

Arduino ultrasonic sensor (HC-SR04 or HY-SRF05)

Both these ultrasonic range modules are fairly cheap modules, expect the HY-SRF05 to be the more expensive of the these two.



At a quick glance there are only small differences between these two:

	HC-SR04	HY-SRF05
Working Voltage	5 VDC	5 VDC
Static current	< 2mA	<2 mA
Output signal:	Electric frequency signal, high level 5V, low level 0V	Electric frequency signal, high level 5V, low level 0V
Sensor angle	< 15 degrees	< 15 degrees
Detection distance (claimed)	2cm-450cm	2cm-450cm
precision	~3 mm	~2 mm
Input trigger signal	10us TTL impulse	10us TTL impulse
Echo signal	output TTL PWL signal	output TTL PWL signal
Pins	<ol style="list-style-type: none">1. VCC2. trig(T)3. echo(R)4. GND	<ol style="list-style-type: none">1. VCC2. trig(T)3. echo(R)4. OUT5. GND

Not sure what the out pin is about, I have seen claims that it goes high when it detects an obstacle. From my personal observations the HY-SRF05 seems like a slightly more accurate sensor and seems to have a much better range [I even got it to measure beyond the 4.5 meters it claims] – but if I were to build for instance a robot that should not collide with a wall that would not matter.

In short a ultrasonic sensor like this works like:

- Send a pulse signal to I/O TRIG which is at least 10us long, this will activate the module to start detecting
- The ultrasonic module will automatically send eight 40khz square waves, and will automatically detect when there is a reflect signal;
- When there is an reflect signal back, the ECHO I/O will output a high level, the duration of the high-level signal is the time from untral sonic launch to return. As a result, the Measured distance = $(T(\text{Time of High Level output}) * (340M / S)) / 2$ The reason for the division by two is that since this is a echo it has traveled both to and from the object. Note the speed of sound is dependent of the temperature so keep that in mind if you need accuracy