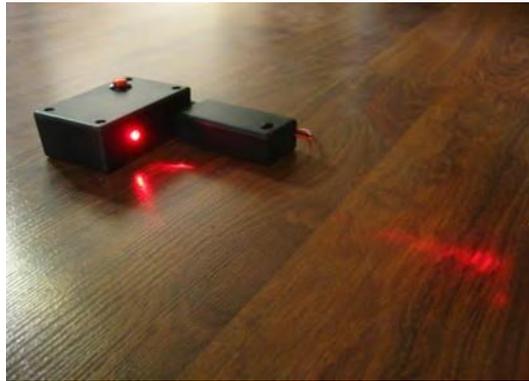**Easy Laser Alarm**
PART NO. 2169580

Protect your home with the Easy Laser Alarm kit. It uses a 741 op-amp and 4017 decade counter as the brain and is powered by a 9V battery. If you like, connect a 9V wall transformer to the power connections to save your batteries. The kit works by sensing the light from the laser hitting the photoresistor which lowers the resistance, once the beam is broken the resistance increases and the 741 chip sends a pulse to the 4017 which sets off the buzzer. To reset the circuit the laser must be back on the photoresistor and then you push the reset button.

If you add mirrors to reflect the laser you can protect multiple entrances at once.

Time Required: 1 Hour depending on experience
Experience Level: Beginner
Required tools and parts:

-A knife is helpful for the holes
-A drill to drill out holes in your project box
-Philips screwdriver for project box
-9V battery
-Wire
-Hot glue
-Battery snap

Bill of Materials:

| Qty	Jameco SKU	Component Name
1	45891	LM4017 Decade counter
1	24539	LM741 Opamp
1	315660	Momentary (ON) push button
1	2128067	9V battery clip with switch
1	335557	12v DC buzzer
1	2157159	1K Ohm resistor
1	18922	Project Box
1	202403	Photo-Resistor 3K-200K
1	2155452	Mini Protoboard
1	2151128	Laser Pointer

Step 1 - Review components

First you need to check that you have all your parts and tools. The only parts that are not included are a 9v battery and wire. The tools you need include a knife, a drill to drill out holes in your project box, a Philips screwdriver for project box and an optional hot glue gun is very helpful for keeping the circuit and photoresistor attached to the project box.

Step 2 - Understanding the circuit

This kit works by sensing the light from the laser hitting the photoresistor which lowers the resistance, once the beam is broken the resistance increases and the 741 chip senses that the resistance is now higher than the 1k resistor. This results in the chip sending a pulse to the 4017, which sets off the buzzer and turns off the power to the photo-resistor so the buzzer will not stop when the beam is

back on the sensor. To reset the circuit the laser must be back on the photo-resistor while you push the reset button.
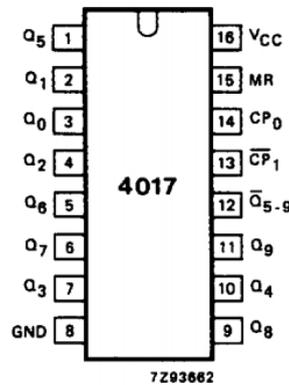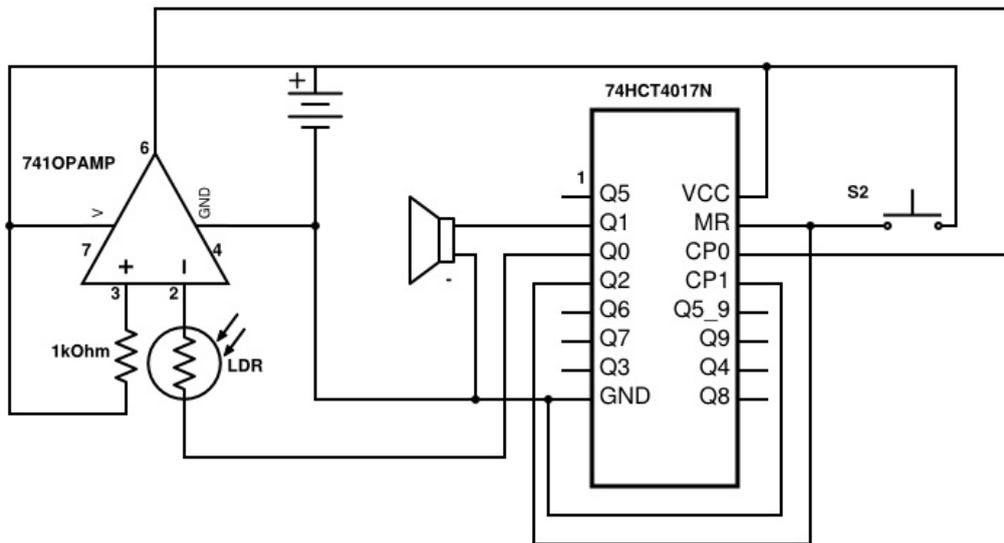

Step 3 - Build your circuit

To begin you will want to have your supplies ready. First push your two ICs into the protoboard in the center making sure that the notch indicated by the "U" or "O" at the top of the IC is pointing up (the same direction) to avoid confusion while connecting the pins. Use the circuit schematic to build the rest of your circuit, but don't attach the power leads and the button yet. For the included laser diode, an arrangement of two AA or AAA batteries connected in series with a switch should power the 3V laser pointer module. A battery snap with a switch is needed for the AA/AAA batteries, but is not included. (AA: 216120, AAA: 216292)
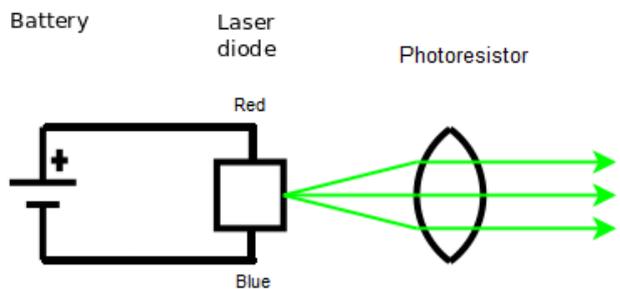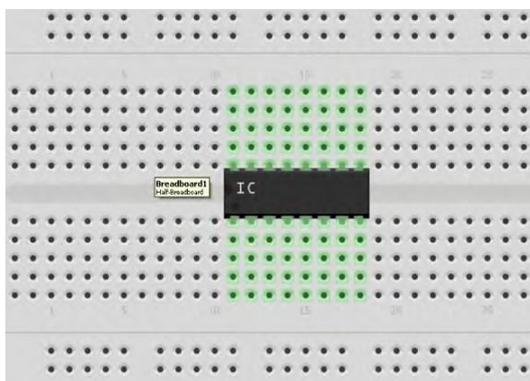
Step 4 - Drill holes in your project box

Use a 7/16" drill bit to drill out a hole for the button. To make a small hole for the photoresistor, I made the hole a little smaller than the size of the component so it would not pick up light from anywhere else but the laser beam. Finally, you need to make another hole for your battery box leads.
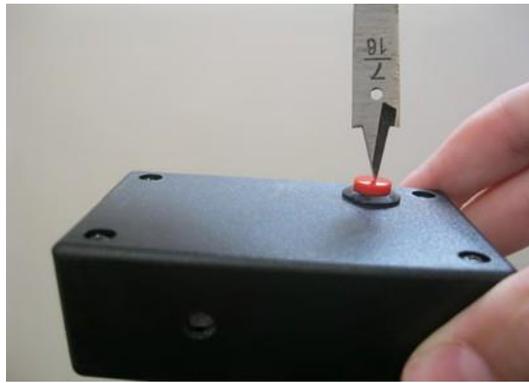
Step 5 - Fitting the outside components

To begin, fit the pushbutton in its hole and secure it. Then attach two pieces of wire to the button. Next, thread the wires from the 9V battery box/wall transformer through the hole and into your project box. Finally, connect the wires to your protoboard.

IMPORTANT - Test your circuit before using hot glue (optional, but recommended) to secure your project in its project box, as hot glue is hard to remove from components and wires.

You can hot glue the photo-resistor to the project box to keep it in place as well as the power supply cables.

Step 6 - Finish up and your done!

Close up your project box, put in your 9V battery and you're done! Shine your laser pointer on the photoresistor and turn on your project. Break the beam and you should hear a loud beep, to reset press the reset button while the laser is on the sensor.

To make your project more like a security system you can remove the 9V buzzer and use the circuit to trigger a more effective alarm system. To make the laser pointer more permanent, get a small project box and mount your laser pointer inside the box with a usual 4.5V-5V power supply to your laser pointer or you can just use the batteries.

Another idea for this project would be to use mirrors to reflect the laser beam across multiple doorways or windows.