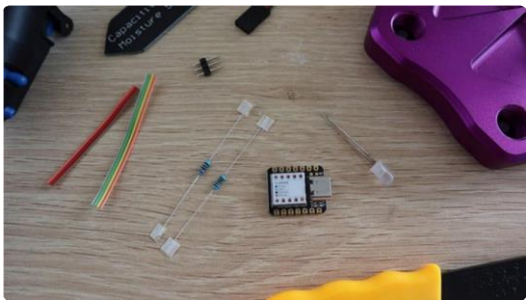
Cutting the Acrylic & MDF

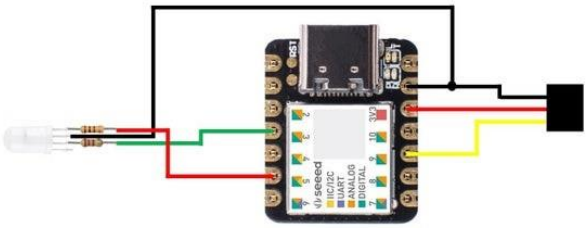
I cut the components out from 3mm MDF on my cnc machine. In order to get the RGB LED to light up the edges of the acrylic layer, you'll need to roughen them up using some sandpaper. I used some 240 grit sandpaper and sanded all of the edges of the acrylic until they had an even white haze. The rough edges difuse the LED's light and make the acrylic look as if it is lighting up.

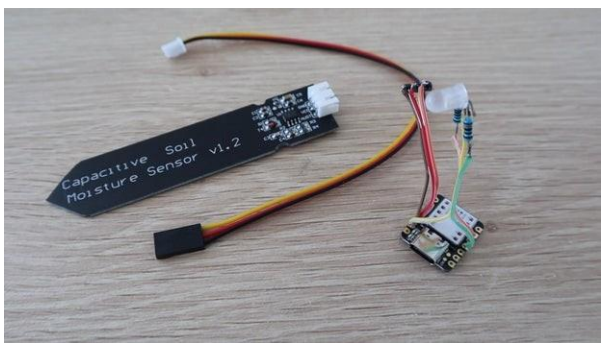
Assembling the base :

Next, glue the layers together using some epoxy adhesive. Only use a small amount of epoxy, you don't want it to seep out of the edges and onto the acrylic faces which you've just sanded or you'll have to sand them again. Use some small clamps to hold the layers together or put them under a heavy object while the epoxy cures.

Soldering the Electronics





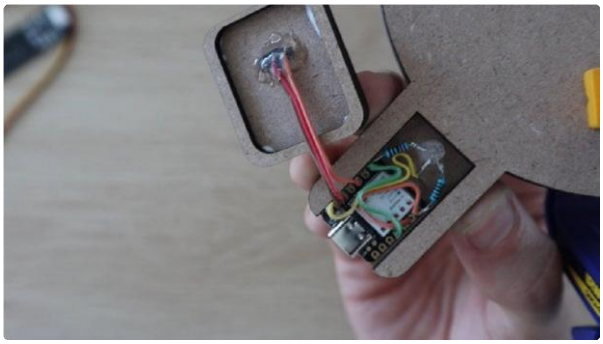


While the epoxy is curing, you can solder your components together. The circuit is quite simple, you've just got two PWM outputs to control the RGB LED, one for the green leg and one for the red leg, and then a single analogue input to read in the sensor output. You'll also need a current limiting resistor on each of the two LED legs. The green light from these LEDs is generally much brighter than the red, so I used a

220 resistor on the green leg and a 100 resistor on the red leg to balance the colours out a bit better. These capacitive soil moisture sensors are supposed to be able to run on either 3.3V or 5V, however, I have had a couple which just don't output anything when powered by 3.3V. If you 9nd that you get no output from your sensor, you might need to power it from the 5V supply on the Arduino - Vcc instead. The sensor steps the voltage down anyway, so you'll still only get a 3.3V output. Be careful if you use a different model sensor as this particular Arduino can only accept up to 3.3V on the analogue inputs.

Installing the Electronics

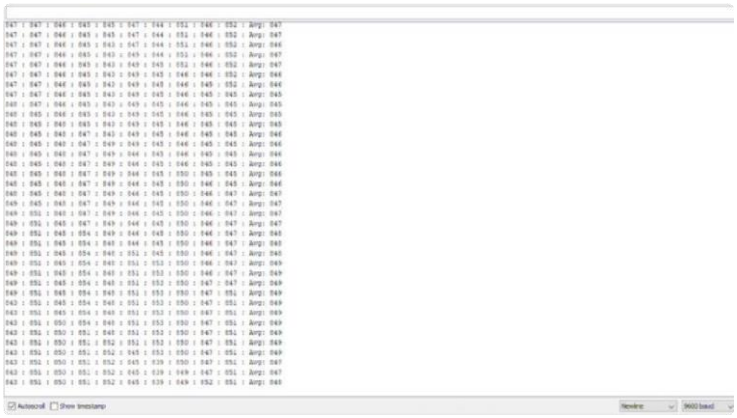
Next, you'll need to install your electronic components into your housing at the back of the base. When I tried to assemble my components the 9rst time, I saw that I'd been a bit optimistic in thinking that I'd get them all into the two-layer space, so I had to cut an additional spacer layer. Push your LED into the hole in the acrylic, making sure that the brightest part of the LED is within the acrylic layer. So don't push it all the way in. Then glue your Arduino into the housing and the header pins onto the top cover. You can use epoxy or a glue gun for this step, I used a glue gun as it sets faster. It's also a good idea to cover the soldered joints on the header pins with glue so that they don't short on the legs of the LED when you close it up. That's it for the assembly, now you just need to program it.



Programming the Arduino

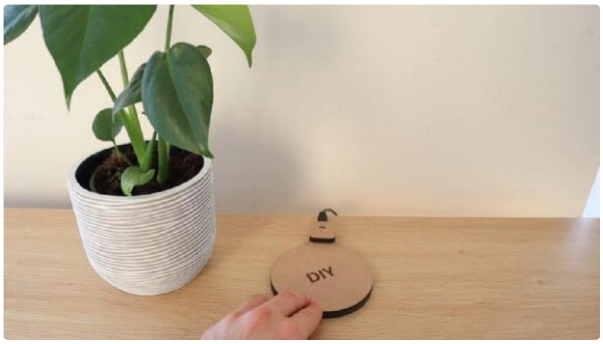
The sketch is quite simple. It just takes readings from the soil moisture sensor and then maps these between the wet and dry limits. It then uses these mapped values to drive the two LEDs proportionally. So the red LED is on completely and green is o= completely when dry and visa versa for wet. Intermediate levels have scaled PWM outputs to provide the varying shades of yellow/orange. In my 9rst version of the sketch, I just updated the LEDs with each value read in from the sensor. I noticed that there was some variation in measurements and every so often there was a value which was signi9cantly higher or lower than the others, which caused a colour icker/glitch. So I changed the code a bit so that the past ten readings are averaged and this average drives the LED colour rather. This makes the changes a bit more gradual and allows for some outliers without signi9cantly a=ecting the colour. This

data can be seen in the Serial monitor output. You can download the sketch here along with a full description of the code.



Calibrating the Sensor

The last thing to do before you use the monitor is to calibrate the sensor. You'll need to do this so that your Arduino knows at what moisture level your plant has enough water and at what moisture level it needs water. This is an important step because each sensor's output is slightly di=erent based on the position and soil type and each plant has di=erent watering requirements. The best way to do this is to start with your plant, with the soil at a moisture level where you'd expect to water it. Place your plant onto the base, push the sensor into the soil (don't submerge the electronic components), and then plug the sensor into the header pins on the base. Connect your Arduino to your computer and Serial monitor so that you can see the raw values.



Using the Smart Indoor Plant Monitor

Since you've just watered your plant to calibrate it, the display should be green. It will slowly start going yellow and then red again over the next few days as the soil dries out. Because of the moving average array, there is a bit of a delay between when you water the plant and when the sensor goes green again. It should turn green after around 20-30 seconds. If you're going to use the base in a really sunny spot then you might want to add a second or third LED and another acrylic layer to the base to make it a bit larger and brighter.