

The back pages

Puzzles

The crossword, a snail-paced puzzle and a quick quiz **p52**

Feedback

Grave consequences and quantum queues: the week in weird **p53**

Liana Finck for New Scientist

A cartoonist's take on the world **p53**

Almost the last word

Galactic distance and menthol cold – readers respond **p54**

Me and my telescope

Vivian Li is building a mini bowel to fight cancer **p56**



How to be a maker 2 **Week 2**

Is your plant happy?

Hannah Joshua's spider plant Marvin isn't happy. His mood may improve when he can tell her if the temperature is acceptable



Hannah Joshua is a science writer and maker based in London. You can follow her on Twitter @hannahmakes

What you need

You should have everything

For next week

3 volt submersible water pump/aquarium pump
Plastic tubing to fit your pump
2n7000 transistor
Breadboard
Crocodile clip jumper wires

Next in the series

- 1 Moisture-sensing plant
- 2 Moisture and temperature-sensing plant
- 3 **Plant auto-waterer**
Your plants will never dry out again
- 4 Tweeting wildlife cam
- 5 Pest scarer
- 6 BBQ thermometer
- 7 Rain alarm
- 8 Mini weather station
- 9 Remote controlled pest-proof bird feeder part 1
- 10 Remote controlled pest-proof bird feeder part 2

LAST week, our plants learned to tell us they are thirsty. Now we are going to expand their repertoire.

Spider plants are happiest at between 20 and 30°C. That range suits me too, so it may seem that my spider plant Marvin is fine. But his microclimate may vary, or you might have a plant, an orchid for instance, that is more sensitive. Micro:bits have a temperature sensor built in, so we can use this to enable a plant to tell us in words when it is too hot or cold, as well as too dry.

In last week's program, you have an "if" block that reads the moisture sensor's input from pin po and compares it with the threshold moisture level. To start, replace the sad face with a "show string" from "Basic", and in this type: "I'm thirsty". This will show on the micro:bit screen when the water level drops.

Next, create a variable. We need to include this so that next week we can tell whether Marvin is happy or sad. This week, we are giving him only sad messages.

Go to the "Variables" menu, click "create new" and type "DRY" in the box. Then, grab "set DRY to", which will have appeared in the menu, and clip into this a "true" block from the "Logic" menu. Place the whole thing under "show string". Under "else", replace the happy face with another "set DRY to", but this time clip in "false".

Now we want to know if the plant's temperature goes below 20°C. Place another "if" block underneath the first, and click the plus at the bottom to add an extra

MOISTURE SENSOR



MESSAGES WILL SHOW UP ON MICRO:BIT SCREEN

Make online

Projects so far and a full list of kit required are at [newscientist.com/maker](https://www.newscientist.com/maker) Email: maker@newscientist.com

if/else section. Next, grab a "o<o" comparison from "Logic". Find a "temperature" block from "Input" and clip this in the left of your comparison, then type 20 on the right. Slot this comparison in place of "true" in the first part of your "if" block. Under this line, add a "show string" block like before, but with a message like "I'm too cold".

Next, another variable. This one enables us to keep track of when the temperature is either too hot or too cold. Call this one "WRONG TEMP" then grab a "set WRONG TEMP to" block and clip into it "true" from the Logic menu. Slot the whole thing under your "show string" block.

In the second part of your "if" block, write a comparison as above, but make it say "temperature > 30". Add a string saying "I'm too hot", and a block to "set WRONG TEMP" to "true" underneath.

Finally, in the "else" section, clip in "set WRONG TEMP to false". If you get stuck, you can check out my code online.

Download your code, and connect up the sensor, micro:bit and battery. You will notice that your plant does nothing but complain – we haven't yet given it a way to say it is satisfied. That comes next week, along with an automatic watering device. ■