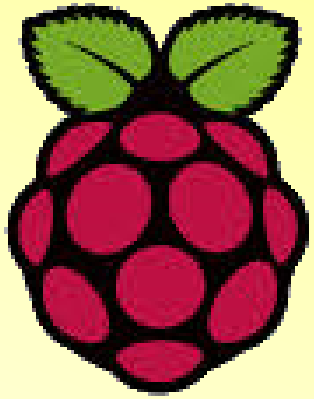
Raspberry Pi



By Declan Fox

Raspberry Pi

Ultrasonic Distance Measurement

Today we are going to look at ultrasonic distance measurement with the HC-SR04 Ultrasonic Ranging Module

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The HC-SR04 module costs around 5 Euros and is the size of a box of matches. It has a 5V, an input pin, an output pin and a ground (0v) pin.

The module works by sending an ultrasonic pulse into the air and measuring the time it takes to bounce back. This value can then be used to calculate the distance the pulse travelled.

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Powering the module is easy. We'll just connect the +5V and Ground pins to the 5v and gnd rails on our breadboard.

The input pin on the module is called the "Trig" as it is used to trigger the sending of the pulse. Ideally it takes a 5V signal but it works fine with a 3.3V signal from the GPIO. We'll connect it to P13 on our extension board.

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The module's output is called the "echo". The output pin is low (0V) until the module has taken its distance measurement. It then sets this pin high (+5V) for the same amount of time that it took the pulse to return. So our script needs to measure the time this pin stays high to calculate the distance.

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There is a slight problem with the output the module uses a +5V level for a “high” but this is too high for the inputs on the GPIO pins which only like 3.3V.

In order to ensure the Pi only gets hit with 3.3V we need to use a voltage divider.

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Two resistors in series are used to make a voltage divider If R1 and R2 are the same then the voltage is split in half. This would give us 2.5V. If R2 is twice the value of R1 then we get 3.33V which is fine. So ideally you want R2 to be between R1 and R1 x 2. In my example circuit I used 440 ohm and 1K ohm resistors. We'll connect the output to P14 on our extension board.

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