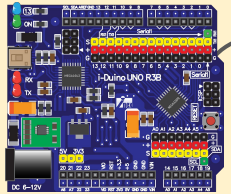
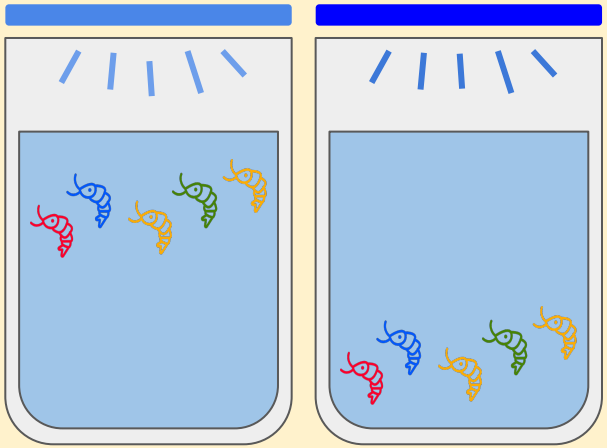
Photons Unchained

Tanguy Chotel, Sarah Talon Sampieri, François Sacquin

Electronic Sensor (Arduino)



Intensity of light



Biological Sensor (Daphnia)

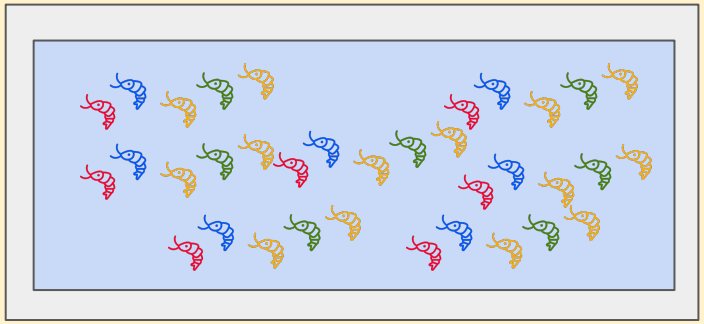
Question

Photons Unchained

François Sacquin
Tanguy Chotel
Sarah Talon Sampieri

Which one is the **best sensor** to catch the increase of intensity of light?

How do biological and electronic sensors **react** to the increase of intensity of blue light?



Buy the daphnias:
Ours were bought at
Paramount Aquarium
279 rue des Pyrénées

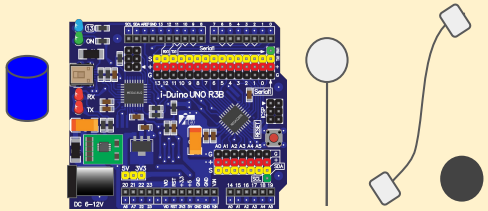
Put the daphnias in a aquarium, to keep them alive:

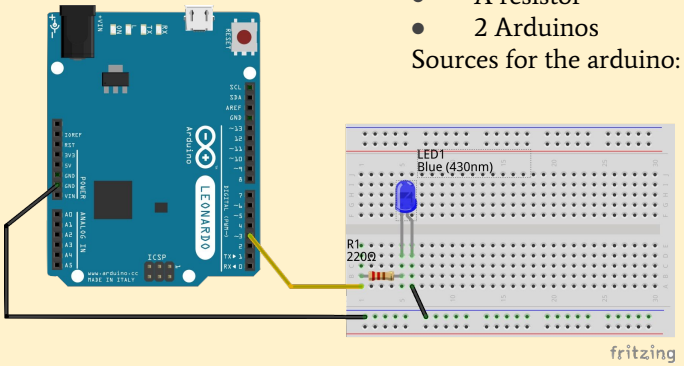
- Use spring water, tap or still water will make them day.
- They should be away from sunlight.
- Ambient Temperature

Prepares the Arduinos with::

- A blue light led
- A photoreceptor
- A tape to fix the arduino
- A resistor
- 2 Arduinos

Sources for the arduino: Github.



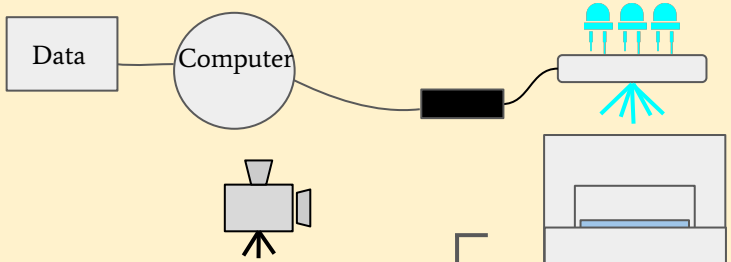


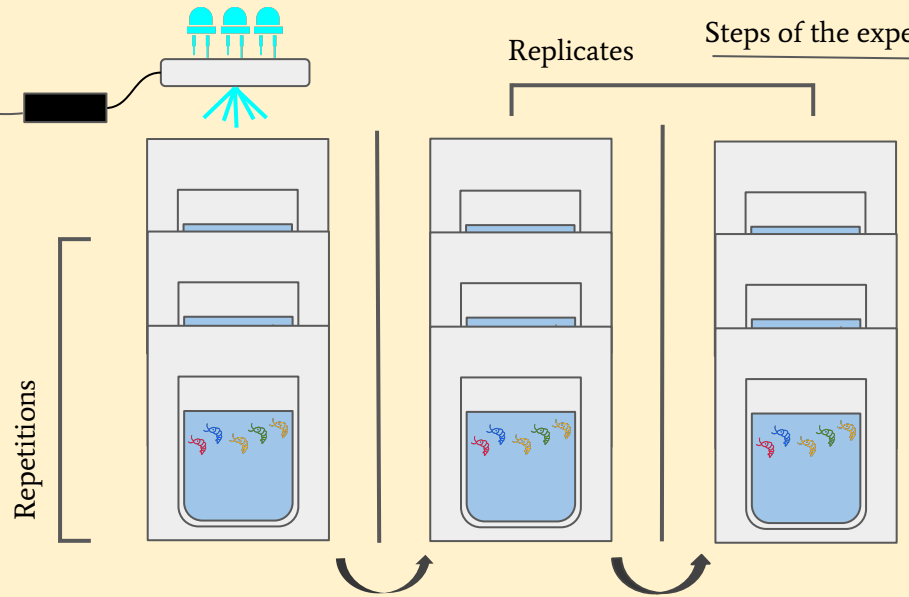
Electronic sensor: Arduino

A camera **filming** the daphnias reacting to light stimuli

Population: Daphnia
Size: 30 individuals par beaker.

Materials: 3 500mL beakers filled with 200 ml of water
2 Replica for each experience.





Make **two replicates**, and **two repetitions** for each replicates (replicates have different populations, repetitions have the same population).

The 3 same beakers (with the same population) will be tested for the same wavelength of light.

For each experience, increase the intensity by **30** (intensité led), for **30s**.

Each beaker will be put in a box, to let them be in the dark.

II.

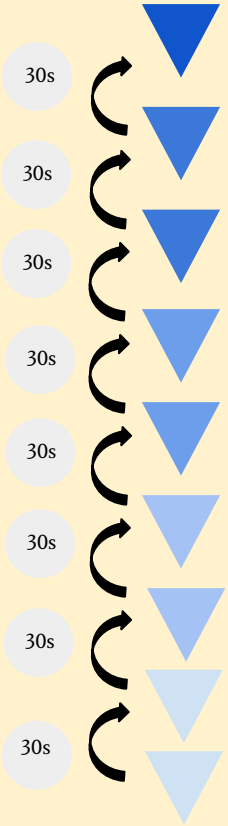
Measurement of the experience

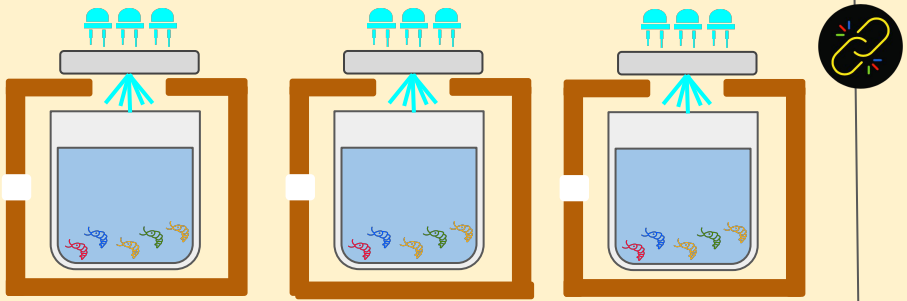
For each beaker (sample and replicates) filmed:

Start with all Daphnia randomly disposed in the beaker. A first intensity of light of 30 nm for 30 seconds.

Wait 30s to reset. Shift with a second intensity of light for 30s.

Reset the dark for 30s., Then shift to the third intensity for 30s, do the same to the last 5 intensities.

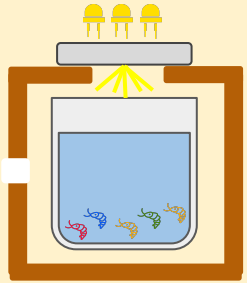




Replicates

Between each intensity, which goes from 0 to 240 lux, wait 30s.

The wavelength of the led light is of 430 nm.

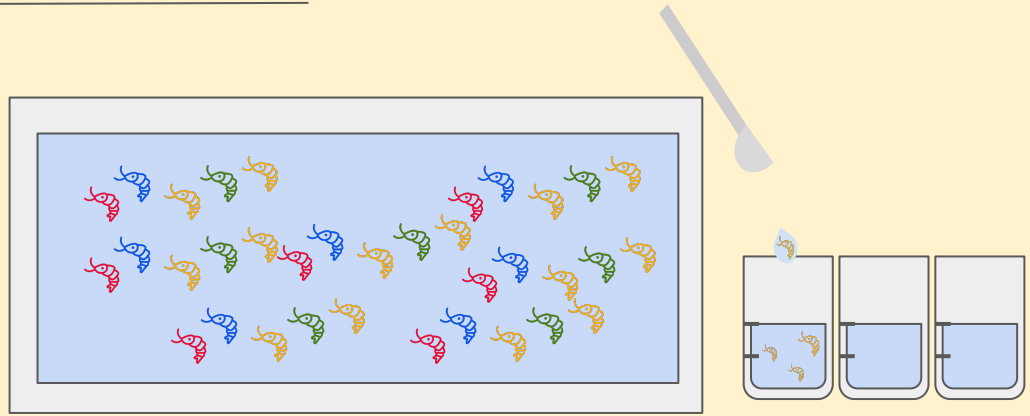


Starting conditions: let all the daphnias be in the same zone, turn off the light...

Characteristic analyzed:

The distribution of daphnia in the beaker: we compartmentalized the beaker in 4 zones: one to 4, in order to be able to count the number of daphnia in each zone at each intensity (every 10s out of the 30s of the video).

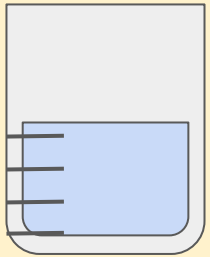
Biological sensor



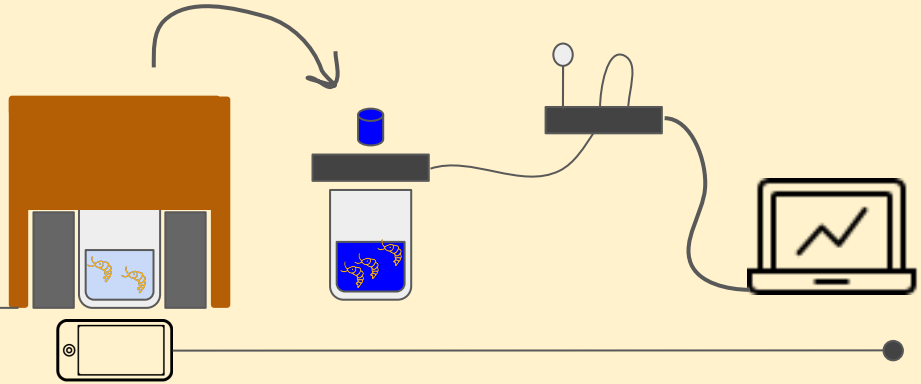
The day of the experience

With a spoon, take one by one the daphnia and fill out the beakers till 20 daphnias. Adjust to the level of 200 mL with dechlorinated water.

Mark in you beaker four different levels in order to be able to identify the zones in which you will count daphnia in your data analysis.



- Inside the box:



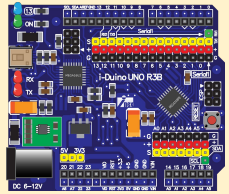
Set up

Regulate the blue light and its intensity, send it to the arduino

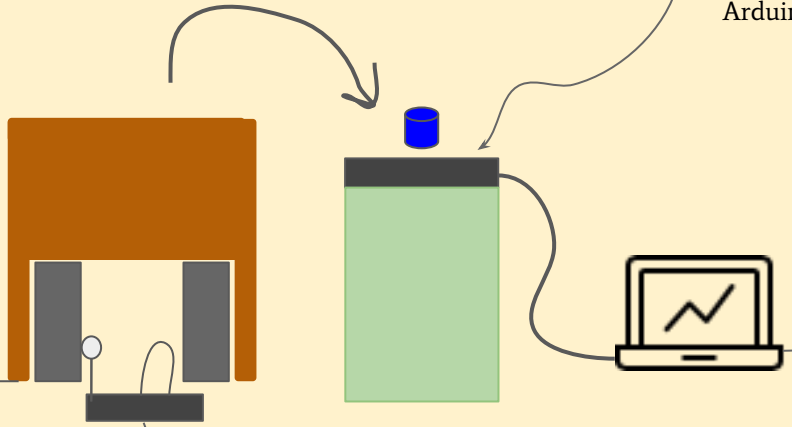
Send the videos to dropbox.

Electronic sensor

- Inside the box:



Arduino



Set up

Photoresistor (LDR) in place of the Daphnia

Lentil Bag with Arduino on top to simulate the height of the beaker

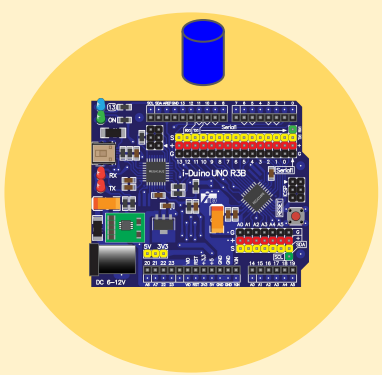
Regulate the blue light and its intensity, send it to the arduino

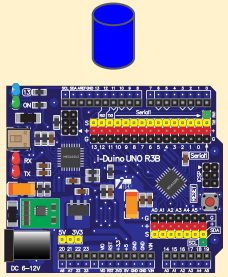
LDR data directly sent through a python code and written in a .csv file

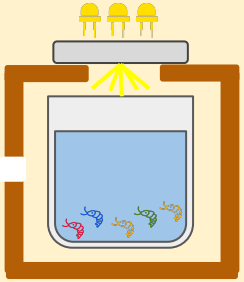
The day of the experience

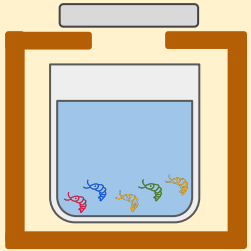
We used two different LDR and took 3 sets of measures for each, plus one negative control and one positive control.

Controls



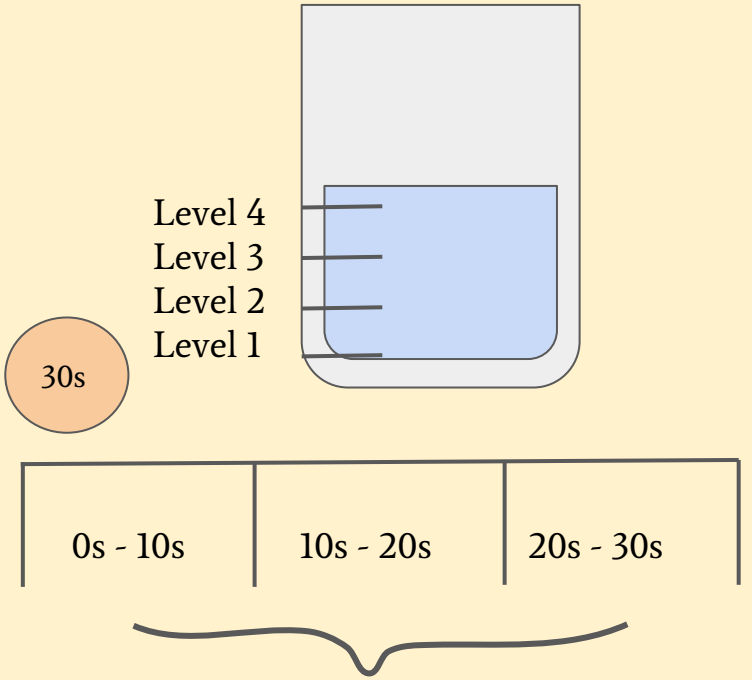






Positive Control: One arduino with light turned on, one arduino in the dark.
Negative Control : One beaker of daphnia stimulated by light, one beaker of daphnia in the dark.

Measurement details and Data Analysis



For each video analyzed (which correspond to one light intensity), every 10s the number of daphnia will be counted for each level, from 1 to 4.

Results/ Comparaison avec bibliography (what's knew before)

- What is our hypothesis ?
- What is the relation relevant to us?
- What are the comments?

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Image Arduino - Pixabay

Shrimps: logomakr

Logo: logomakr and canva