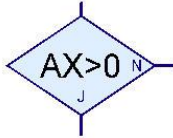




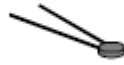
# Using Sensors

Note:

Thermal and Photo Sensors get plugged into the **AX terminals** on the computer interface and are programmed with an Analog Branch.



Sensors detect input from the environment that can be used to program a response.



Thermal Sensor - detects changes in temperature.

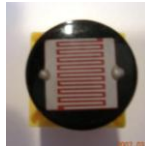


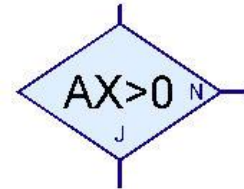
Photo Sensor - detects changes in the amount of light.

## Sensor Problem # 1 - Using Photo Sensors

### The Emergency Light

Materials:

- 1 lamp
- 1 photo sensor (start with a value of  $AX < 500$ )
- a few building parts to mount everything with



Make an emergency light that is turned off when the room lights are on but will turn on when the room lights go out.

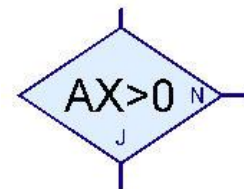
Hint: you will need to calibrate the sensor using an analog branch in your program.

## Sensor Problem # 2 - Using Thermal Sensors

### The Fire Alarm with flashing light and buzzer

Materials:

- 1 lamp
- 1 thermal sensor (start with a value of  $AX < 385$ )
- 1 buzzer
- a few building parts to mount everything with



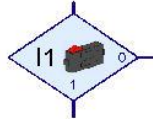
Make a fire alarm that will turn on a buzzer and a rapidly flashing light when the temperature goes up (buzzer and flashing light turn off when temp goes back down).

Hint: you will need to calibrate the sensor using an analog branch in your program.

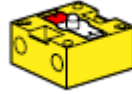


### Note:

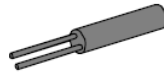
Phototransistors and Reed Switches are plugged into the **Digital Inputs I1 - I8** on the computer interface and are programmed with a Digital Branch.



### Sensors (continued)



Phototransistors - detect when a light beam has been broken and will act as a switch to turn on a light, motor, etc.



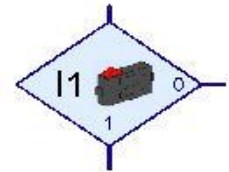
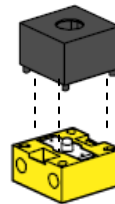
Reed Contact - detect changes in magnetic fields and can be programmed like switches.

## Sensor Problem # 3 - Using Phototransistors

The Burglar Alarm with flashing light and buzzer

### Materials:

- 1 lamp with black cover
- 1 phototransistor with black cover
- 1 buzzer
- a few building parts to mount everything with



Make a burglar alarm that will turn on a flashing light and make a buzzer sound when the beam is broken.

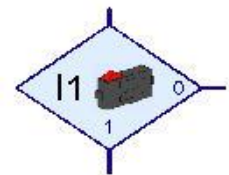
Hint: you will use a digital branch in your program.

## Sensor Problem # 4 - Using Reed Switches

The Magnetic Cookie Jar Alarm with flashing light and buzzer

### Materials:

- 1 lamp
- 1 reed switch (reed contact)
- 1 buzzer
- 1 magnet
- a few building parts to mount everything with



A cookie jar is rigged with a magnet on the lid and a reed switch on the jar. Make a model of this by wiring a reed switch, light, and buzzer and programming it so that the buzzer will go off (and light flash) when a magnet is no longer in contact with the reed switch. As long as the magnet (lid) is touching the reed switch (jar) the alarm stays off.

Hint: you will use a digital branch in your program.



### Sensor Problem # 5 - Using Multiple Sensors

#### The Super Duper Deluxe Cookie Jar Alarm

Materials:

- 1 pushbutton switch
- 1 lamp
- 1 lamp with black cover
- 1 phototransistor with black cover
- 1 thermal sensor
- 1 reed switch (reed contact)
- 1 buzzer
- 1 magnet
- a few building parts to mount everything with



Me hate  
broccoli!!

In spite of our best efforts to protect our cookies, a super thief has found a way past our alarm system. You must build a super duper alarm system with the following specifications:

- a light turns on in a "separate room" when a beam is broken. No alarm sounds at this time. The light stays on. (use a phototransistor)
- The light begins to flash when the thief's hot breath warms up the cookie jar. Still no alarm. (use a thermal sensor)
- Finally, an alarm sounds (buzzer) when the lid is removed from the jar. (use a reed switch and magnet)
- The alarm must continue to sound and the light continues to flash until a switch in the control room is pressed. The alarm and light turns off.

Hint: you will use at least 3 analog branches and 1 digital branch in your program.