Reading an Ultrasonic Sensor

The sensor used with the code in this document is the HC-SR04 ultrasonic sensor. Other sensors might also work, but not guaranteed.

Working principle:
Ultrasonic sensors send a short pulse from the transmitter and wait for it to get reflected into the receiver. By calculating the time taken we can measure the distance to the reflecting object.

Before Setup:

```
//Declare pin numbers used for the sensor
const int trigPin = 9;
const int echoPin = 10;

//Declare variables to store the duration of an ultrasonic pulse,
//and the calculated distance.
unsigned long duration;
unsigned int distance;
```

In Setup:

```
void setup()
{
//Sets the trigPin as an Output, and echoPin as input
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
}
```

In Loop:

```
void loop() {
//Send a short (2µs) LOW pulse to ensure a clean HIGH pulse
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);

//Sets the trigPin to HIGH state for 10µs to send a pulse from the
//sensor transmitter
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
```

```
//Reads the echoPin and returns the sound wave travel time in
//microseconds
  duration = pulseIn(echoPin, HIGH);

//Calculate the distance (cm) by dividing the duration by 2 and
//multiplying with the speed of sound
  distance = (duration/2) * 0.0343;
}
```

Good to know:
- Some materials reflect sound waves better than others, which might affect the accuracy of sensor readings.
- The `pulseIn()` function used to determine distance does not work if interrupts are disabled with `noInterrupts()`.