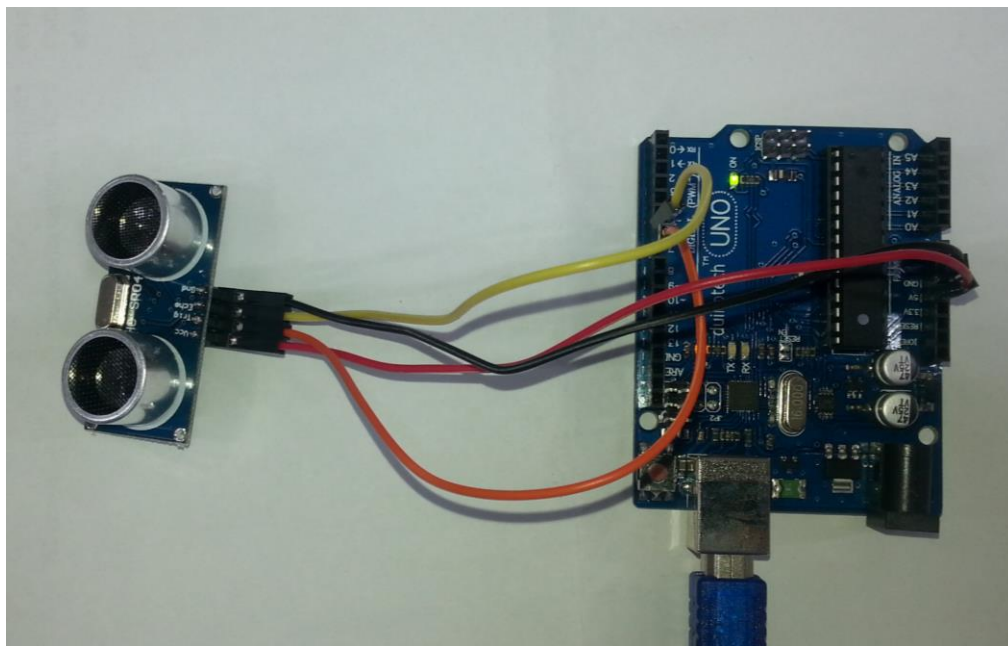# XC4442 Ultrasonic sensor

The HC-SR04 ultrasonic sensor module can be used to measure the distance to an object in front of it, by timing how long an ultrasonic pulse takes to return.

Pin	Duinotech Pin	Function	Comment
VCC	5V	5V supply	Supplies power to the module
TRIG	D7	Trigger input	When the trigger pin goes high, the module starts sending out a pulse.
ECHO	D6	Echo output	This output goes high when the pulse returns.
GND	GND	Ground connection	Ground connection

The TRIG and ECHO pins can be connected to any digital IO pins on the Duinotech Main Boards. The sample code below uses pin 7 for the TRIG and pin 6 for the ECHO.

There are no libraries needed for this module. Simply copy and paste the usonicsetup() and usonic() functions definitions from the end of the sample code to use in your own sketches.

Sample Code:

```
// Ultrasonic HC-SR04 unit interface
// Uses serial port at 115200 baud for communication

// use trig pin for output, echo pin for input
// pulse out (10us) on trig initiates a cycle
// pulse width returned on echo is proportional to distance
// specs say 38ms = no return (beyond limit), but 90ms and more have been seen
// set utimeout when calling usonic (routine will take longer for longer returns)
```

```
// higher timeout measures further, but can take longer if no echo
// if return >= utimeout, no valid pulse received
// if return < ~100 unit is faulty/disconnected (routine is timing out waiting for start of
return)
// if return == 0 then unit is still sending return from last ping (or is faulty)
// maximum nominal range is 5m => utimeout = 29000 us
// call usonicsetup() during setup
// call usonic(timeout) to get return time in microseconds
// divide result of usonic by 58 to get range in cm

//define pins here
#define TRIG 7
#define ECHO 6
#define USMAX 3000

void setup() {
   Serial.begin(115200);   //open serial port
   usonicsetup();           //set up ultrasonic sensor
}

void loop() {
    int d;                  //variable to store distance
    d=usonic(11600)/58;    //distance in cm, time out at 11600us or 2m maximum range
    Serial.println(d);     //print distance in cm
    delay(200);            //wait a bit so we don't overload the serial port
}

void usonicsetup(void){
  pinMode(ECHO, INPUT);
  pinMode(TRIG, OUTPUT);
  digitalWrite(TRIG, LOW);
}

long usonic(long utimeout){    //utimeout is maximum time to wait for return in us
  long b;
  if(digitalRead(ECHO)==HIGH){return 0;}    //if echo line is still low from last result,
return 0;
  digitalWrite(TRIG, HIGH);  //send trigger pulse
  delay(1);
  digitalWrite(TRIG, LOW);
  long utimer=micros();
  while((digitalRead(ECHO)==LOW)&&((micros()-utimer)<1000)){}  //wait for pin state to change-
return starts after 460us typically or timeout (eg if not connected)
  utimer=micros();
  while((digitalRead(ECHO)==HIGH)&&((micros()-utimer)<utimeout)){}  //wait for pin state to
change
  b=micros()-utimer;
  if(b==0){b=utimeout;}
  return b;
}
```