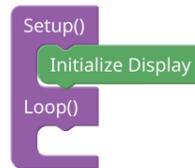


### Step 1:

1. For programming: [blockly.sensebox.de](http://blockly.sensebox.de)
2. In Setup, some components need to be activated once at the beginning of the program.

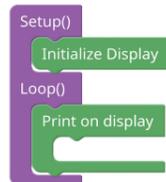


3. For the display to work, it must be initialized in the setup. Connect the "Initialize display" block to the purple "Setup" block.

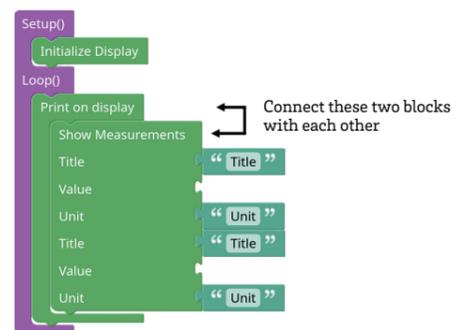


### Step 2:

1. Something should be displayed on the screen! Connect the "Print on display" block to the "Loop" block.



2. What should be displayed? Measured values!

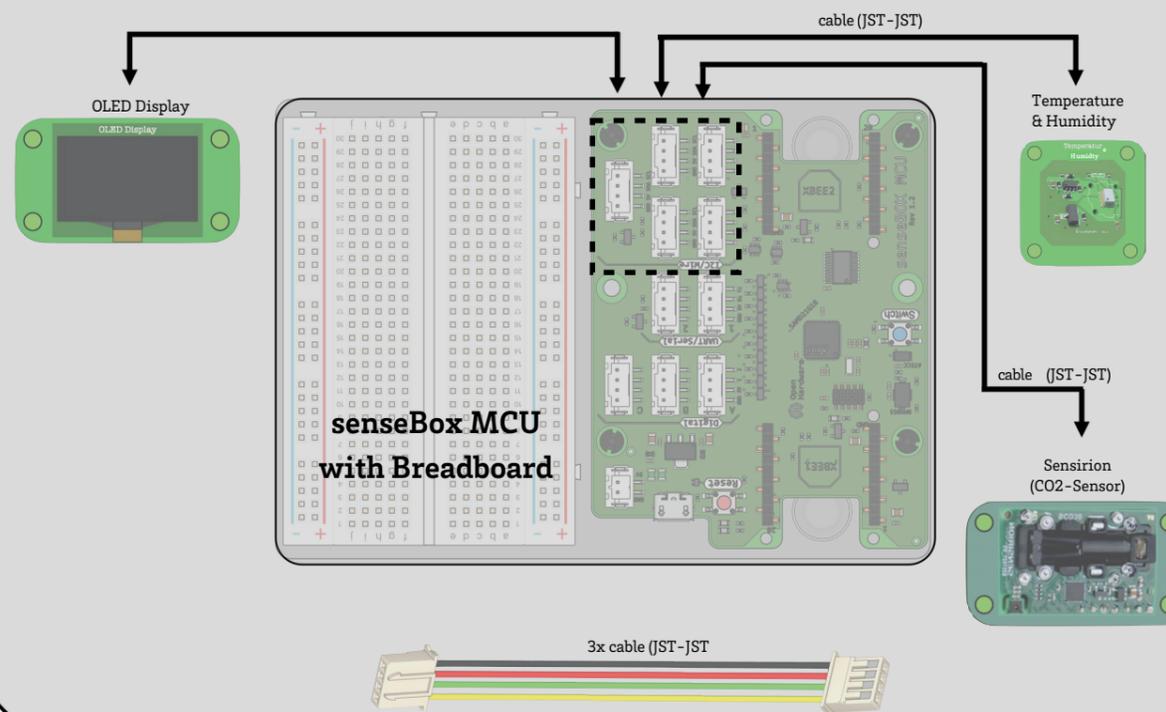


### Task 1

#### Measure Air Quality with the senseBox.

- a) Connect the OLED display and the sensors to the microcontroller.
- b) Create a program so that the measured values of the temperature and CO<sub>2</sub> sensors are shown on the display.

#### Hardware Setup:



### Time to test!

1. Document the CO<sub>2</sub> concentration over a period of 10 minutes.

Time	Temperature	CO <sub>2</sub> concentration

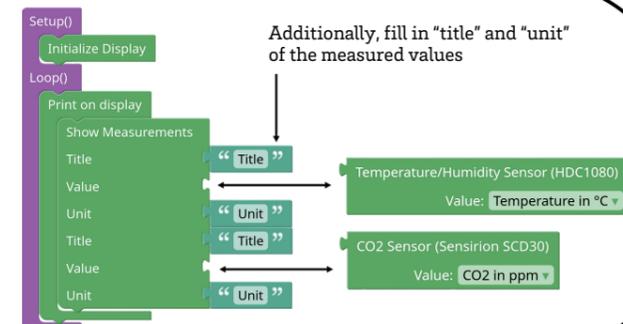
2. Compare the CO<sub>2</sub> concentration between the classroom and the outside air. To do this, place the sensor near the window.

3. Expand your hardware setup and program code with additional measurements, such as humidity.

Time		

### Step 3:

The sensors need to send their measurements. Select the correct measured values and connect them to the main block. After that, test the program code to check if everything works correctly.



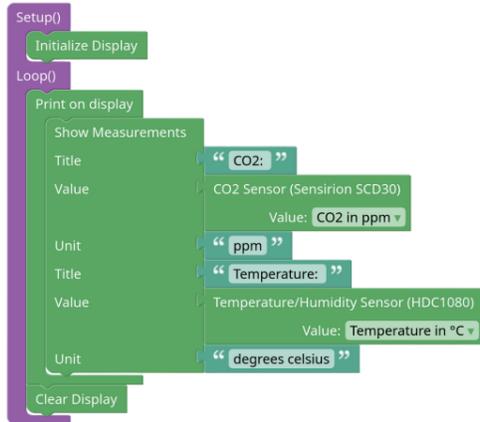
### Info: CO<sub>2</sub> sensor

The CO<sub>2</sub> sensor measures concentrations between 400 and 10,000 ppm. CO<sub>2</sub> levels in the air are expressed in parts per million (ppm), which indicates how many parts of CO<sub>2</sub> are present per one million parts of air. The accuracy is ± 30 ppm (+ 3%).

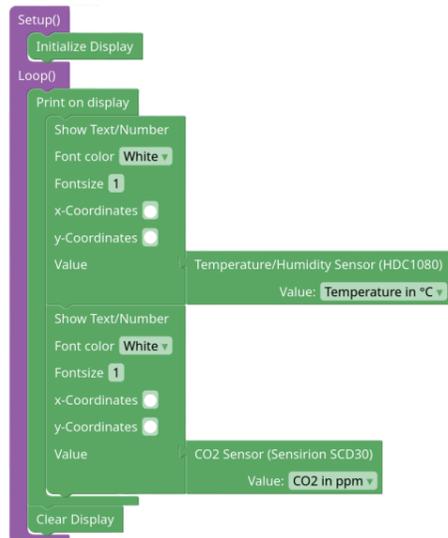
## Tip:

There are two options for the program code.

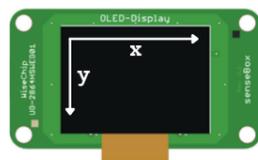
### Option 1:



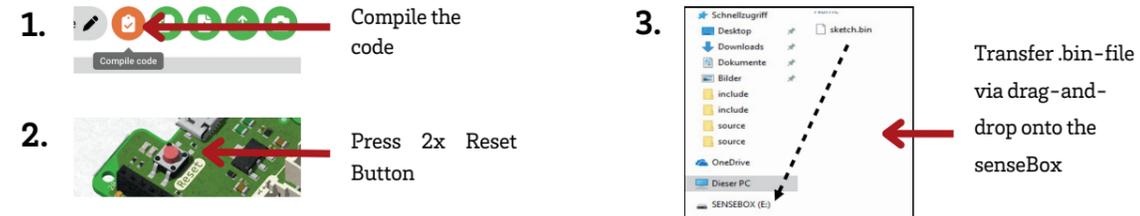
### Option 2:



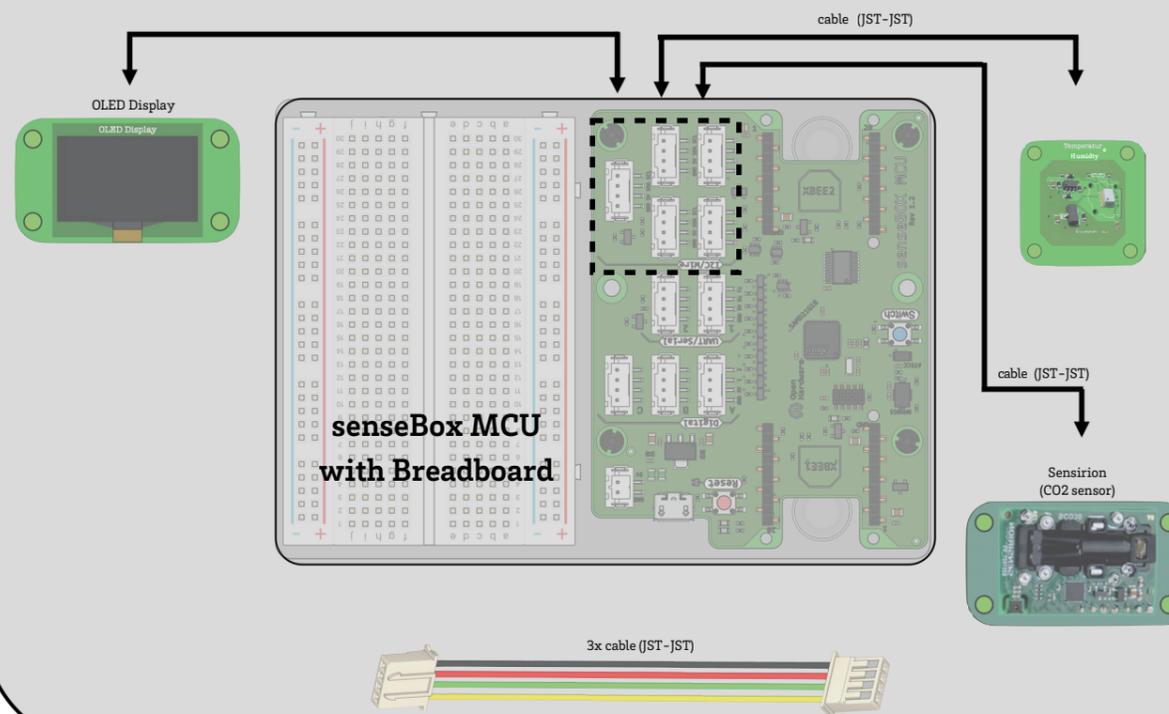
Please note: The x and y coordinates must differ for each measured value, otherwise the two measured values will overlap. The display has a resolution of 128x64 pixels. This means 128 pixels in the horizontal direction (x-axis, width) and 64 pixels in the vertical direction (y-axis, height).



## Transfer program code



## Hardware Setup:



## Troubleshooting:

- Check whether you have reset the microcontroller (press 2x Reset Button).
- Are your cables plugged in exactly as shown in the illustration?
- Are your command blocks really connected like small "puzzle pieces"?
- Do the x and y coordinates differ (see tip 1)?
- Have you deleted all blocks that are not connected to your main block?

Still having problems? Talk to a teacher!

## For experts:

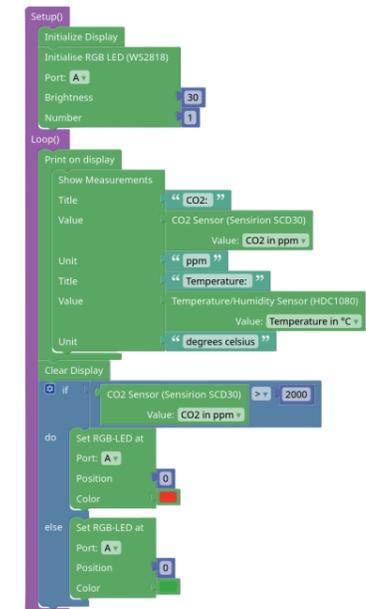
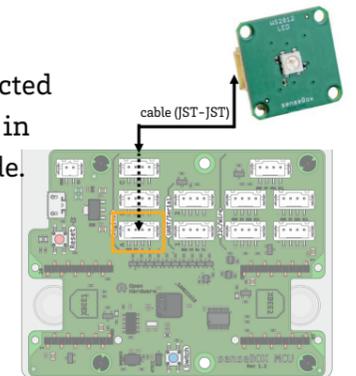
Build and program a CO2 traffic light.

Set the RGB LED so that it lights up red when the CO2 concentration exceeds 2000 ppm (see instructions: RGB LED).

## Connection and programming: RGB LED

Connect the RGB LED to one of the digital/analog ports using a JST-JST cable. Be sure to use the "Input" connection on the RGB LED.

Also take the selected port into account in your program code.



**Note:**  
You can find the numbers in the "Math" category.  
You can find the colors in the "LED" category.