square, approximately 2 inches from edge of the board (on both sides).
3. Orient the battery holder so the “+” is on the left. (The left side of the battery holder is the side nearest to the edge of the board.)
4. Place a thick line of super glue on the back side of the battery holder. Press the battery holder down to the board. Continue to hold down for about 30 seconds to allow the glue to set. **CAREFUL – SUPER GLUE CANNOT BE REMOVED FROM SKIN!!**

Attaching the Alarm:

5. Place the mini-buzzer on in the top right corner of the plywood square, approximately 2 inches from the edge of the board (on both sides).
6. Orient the mini-buzzer so that the side with the wires is facing toward the battery holder.
7. Notice that the mini-buzzer has predrilled holes on two sides. On the back side of the mini-buzzer, place a thick spot of super glue on the plastic surrounding these predrilled holes. Press the mini-buzzer down to the board. Continue to hold down for about 30 seconds to allow the glue to set. **CAREFUL – SUPER GLUE CANNOT BE REMOVED FROM SKIN!!**

Making and Attaching the Switch:

8. The switch is made by wrapping two bare wires on the clothes pin. To begin, open the clothes pin. Notice that there is a large notch in both legs of the clothes pin.
9. Take out one of the red wires. Notice it has a long bare end. Wind the bare wire around the bottom leg of the clothes pin. The wire should be in the location of the notch. When you finish, all of the bare wire should be wrapped around the leg. The shielded portion of the wire should be on the left of the clothes pin.
10. Take out the other red wire. Wind the bare wire around the top leg of the clothes pin. The wire should be in the location of the notch. When you finish, all of the bare wire should be wrapped around the leg. The shielded portion of the wire should be on the right of the clothes pin.
11. Locate the switch (clothes pin and wires) in the center of the board about 2 inches up from the bottom edge. Attached the switch to the board using electrical tape.
12. Tie the string to the cardboard square. Open the clothes pin switch and place the cardboard square inside so that the bare wires on the top and bottom legs cannot touch.

Wiring:

13. Hot wires are typically red or black. In this experiment, the hot wire from the battery is red. The hot wire from the switch is also red. Join the hot wires from the battery and switch using a wire nut. (The switch hot wire is located on the left side of the clothes pin.)
14. Join the hot wires from the switch to the mini-buzzer using a wire nut. The hot wire from the switch is red. (Use the wire located on the right side of the clothes pin.) The hot wire from the mini-buzzer is also red.
15. Typically, return wires are white. However, in this experiment, both the mini-buzzer and battery return wires are black. Join the return wires from the mini-buzzer and the battery using a wire nut.
16. Now that all the wires have been connected, test out the circuit by removing the cardboard square from the clothes pin. Does the alarm sound? If so, the circuit is closed and electricity is flowing. If not, the circuit is open and electricity is not flowing.

Final Steps:

17. Once your alarm circuit is working, tidy up your circuit by taping down the wires using electrical tape. Cut 2” strips and tape down the wire on either side of each wire nut. Bundle up excess wire under the electrical tape.
18. Write your name on the adhesive with the iCan logo. Place the adhesive on the bottom right of your circuit board.

CONGRATULATIONS!!
YOU NOW HAVE A WORKING BURGLAR ALARM!!

Lesson Recap

- Power flows from “+” to “-”.
- A switch controls the connection between the power supply and a device. In this experiment, the switch controls the connection between the battery and the mini-buzzer. Without power from the battery, the mini-buzzer will not sound. The switch must be “closed” to allow power to pass through. The switch is “closed” when the bare wire on the top and bottom legs of the clothes pin are in contact with one another. The switch is “open” when the cardboard square is placed in the clothespin.
- Wires can be insulated or bare. Insulated wires have a plastic or rubber cover. This cover does not let electricity pass from the sides of the wire. Bare wires do not have insulation so electricity can pass through the sides of the wire. To connect two insulated wires together, you must remove insulation from the wire ends. The two bare ends of wire can be joined together using connectors. In this experiment, we used wire nuts to join wires.