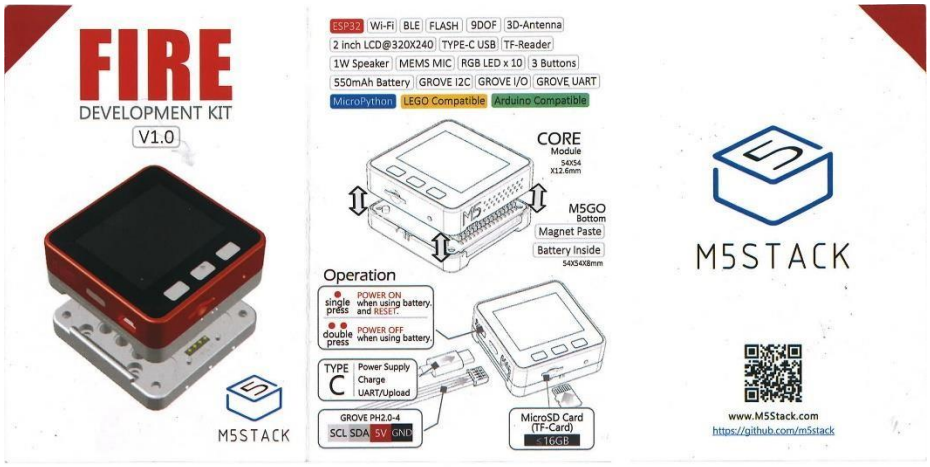
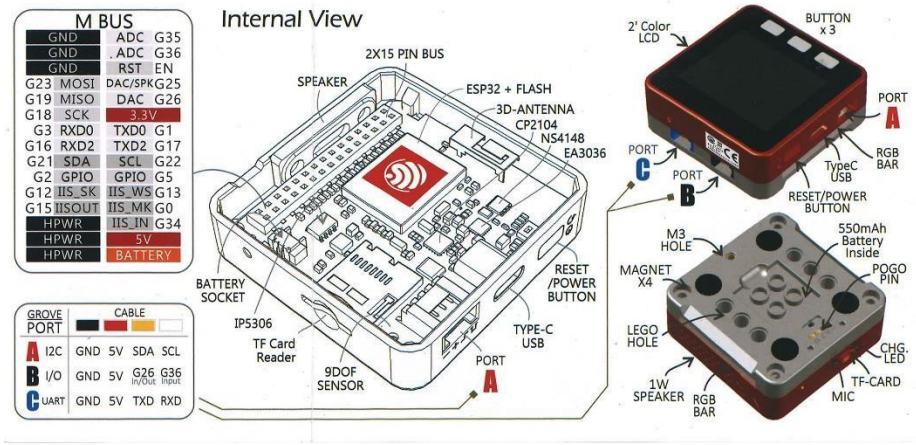
M5Stack Development Kit

Workshop Instructions





Working with M5Stack

The M5Stack can measure lots of things using sensors, and provide information to the operator. It is often set up to operate at remote location. It has a convenient screen which can be programmed with a simple Graphical User Interface, so it is easy for the operator to configure.

In this workshop we will focus on measuring Temperature, Humidity and Pressure.

You can program your M5Stack to measure these factors.

You will need to personalise your M5Stack screen, like an app, so you can read and display the temperature, humidity and pressure readings.

These instructions will show you how to do this.

The M5Stack can help you to create graphs and outputs that you (and farmers) can analyse. It can also be used to react to certain sensor values (e.g. too bright, too hot or too dry) and turn outputs on or off, such as a light, a fan, or a water pump.

Turning the M5Stack On and Off

To power on the M5Stack, connect the USB-C cable from your Laptop to the battery USB-C port – This will charge the battery and power on the M5 at the same time. You can **turn on the M5 by pressing once** on the red power button. You can **turn off the M5 by pressing twice rapidly on the red power button**.

NOTE:

You can also connect the USB-C cable from your laptop to the top USB-C port – This will automatically power the M5. With this connection, **you cannot turn off** the m5, so **it isn't recommended.**

Pre - Programming

You will program your device through an online portal https://flow.m5stack.com/ which you can connect to using the **API key** for your device. Each M5 comes with its own unique **API key**, this lets the online portal know which M5 device to send the code to.

Before you can program your M5, you need to put it into the right mode, so it will accept connection to your laptop.

When you first turn on your M5, it will briefly stay on the menu page. You need to press the right button shown in the below picture to enter the settings.

If you miss it, you can reboot your m5 by simply pressing the red power button once.

Use the steps below to enable internet mode.

Choose ‘Setup’.

Click the middle button to select ‘Internet Mode’.

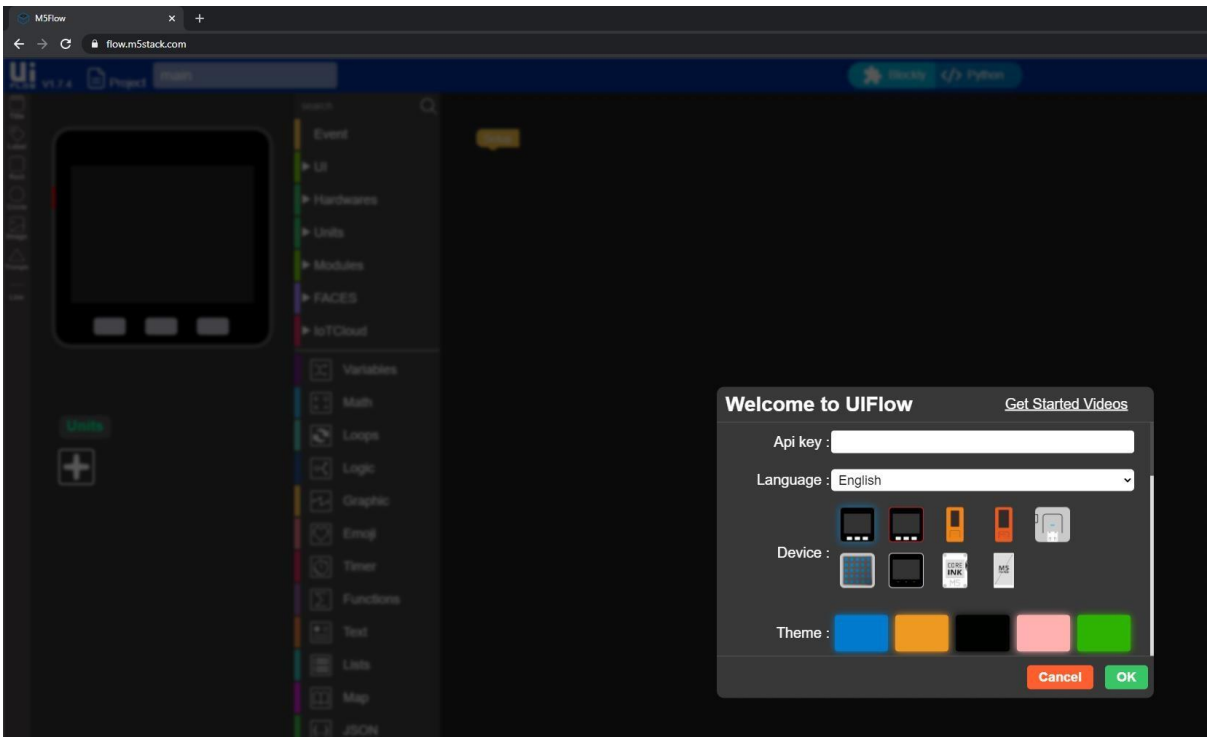
Click the middle button to select ‘Reboot’

Wait for the M5Stack to connect to WiFi.

If the two icons in the top left (the wireless and cloud icons) are green, the M5Stack has connected. If either of them are red, you will not be able to program your M5.

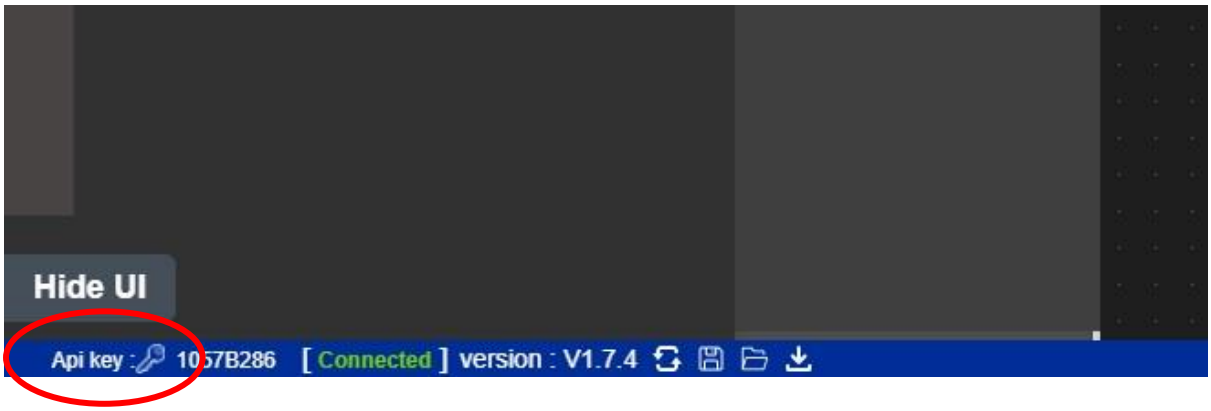
Your **API key** will be displayed clearly on the screen. For example, the **API key** on the picture is **1057B286**

Head over to google chrome, and open this link https://flow.m5stack.com/



The M5 online portal is called M5flow. When you first enter, it will ask you for an API key, language of preference and device type.

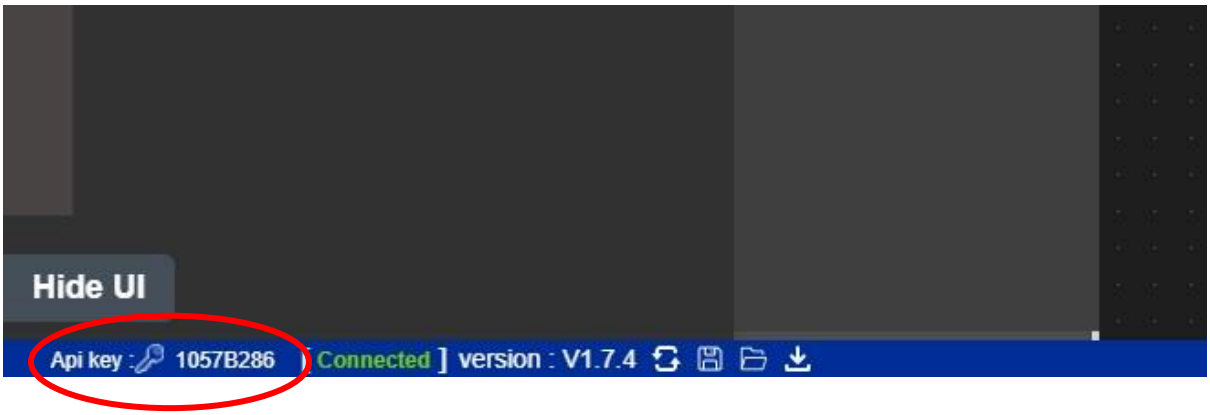
NOTE: If this Welcome to UIFlow box doesn't show up when you start the program, click on API key in the bottom left of the screen and the Welcome box will show up.



Enter the information accordingly,

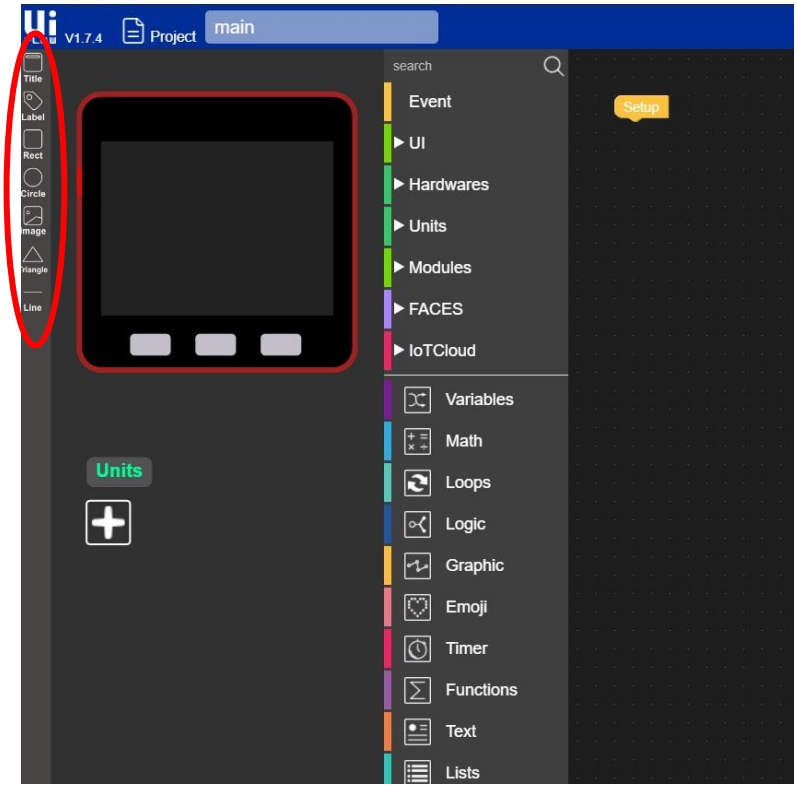
Notice that, the red device (M5Fire) is selected, this must be chosen for the software to work correctly.

Click OK to proceed, the portal will display “Connected” message on successful connection. You can also check the bottom left toolbar to see whether your M5 is connected or not.

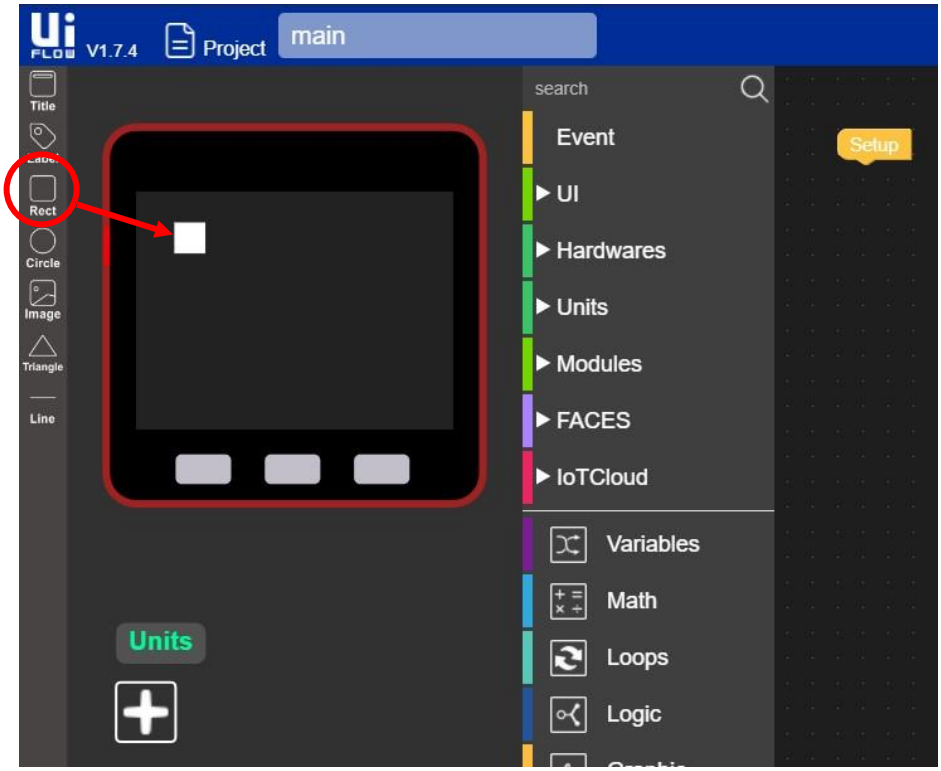


<u>Practice Activity</u>: Programming the M5 – The Graphic Interface

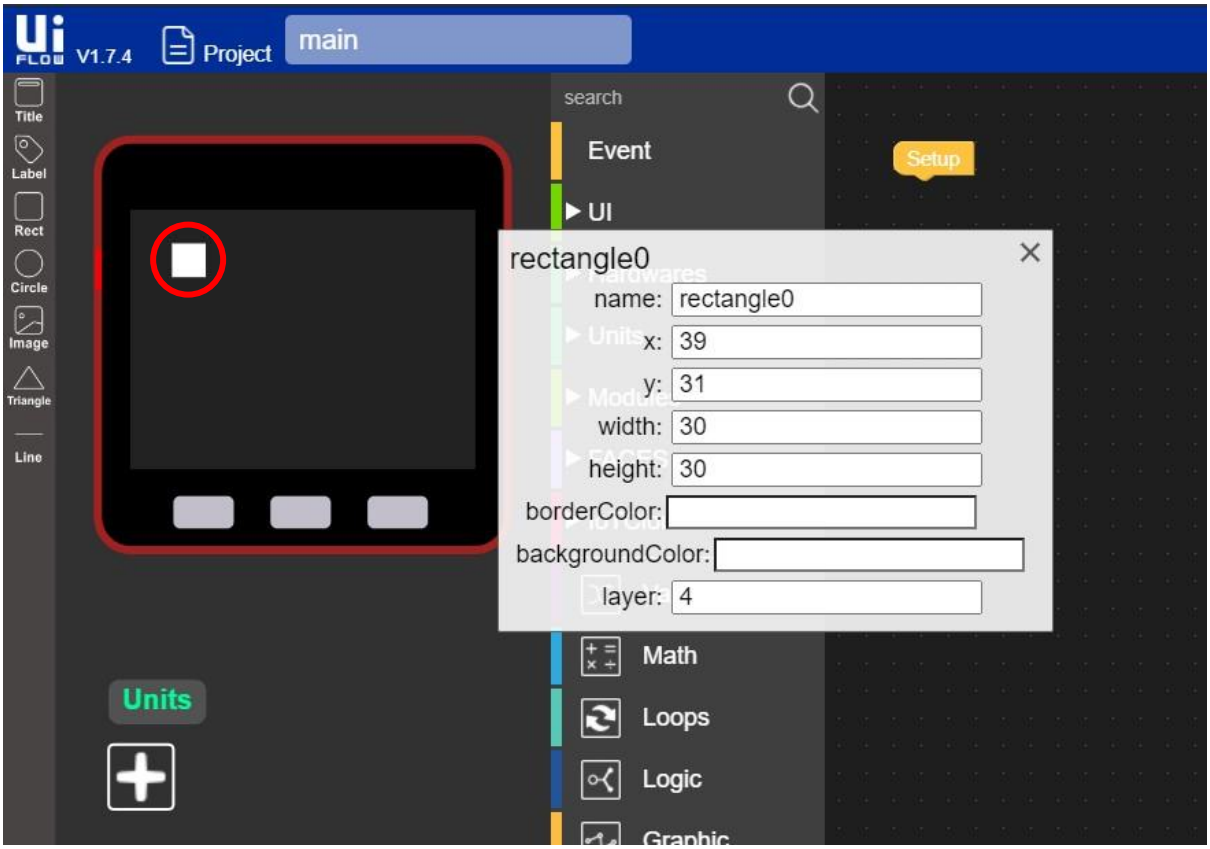
The quickest program you can do is to draw something. The far left toolbar allows you drag and drop graphics such as circles, rectangles, triangles, etc.



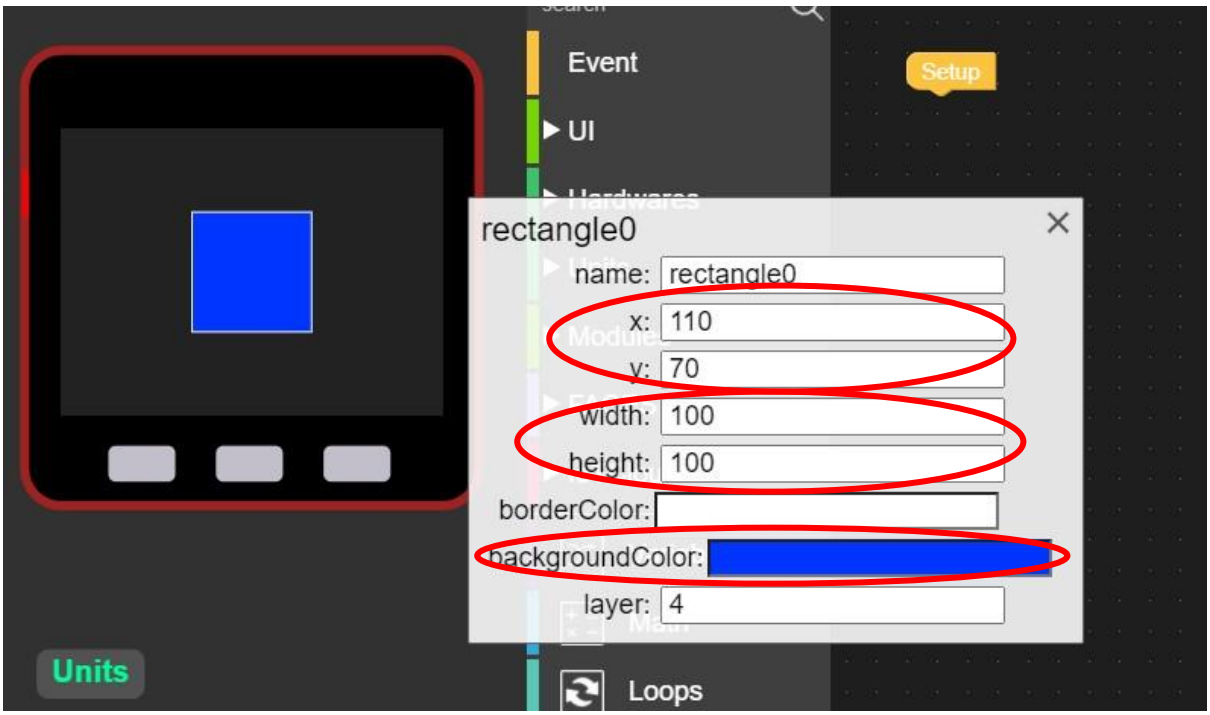
In this tutorial, we will drag a rectangle onto the screen simulator.



If you click on the rectangle, you will have options to change the size, rename the rectangle, change the position and change the colours.



For this tutorial, we will make the width 100 and height 100 with the blue background colour. We also move the rectangle to the centre of the screen.



To run this simple program, click on the play button on the top right-hand toolbar.

The program will take 1-2 seconds to upload the code to your M5 device. The blue rectangle is now displayed on the M5 screen.

ACTIVITY:

Try adding a number of shapes and / or text to the screen to create a simple design or message. You have 5 minutes to complete this.

Programming the M5 – Reading the data.

M5 comes with many different sensors that you can use to build your own mini Internet of Things projects.

Sensors

UlTRASONIC

MIC

AMeter

VMeter

WATERING

EARTH

ENV

LIGHT

PIR

NCIR

THERMAL

COLOR

TOF

HEART

ADC

MUSIC

FINGER

WEIGHT

ACCEL

OP.90

OP.180

ENV II

HALL.EFFCT

TVOC/eCO2

PDM

We will be using a very simple but useful sensor in this tutorial: The ENV sensor.

The ENV sensor allows us to capture

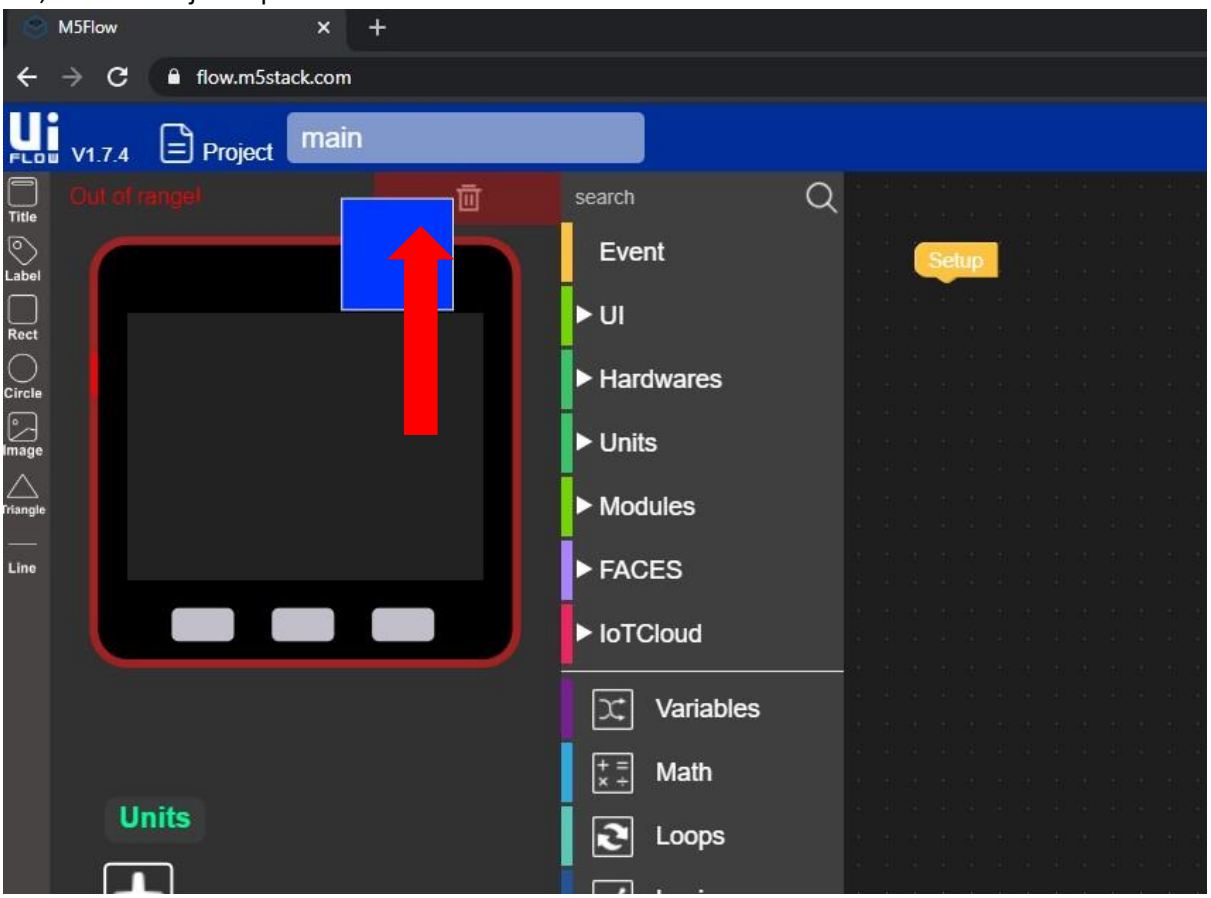
1. Temperature (In Celsius)
2. Humidity (In percentage)
3. Air pressure (HPA)

The ENV unit is a red port sensor, which means it only connect to the red port of the M5. The ports on the M5stack are colour coded.

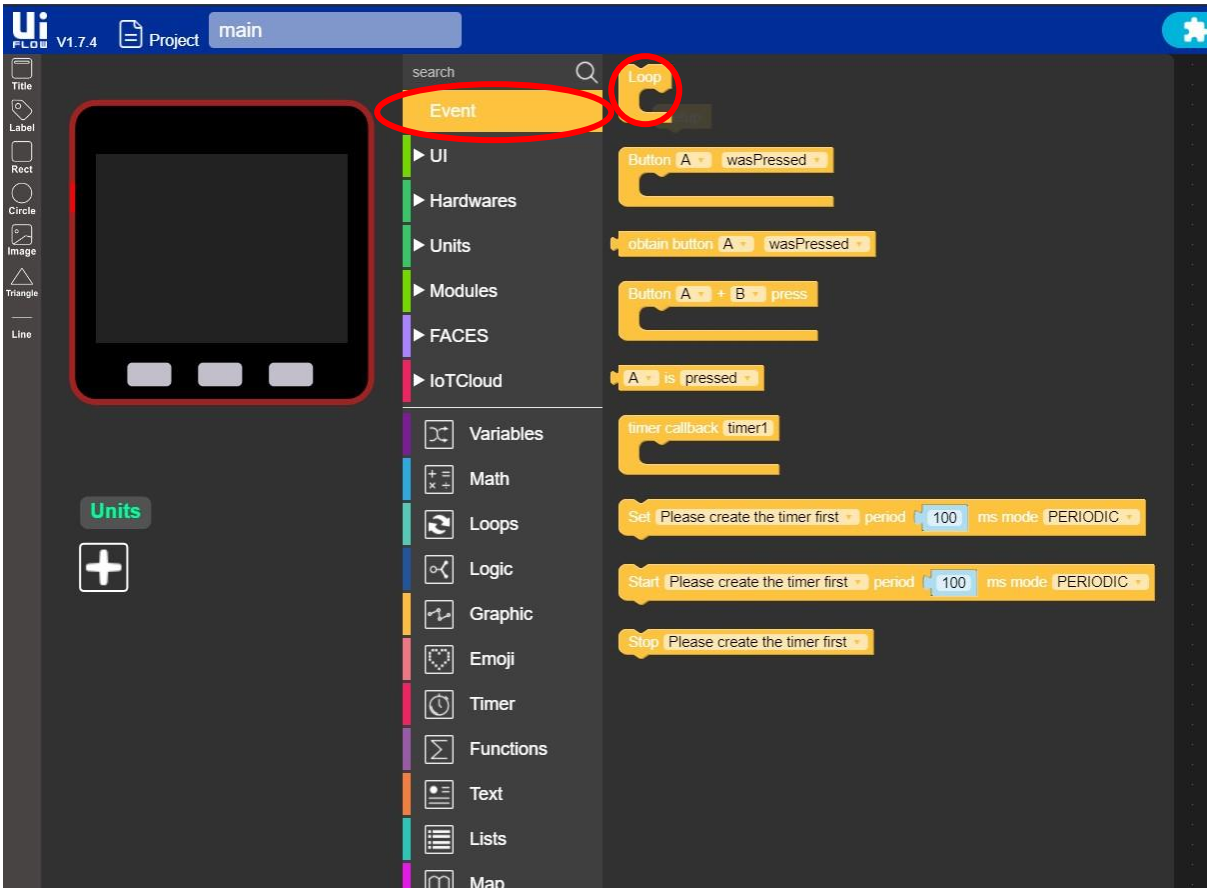
Connect the ENV unit to the M5 red port using the provided cable.

NOTE: This cable is known as a grove cable, it is pretty standard when working with sensors

In the programming portal, remove the blue rectangle (and any other designs you have made) by moving it onto the bin, as this was just a practice.



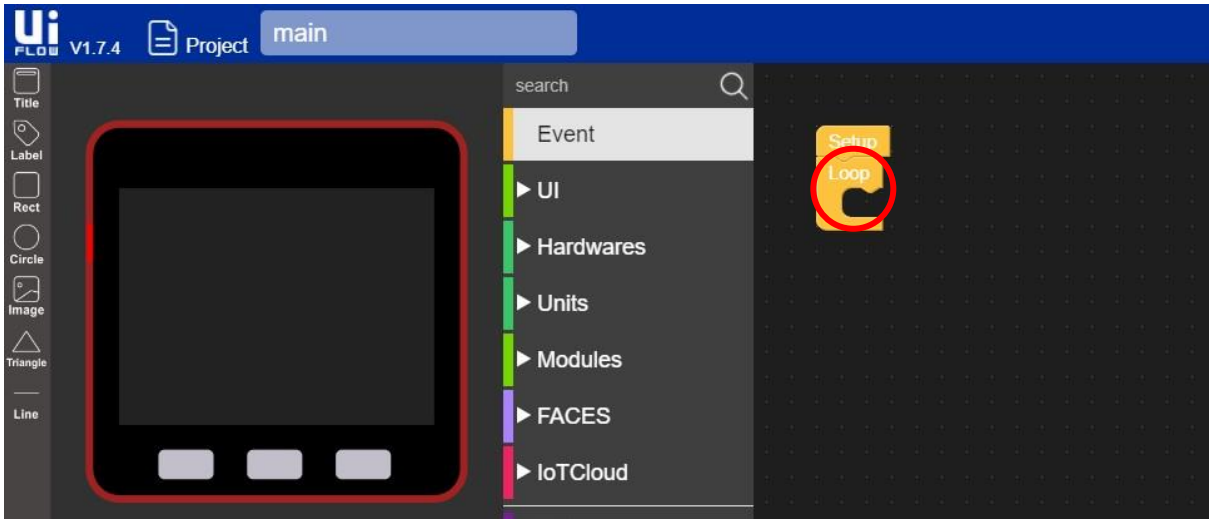
On the block programming menu, to the right of the simulator, click Event, this will open up a tray containing a number of different code blocks you can choose between.



We will be using a Loop block as our first block. Most of the programs that you will write in this Smart Farming challenge are recommended to use a Loop block.

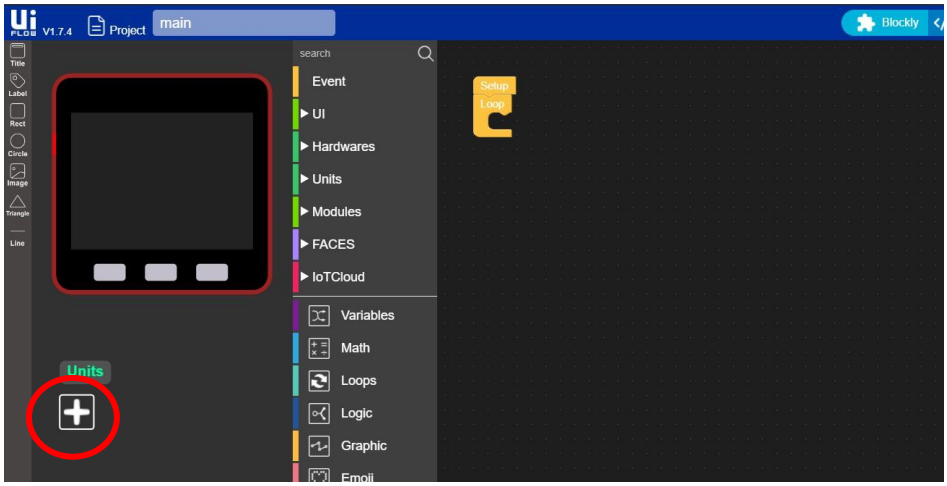
NOTE: A loop is a programming block that causes the sequence of blocks that are placed inside it to execute repeatedly.

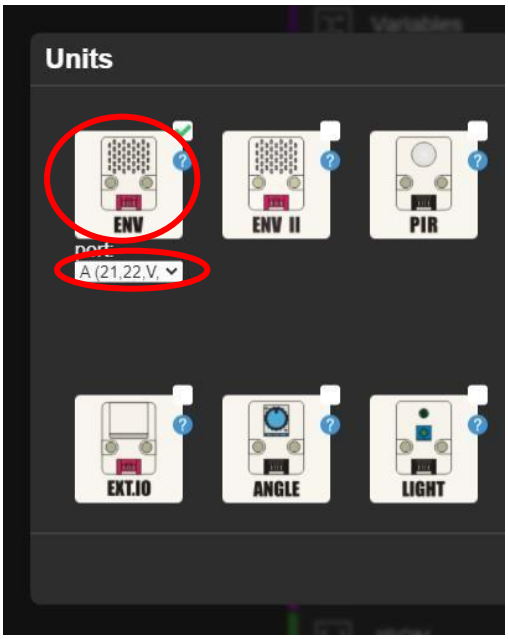
Drag a loop block and snap it with the Setup block.



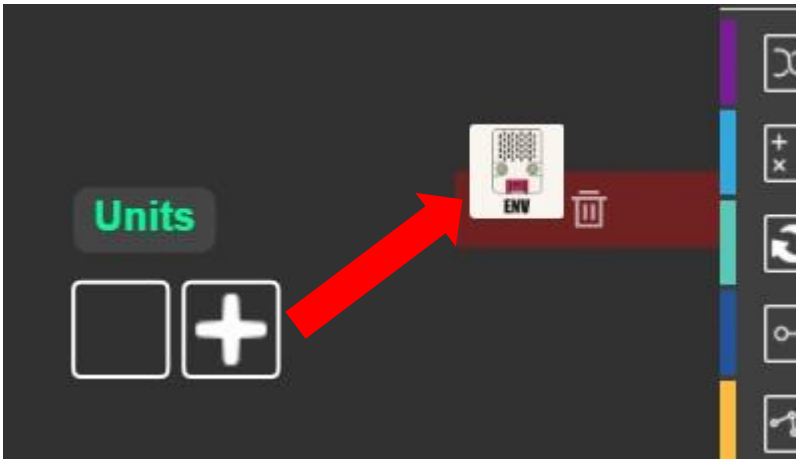
To read the ENV sensor, you will need to tell the M5 that you have attached the ENV sensor. To do this, click on the big + icon under the simulated device (and under “Units”)..

This will show a list of units that you can attach to this M5. We want to select ENV unit and make sure that you select the option “Port A (21,22,V,G)”, Don’t worry about the details of this, but Port A is the name of the red port.

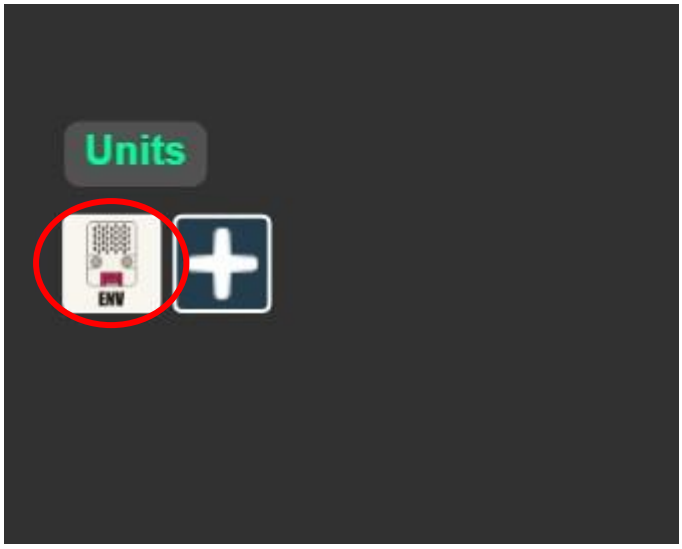




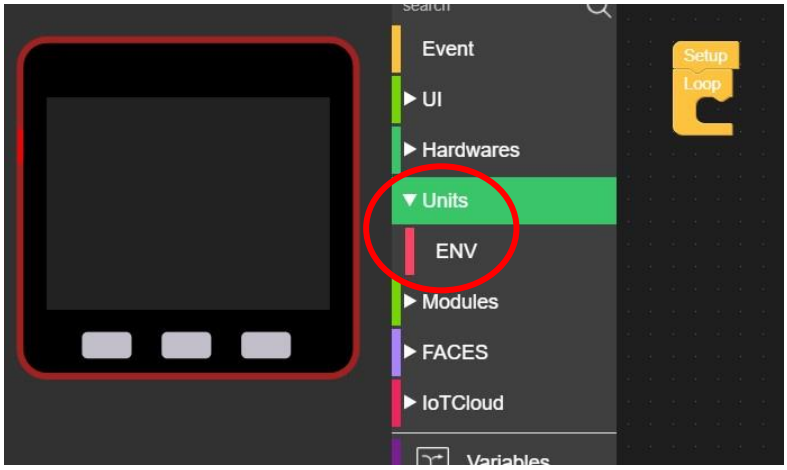
Click OK to add the unit, if you make a mistake, you can click and drag the unit to the bin to delete it.



Once added, your ENV sensor will be displayed under Units.

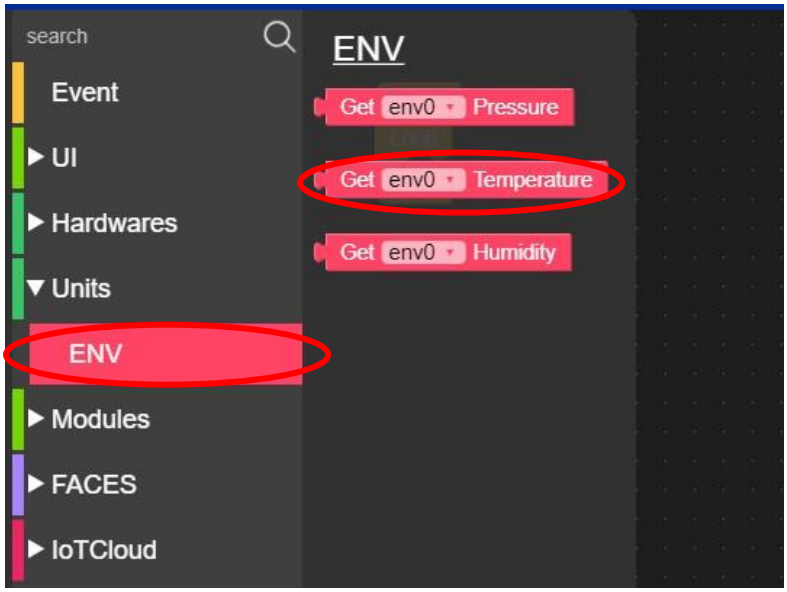


To access the data given by the ENV sensor, click on Units on the block programming menu.



ENV is now listed under Units.

Click on ENV to reveal more options.

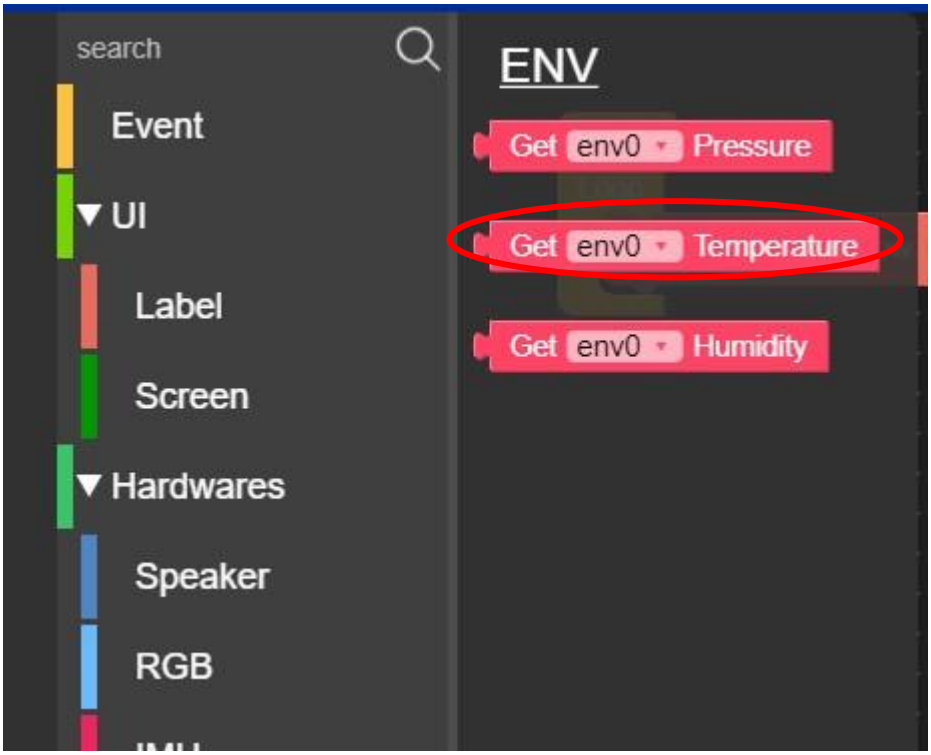


You can see the 3 data types captured by ENV sensor. ***We will read and display the temperature first.***

To display a text, from the graphic toolbar on the top left, drag a Label graphic and place it on the screen, change the font to DejavuSans 24 for better visibility.

Under the block programming menu, click on UI and then click on Label. Drag the first Label block and attach it in the middle of the Loop block. When dragging, it will look a greyish colour, it will change back to its bright pink colour when it is attached to the loop.

Under the block programming menu, click on Units and then click on ENV. Drag the Get Temperature block and snap it inside the Label block, replacing “Hello M5”.



We only need to check the temperature every 3 seconds.
To achieve this, we can add a Wait block, which just waits the program for the specified (3) number of seconds, and then continues.

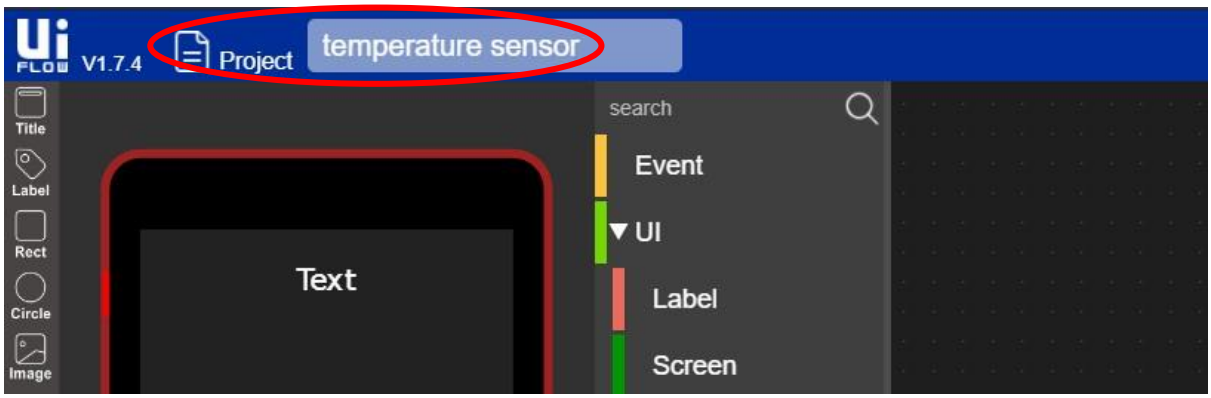
Next, add a timer (scroll down to see the Timer):

Click on Timer and drag the Wait block and snap it under the Label block. Make the wait time 3 seconds.

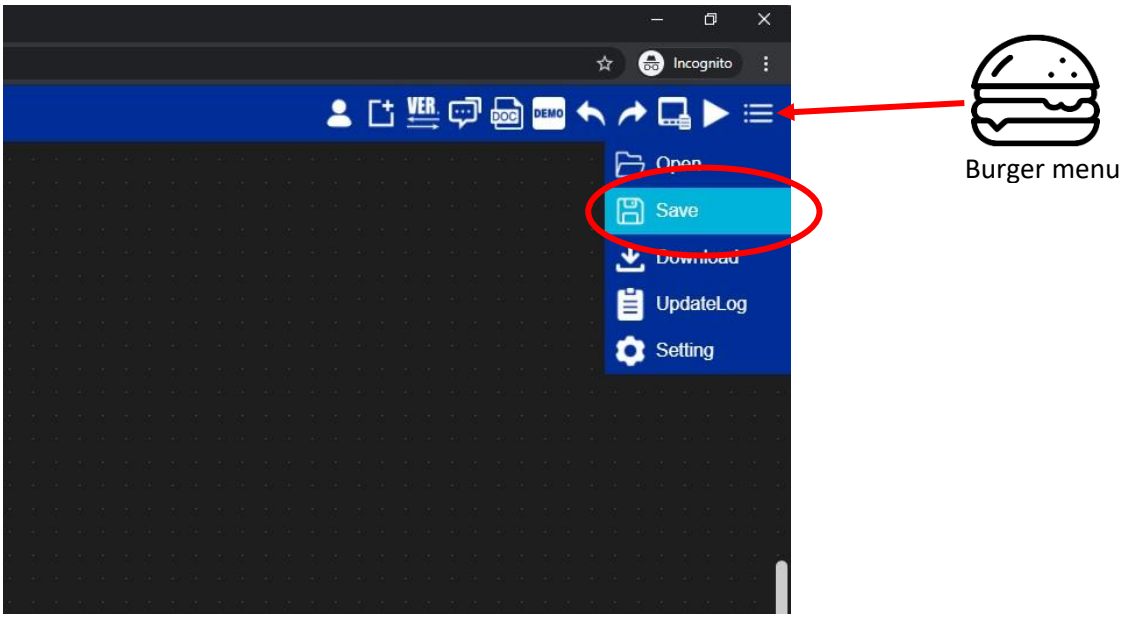
Now click the play button to execute your program. This may takes 1-2 seconds.

Saving your code

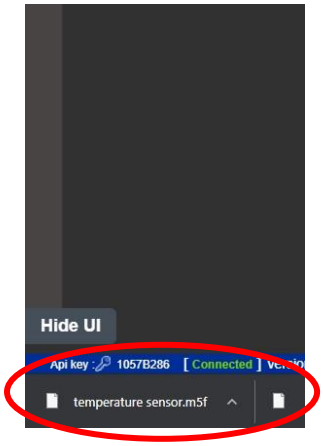
You can rename your project using the text box on top left hand corner.



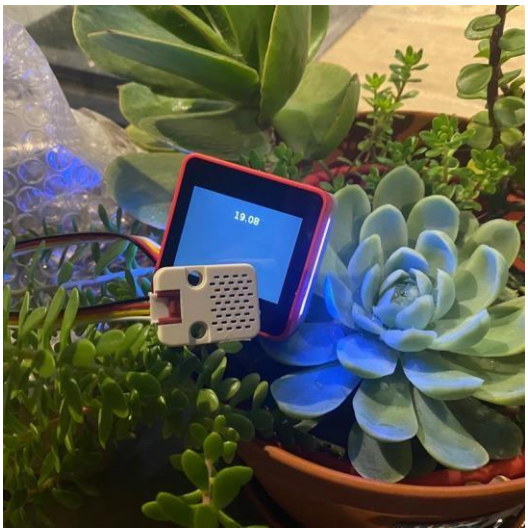
In the top right hand corner of the programming portal, you can click on the burger menu to bring down the save option.



Click Save, this will download the program you have just made.



The program you have downloaded is located in your computer Downloads folder.



(It's cold outside!!, Is it too cold for succulents?)

Further Steps

Sometimes, when you read the sensor you want the device to output something. This output can be:

1. Warning lights
2. Sound
3. Messages
4. Graphs

In this tutorial, we will show you how to change the LED colour based on the temperature.

Before writing such program, we will need to decide the rules for our device:

For example,

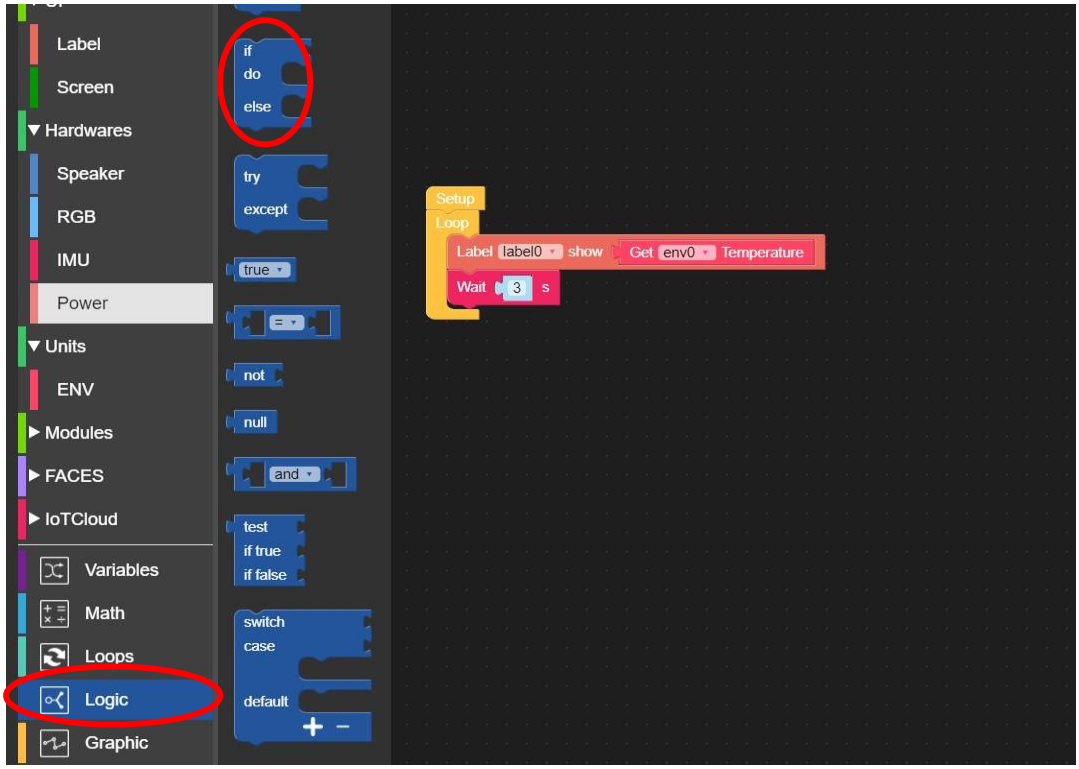
Temperature	Output
Below 20 C	Blue LED
20 C or above	Red LED

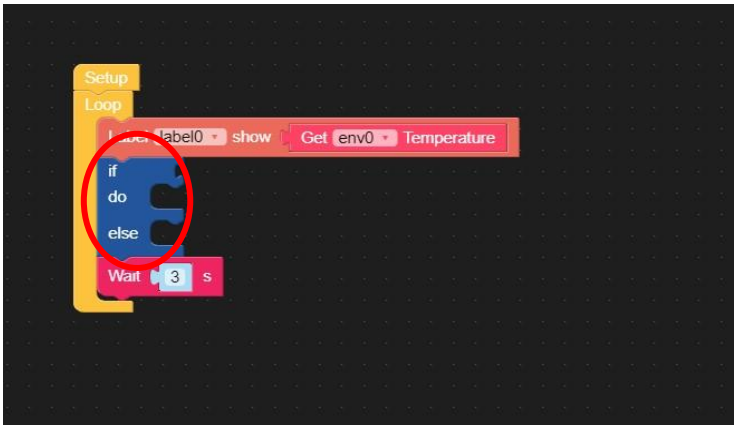
In many programming languages (including M5 UI-Flow block coding), we can create this functionality using an **If-Else statement**.

Using the code that you made in the previous tutorial:

We will add conditions to get the M5 to flash red if the temperature is equal or greater than 20 C, and flash blue if the temperature is less than 20 C.

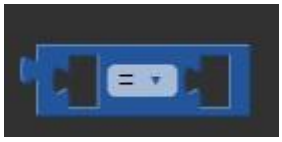
Click Logic in the block programming menu and drag If-do-else block and paste it before the Wait block.

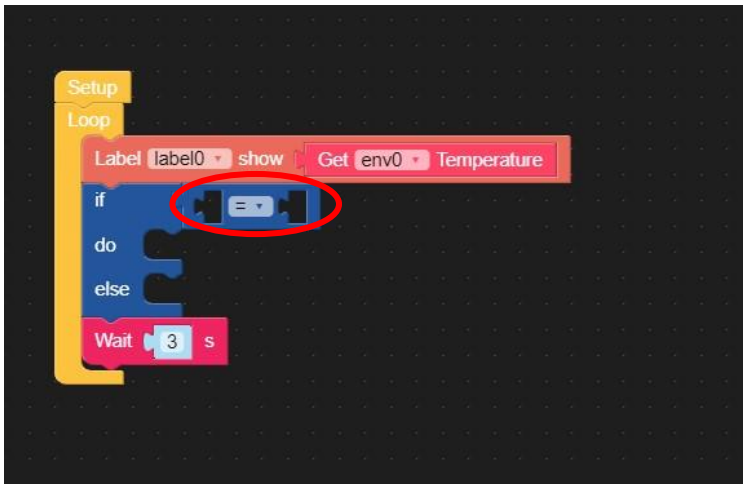




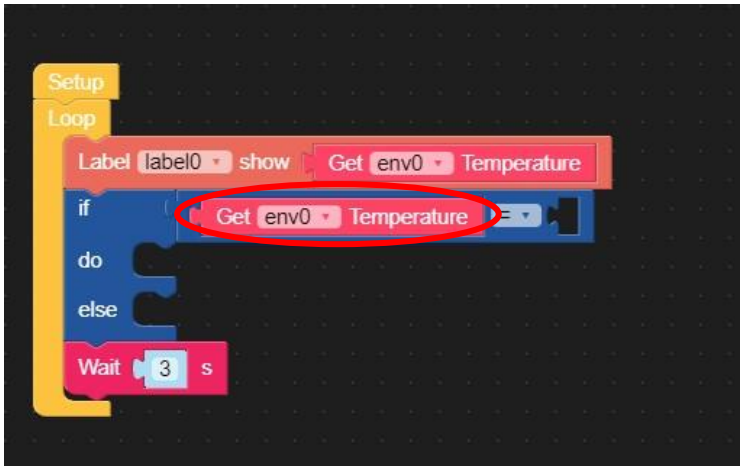
Let us create our first condition which is **if the temperature is below 20 C**.

Under Logic, drag the Comparison block and snap it after the if.

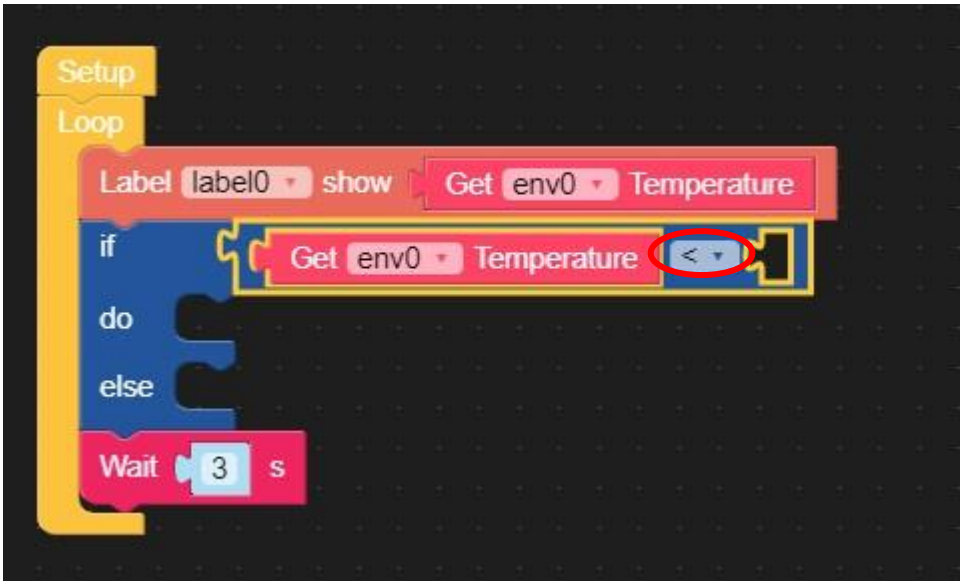




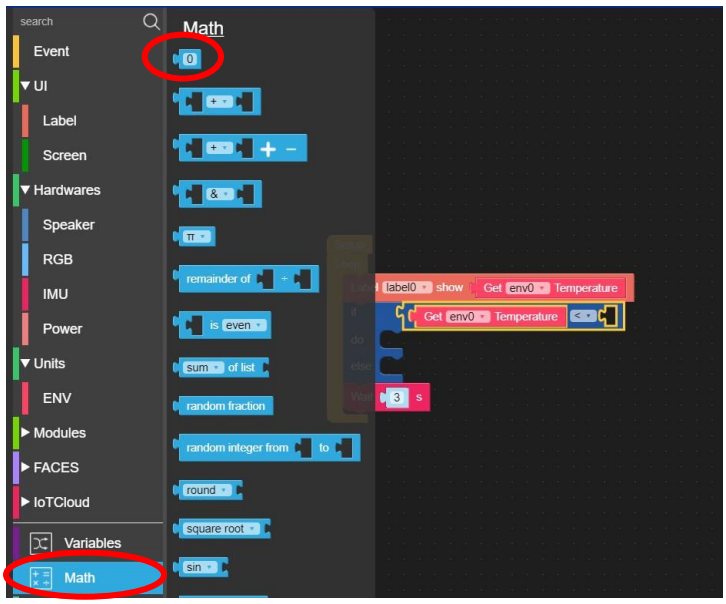
Under Unit, drag the Get Temperature block and put it on the first slot of the Comparison block.

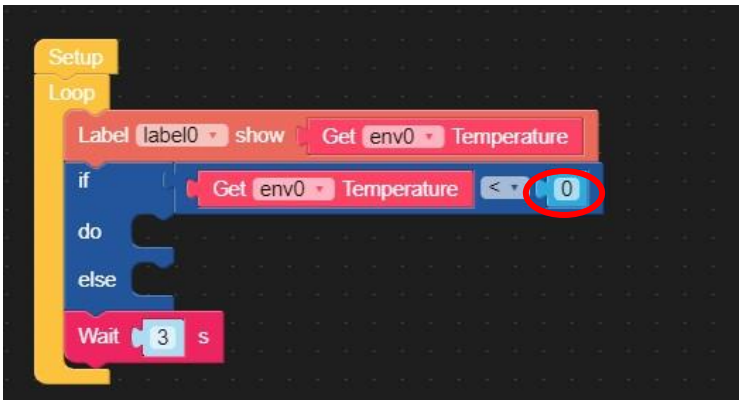


Change the = (equal) sign to < (less than)

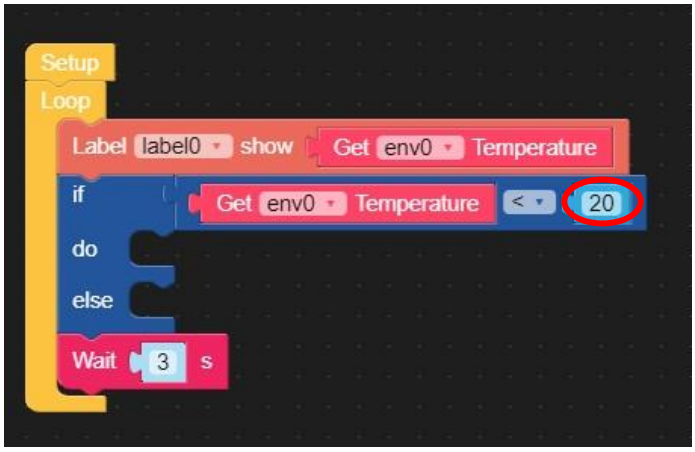


In the block programming menu, select Math, drag the number block and snap in the last slot in the comparison block.



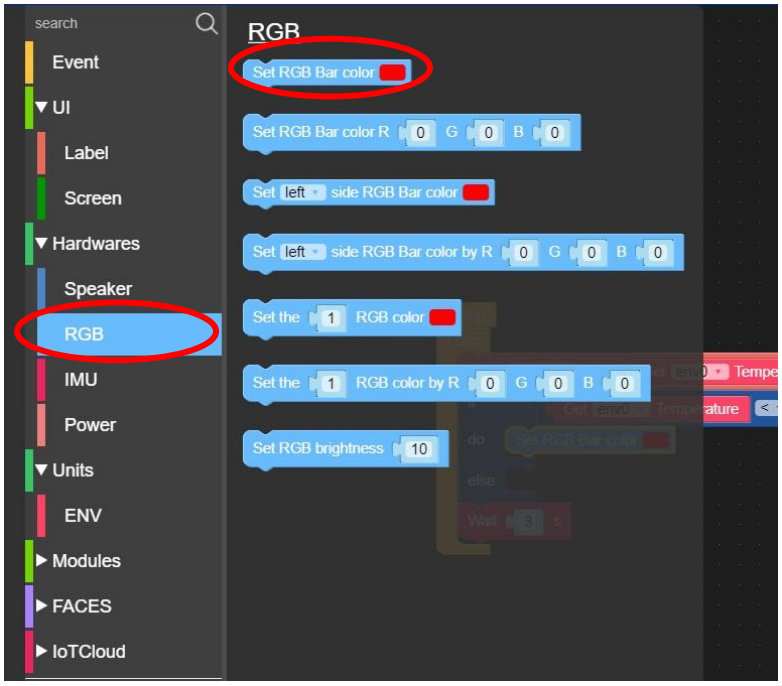


Change the number to 20.



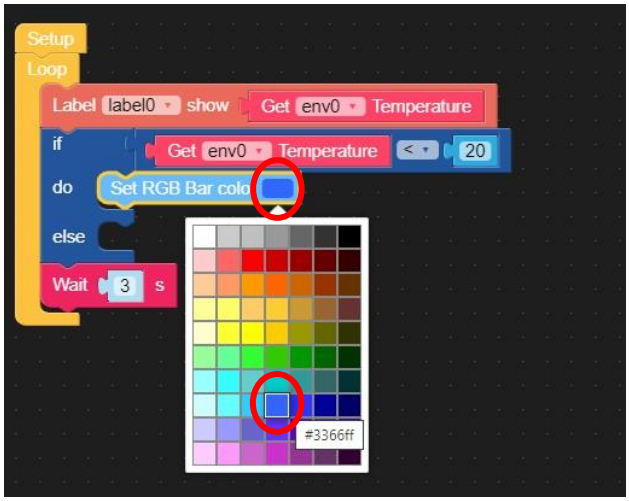
We now need to tell the M5Stack that if the temperature is less than 20, we flash a blue light on the M5.

Under the block programming menu, select Hardware and select RGB.



Drag the Set RGB Bar colour and snap it on the Do part of the If-Do-Else block..

Click on the colour to change the colour.



Drag another Set RGB Bar colour onto the else, then change the colour to red.

Click the play button to upload your code to the M5, this might take 1-2 seconds.

The temperature is 20.16 which is above 20, therefore the side RGB light will flash red.