/\* Ping))) Sensor

 This sketch reads a PING))) ultrasonic rangefinder and returns the

 distance to the closest object in range. To do this, it sends a pulse

 to the sensor to initiate a reading, then listens for a pulse

 to return. The length of the returning pulse is proportional to

 the distance of the object from the sensor.

 The circuit:

 \* +V connection of the PING))) attached to +5V

 \* GND connection of the PING))) attached to ground

 \* SIG connection of the PING))) attached to digital pin 7

 http://www.arduino.cc/en/Tutorial/Ping

 created 3 Nov 2008

 by David A. Mellis

 modified 30 Aug 2011

 by Tom Igoe

 This example code is in the public domain.

 \*/

// this constant won't change. It's the pin number

// of the sensor's output:

const int pingPin = 7;

void setup() {

 // initialize serial communication:

 Serial.begin(9600);

}

void loop() {

 // establish variables for duration of the ping,

 // and the distance result in inches and centimeters:

 long duration, inches, cm;

 // The PING))) is triggered by a HIGH pulse of 2 or more microseconds.

 // Give a short LOW pulse beforehand to ensure a clean HIGH pulse:

 pinMode(pingPin, OUTPUT);

 digitalWrite(pingPin, LOW);

 delayMicroseconds(2);

 digitalWrite(pingPin, HIGH);

 delayMicroseconds(5);

 digitalWrite(pingPin, LOW);

 // The same pin is used to read the signal from the PING))): a HIGH

 // pulse whose duration is the time (in microseconds) from the sending

 // of the ping to the reception of its echo off of an object.

 pinMode(pingPin, INPUT);

 duration = pulseIn(pingPin, HIGH);

 // convert the time into a distance

 inches = microsecondsToInches(duration);

 cm = microsecondsToCentimeters(duration);

 Serial.print(inches);

 Serial.print("in, ");

 Serial.print(cm);

 Serial.print("cm");

 Serial.println();

 delay(100);

}

long microsecondsToInches(long microseconds) {

 // According to Parallax's datasheet for the PING))), there are

 // 73.746 microseconds per inch (i.e. sound travels at 1130 feet per

 // second). This gives the distance travelled by the ping, outbound

 // and return, so we divide by 2 to get the distance of the obstacle.

 // See: http://www.parallax.com/dl/docs/prod/acc/28015-PING-v1.3.pdf

 return microseconds / 74 / 2;

}

long microsecondsToCentimeters(long microseconds) {

 // The speed of sound is 340 m/s or 29 microseconds per centimeter.

 // The ping travels out and back, so to find the distance of the

 // object we take half of the distance travelled.

 return microseconds / 29 / 2;

}