

• Types of sensors used in RC car :

- 1- Ultrasonic sensor
- 2- Line tracking sensor
- 3- Light sensor
- 4- Dark sensor
- 5- Buzzer
- 6- Temperature sensor

What is ultrasonic sensor?

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object.

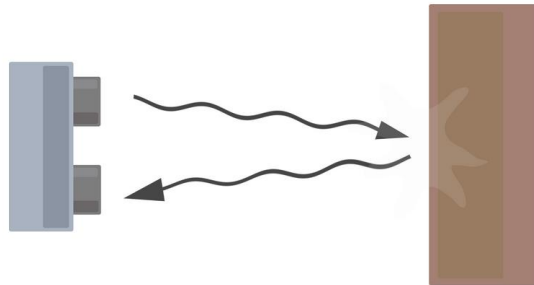


Diagram of the basic ultrasonic sensor operation

Since it is known that sound travels through air at about 344 m/s (1129 ft/s), you can take the time for the sound wave to return and multiply it

by 344 meters (or 1129 feet) to find the total round-trip distance of the sound wave. Round-trip means that the sound wave traveled 2 times the distance to the object before it was detected by the sensor; it includes the 'trip' from the sonar sensor to the object AND the 'trip' from the object to the Ultrasonic sensor (after the sound wave bounced off the object). To find the distance to the object, simply divide the round-trip distance in half.

$$\text{distance} = \frac{\text{speed of sound} \times \text{time taken}}{2}$$

NOTE: The accuracy of Ultrasonic sensor can be affected by the temperature and humidity of the air it is being used in. However, for these tutorials and almost any project you will be using these sensors in, this change in accuracy will be negligible.

It is important to understand that some objects might not be detected by ultrasonic sensors. This is because some objects are shaped or positioned in such a way that the sound wave bounces off the object, but are deflected away from the Ultrasonic sensor. It is also possible for the object to be too small to reflect enough of the sound wave back to the sensor to be detected. Other objects can absorb the sound wave all together (cloth, carpeting, etc), which means that there is no way for the sensor to detect them accurately. These are important factors to consider when designing and programming a robot using an ultrasonic sensor

What is a line tracker sensor ?

The [Line Tracking Sensor for Arduino](#) can detect the white lines in black and black lines in white. The single line-tracking signals can provide a stable output signals TTL, so look for more accurate and more stable line. Optional multi-channel mix is easy to install with the necessary line-tracking robot sensors.

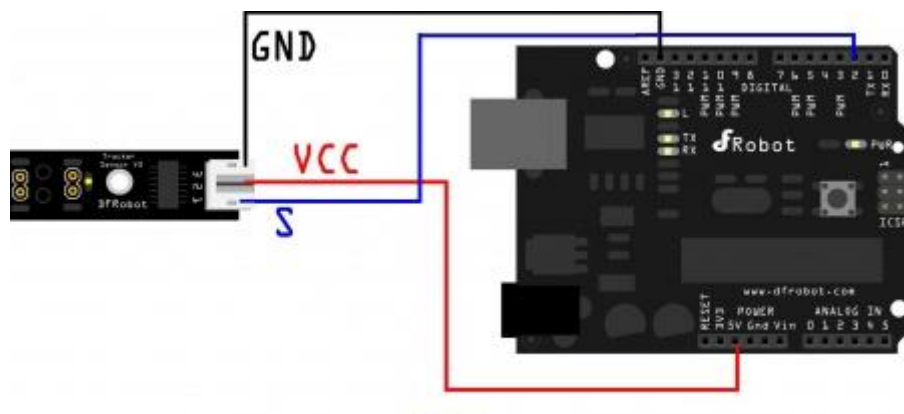
Features

- Power supply: +5V
- Operating current: <10mA
- Operating temperature range: 0°C ~ + 50°C
- Output interface: 3-wire interface (1 - signal, 2 - power, 3 - power supply negative)
- Output Level: TTL level (black line of low effective, high efficient white line)
- Module Size: 10mm×35mm
- Module Weight: About 1g

Installation

The best distance between objects such as ground and the sensor is 1-2 cm.

Connection Diagram



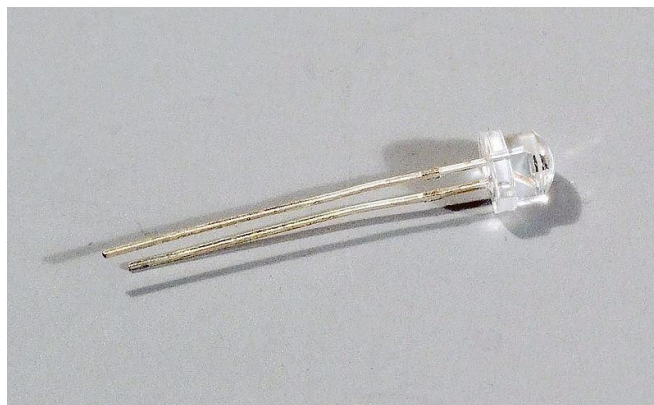
Line Tracking Sensor connection

Sample Code

```
///Arduino Sample Code  
void setup()  
{  
  Serial.begin(9600);  
}  
void loop()  
{  
  Serial.println(digitalRead(2)); // print the data from the sensor  
  delay(500);  
}
```

What is light sensor ?

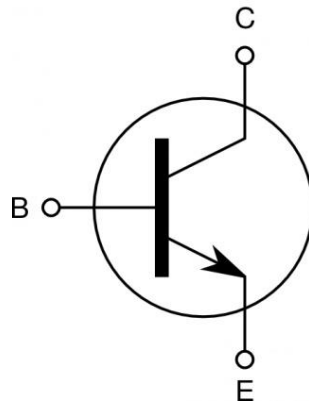
A *Light Sensor* is something that a robot can use to detect the current ambient light level - i.e. how bright/dark it is. There are a range of different types of light sensors, including 'Photoresistors', 'Photodiodes', and 'Phototransistors'. The sensor included in the BOE Shield-Bot kit, and the one we will be using, is called a *Phototransistor*.



A Phototransistor

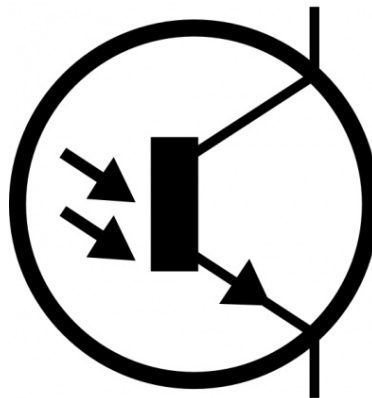
To understand what a phototransistor is, we must first determine what a transistor is.

Basically, a regular transistor is an electrical component that limits the flow of current by a certain amount dependent on current applied to itself through another pin - so there is the collector, emitter, and 'base', which controls how much current can pass through the collector through to the emitter.



Circuit diagram of a transistor

A phototransistor, on the other hand, uses the level of light it detects to determine how much current can pass through the circuit. So, if the sensor is in a dark room, it only lets a small amount of current through. If it detects a bright light, it lets a larger amount of current through.



Circuit diagram of a phototransistor

We can utilize the phototransistor's unique properties by plugging it into an Analog Port.

[Back to the top](#)

What is Analog?

As of now, you have only used the board's *Digital ports*, which can accept either a 0 (a value of 0 volts) or a 1 (a value of 5 volts) as input, and give the same as output (PWM just cycles this on and off very quickly). *Analog ports*, on the other hand, can accept an infinite range of values between 0 volts and 5 volts. This means that our robot can translate these into meaningful sensory input that can convey far much more data. In the case of the phototransistor, this means that we can tell not only if it is 'dark' or 'light', but *all the values in between*. This is vitally important for an application like this, and indeed, for many sensors.

[Back to the top](#)

Photoresistors

There may be a time you find yourself using a photoresistor. A photoresistor operates similarly to a phototransistor however it changes its resistance based on the amount of light that falls upon it. Photoresistors tend to be less sensitive, also.



A photoresistor

What is dark sensor ?

Dark sensor is also known as automatic street light sensor.

it is a simple and powerful concept , which uses transistor (**BC 547** NPN) as a switch to switch ON and OFF the street light system automatically .

It automatically switches **ON** lights when the sunlight goes below the visible region **of our eyes. (e.g in evening after Sunset).**

it automatically switches **OFF** lights when Sunlight fall on it (e.g in morning) , by using a sensor called LDR (Light Dependent Resistor) which senses the light just like our eyes.

What is buzzer ?

A **buzzer** or **beeper** is an [audio](#) signalling device,^[1] which may be [mechanical](#), [electromechanical](#), or [piezoelectric](#) (*piezo* for short). Typical uses of buzzers and beepers include [alarm devices](#), [timers](#), and confirmation of user input such as a mouse click or keystroke

it's used to detect obstacles found in the road of the car.

What is temperature sensor ?