The weather station project (Level 3)

Worksheet for students

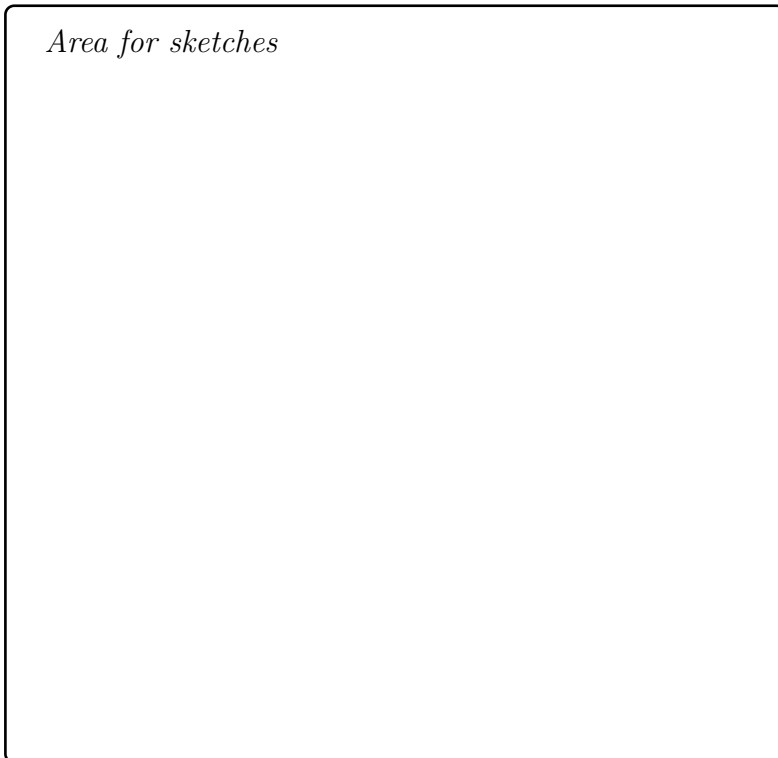Team:....................................

How does liquid-crystal display (LCD) work? Search for information online and write your answers below.
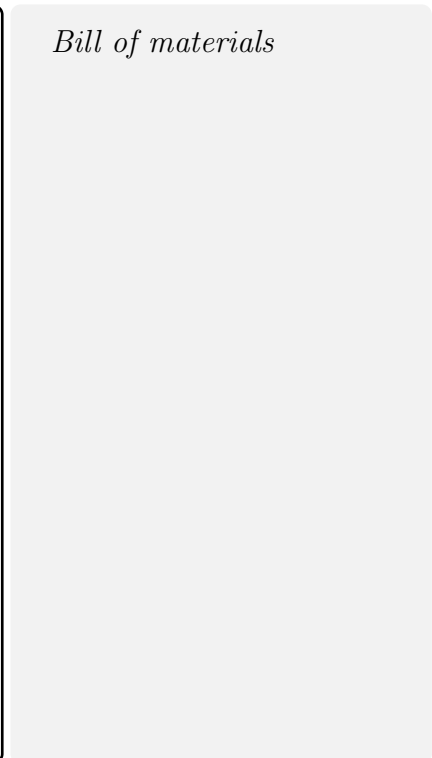
Review several scenarios, how weather station can be build, and choose one to demonstrate. Sketch your weather station and list the crafting material that you may need.

Area for sketches

Bill of materials

During this project, sensors and other electronic components with Grove standard will be used. This standard allows to connect elements easily. This is really important when elements are sensitive to damage.

The circuit from level 2 will be extended by adding the LCD screen as is shown in Fig. 1.
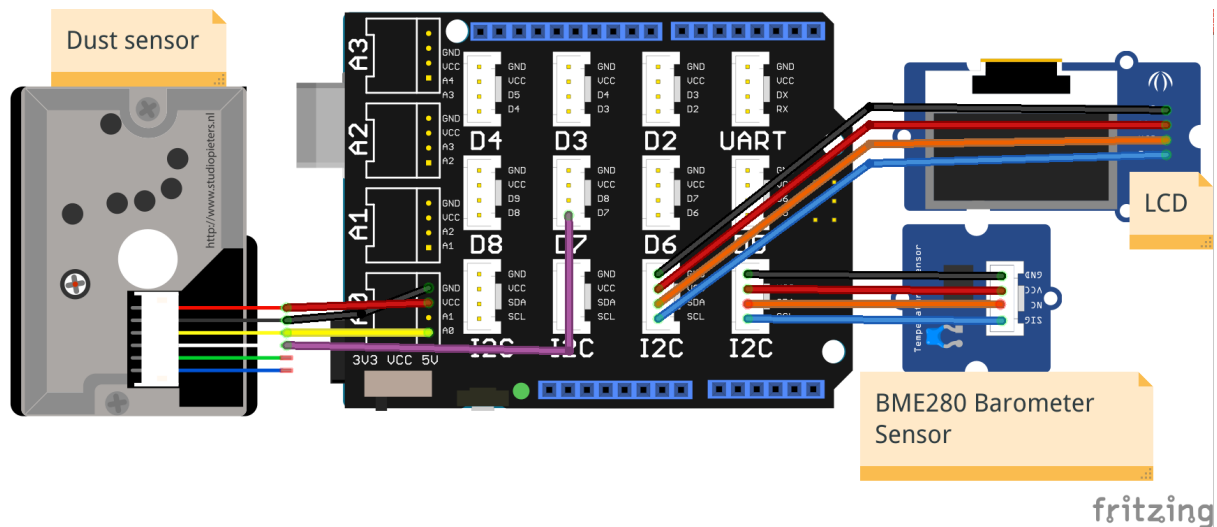

Figure 1: The LCD RGB screen connected to shield.

During this level, the code will be improved by adding commands to display temperature, pressure, humidity and dust concentration on the LCD RGB screen.

The LCD RGB screen needs dedicated libraries, which can be downloaded from page: https://github.com/Seeed-Studio/Grove_LCD_RGB_Backlight . As previously, the library should be downloaded and saved in *libraries* folder inside Arduino IDE folder. Then, the library should be unzipped and Arduino IDE should be restarted. If you do not have library installed, follow above instructions.

Modify your code from level 2 to display measurements on LCD screen:

1. Add special library dedicated to the LCD RGB screen,

2. Create three variables:

   - to store contribution of red color in LCD background color,
   - to store contribution of green color in LCD background color,
   - to store contribution of blue color in LCD background color,

   You can choose initial color. Remember that contribution of chosen color is in the range of (0;255), where 255 means 100%.

3. Create object of *rgb_lcd* class,

4. Define size of the LCD screen and the background color inside *setup* function,

5. Set cursor on chosen position in the LCD screen and display measurements in the *loop* function.

Useful functions:

- #include name_of_library - this line adds library to the script,

- int name_of_variable - creation of integer value,

- Class_name object_name (e.g. rgb_lcd lcd) - create object of class, in which special functions can be called,

- begin(number of rows, number of columns) - function of *rgb_lcd* class, which initialize LCD screen of chosen size of display. Popular size of LCD screen is 16x2, where 16 is number of rows and 2 is number of columns,

- setRGB(red, green, blue) -function of *rgb_lcd* class, which sets the background color. The arguments of function are contributions of colors: red, green and blue in range of (0,255),

- setCursor(row number, column number) - function of *rgb_lcd* class, which set cursor on chosen position. The row and column are numerated from 0,

- print(string) - function of *rgb_lcd* class, which allows to display strings on the LCD screen. The string is a type of variable, which stores text, e.g. "T=20.0C".

Time to revise your model!
Start improving the design of the weather station using the available crafting materials. Integrate the electrical circuit and the script to add the needed level of interactivity.

Electrical components

The following table is an index containing all the components that need to be implemented for accomplishing the present activity.

	Grove Base Shield (for Arduino UNO) or Grove Mega Shield (for Arduino Mega 2560)
	Grove Barometer Sensor (BME280)
	Optical dust sensor (GP2Y1010AU0F)
	Grove - LCD with RGB Backlight

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Declaration
This report has been prepared in the context of the ROBOSCIENTISTS project. Where other published and unpublished source materials have been used, these have been acknowledged.