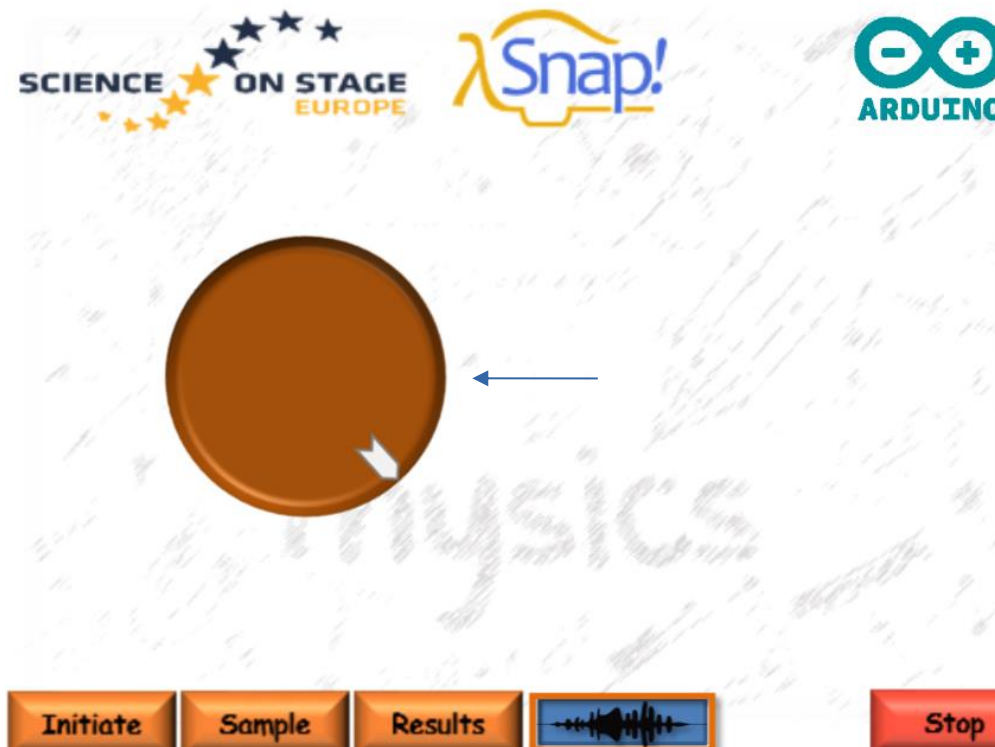


Students work assignment

The basic template .xml file



Please note that the above brown disc, indicated by the little blue arrow, changes size according to the entered value of radius and rotates during the experiment.

Initiate : Used for the input of the various parameters needed to run the program :

- Arduino connection port
- Digital pin to which the infrared sensor has been connected
- Radius of the disc
- Time in seconds for data acquisition

Sample : Used for the activation of the sensors and data acquisition from the sensor.

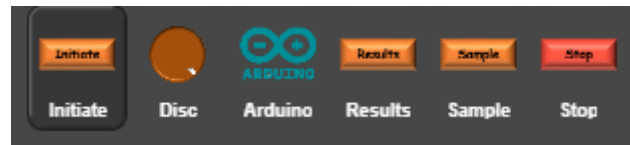
Result : Calculations and display of the results.

Sound : Processing of the sound spectrum data.

Stop : Termination of the code execution at any time if needed.

Assignments

Assignment 1



On the **Initiate button sprite script**, implement the two blocks, Input Arduino and Input Parameters. You must read the user input and validate the data for the program to run.

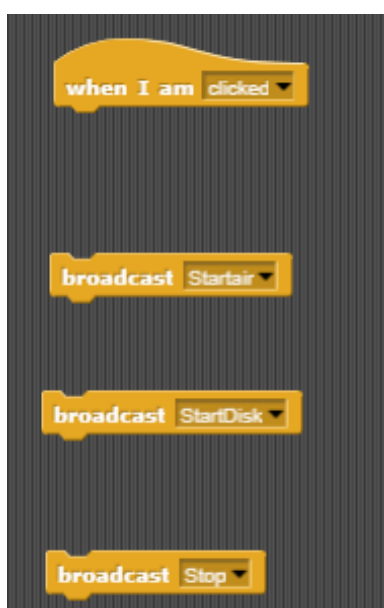
Input Arduino:

- Name of the Arduino's connection port (eg. COM3)
- Digital pin for infrared sensor, accepted values 1..5

Input Program Parameters:

- Radius of Disc, accepted values 2..25cm
- Data acquisition time, accepted values 5..20sec

Assignment 2



On the **Sample button sprite script**, check that the necessary parameters have been given by the user and start the sensor to receive the data.

For a better user interface, show a time countdown until the end of the running period.

Use the broadcast message

StartDisk: to start the infrared sensor

Stop: to stop the sensor when the time over.

Assignment 3



On the **Arduino sprite script** you have to create the code

- ✓ for connecting the Arduino after the User enters the parameters by pushing the Initiate button (Ready)
- ✓ read and process the data from the motion sensor (StartDisk)

Assignment 4



On the **Result button sprite script**, you have to display the following results.

$$f=1/T, \omega=2\pi/T \text{ and } v=2\pi R/T$$

For displaying the results, you will use string variables and join the result value with the **appropriate** measurement unit.

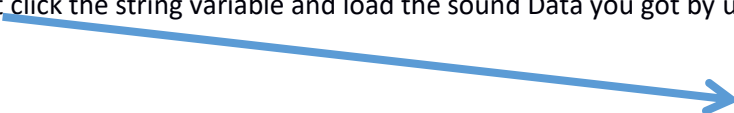
Assignment 5

Step 1

To start the last assignment you have to record the sound of the. We will use the open source Audacity application.

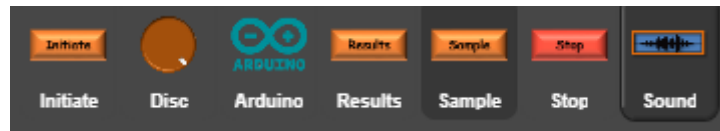
Step 2


Right click the string variable and load the sound Data you got by using Audacity.





On the **sound** button, write the script to process the Sound Data



	<p>a) split the data in two lists b) find the two frequencies with the highest level c) apply the Doppler Equation</p> $f = f_0 \cdot \left(\frac{v_s}{v_s - v_D} \right) \Rightarrow f = \frac{f_0 \cdot v_s}{v_s - v_D} \Rightarrow$ $f \cdot v_s - f \cdot v_D = f_0 \cdot v_s \Rightarrow f \cdot v_D = (f - f_0) \cdot v_s$ $\Rightarrow v \cdot \cos(\pi / 4) = \left(\frac{f - f_0}{f} \right) v_s \Rightarrow$ $v = \left(\frac{f - f_0}{f} \right) \frac{v_s}{\cos(\pi / 4)}$ <p>d) Display Results</p>
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