

Choosing Sensors

Referring to the worksheet “Senses and Grounds the scratchboard can have 4 additional inputs: sockets A, B, C and D, one of the clips is the Sense and the other is the Ground. The “**Science Bit**” elaborated each of the Senses inputs are different – a variable voltage up to five volts, which is converted by the clever electronics into a digital signal that can be read by your computer (via the USB connection), and that to make sure you always have a value, **the makers have added a resistor between each of the sense inputs to the +ve of the Scratch Board** (which is the +5 volts it gets down the USB lead). This has implications for the types of sensors that the board can read.

More of The Science Bit

The sensors we use are also resistors, the value of which varies with the thing in the real world we want to sense, be it temperature, humidity or light level.

The effect is that we have two resistors in series; the one on the Scratchboard connected to the +ve and our sensor connected to the ground.

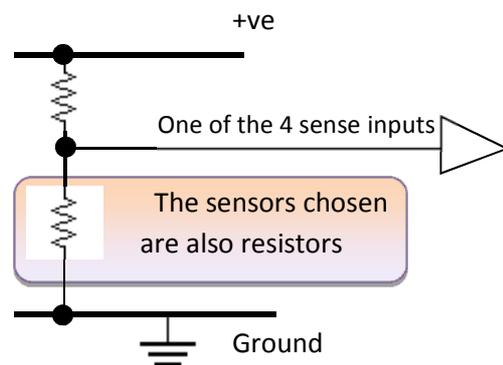
This means that there is not a linear relationship between the resistance of the sensor, and the Value as seen by Scratch.

The graph on the right outlines the relationship, as you can see to get 100 you need infinite resistance (i.e. open circuit)

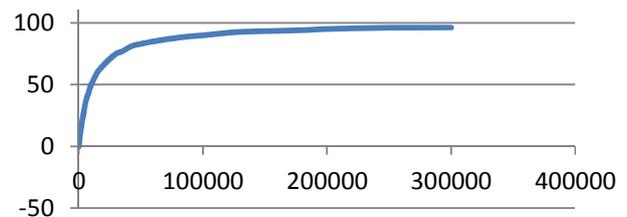
To save us all having to do the math, an enlargement of the “more interesting” part of the curve is provided overleaf, along with some interesting sensors and their typical resistance values. ...cont/d...

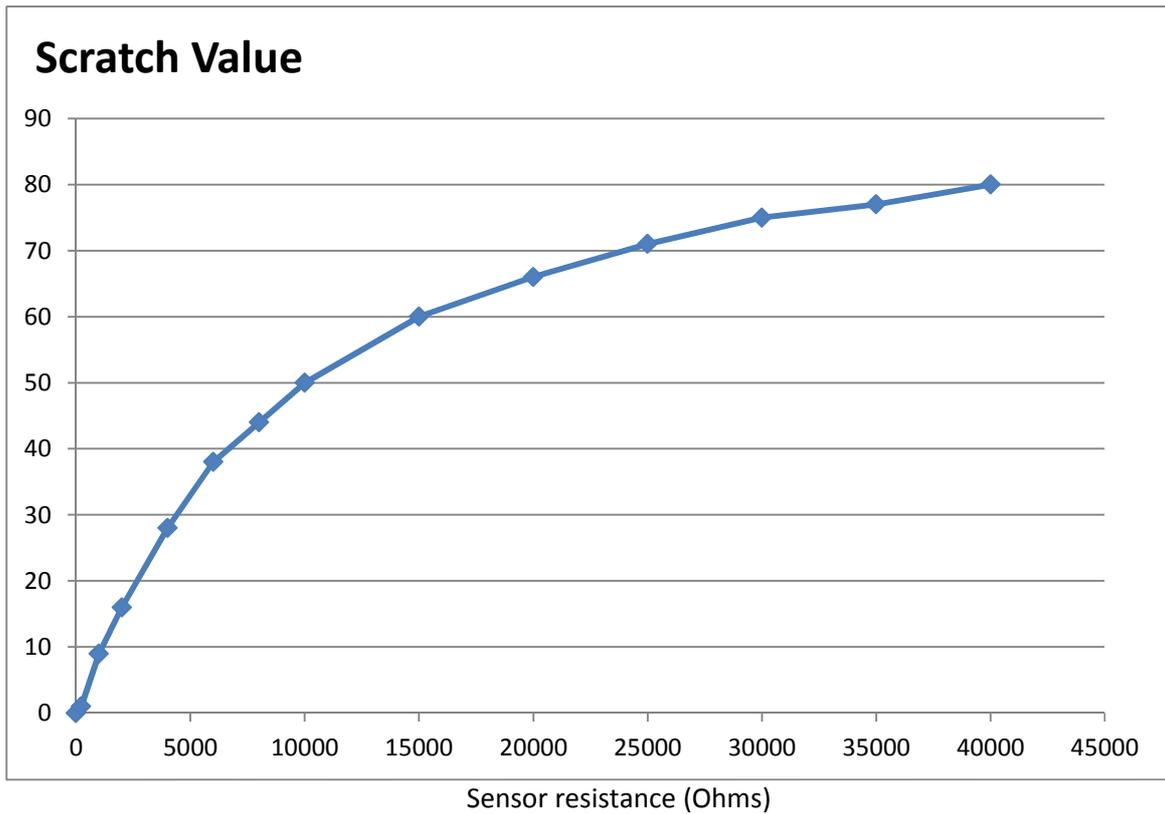


Remember, a resistor is shown like this



Scratch Value





More of The Science Bit ..cont/d

As you can see, a useful range of 0-80 is accommodated by resistances less than 47KΩ (47,000 ohms).

The 'thermistor' (temperature sensor) was chosen to have a resistance of 15KΩ at 25°C: at 0°C its resistance rises to 47KΩ and at 100°C the resistance falls to 2KΩ. So the Scratch value swings between about 80 at 0°C and 10 at 100°C

!!!Please be careful if using boiling water!!!....

The humidity sensor we chose was specified to have a resistance of 1MΩ (1,000,000) at 30% relative humidity, falling to 1KΩ at 90% relative humidity.

Our light sensor is specified to have a typical dark resistance of 1MΩ and a light resistance of 2-4KΩ (depending on how bright the light is.)

|-3.8mm-|



The bead thermistor, enlarged so you can see it!

|--10mm-|



Moisture sensor

|--13mm-|



Light sensor