

PROJECT PROPOSAL

We will use *Lumbriculus variegatus* and piezo element in order to determine their ability to detect the intensity and the direction of a vibration.

We will test 3 intensity of vibration.

We will do at least 5 replicates for each vibration device.

Positive control : one vibration from one direction at maximum intensity

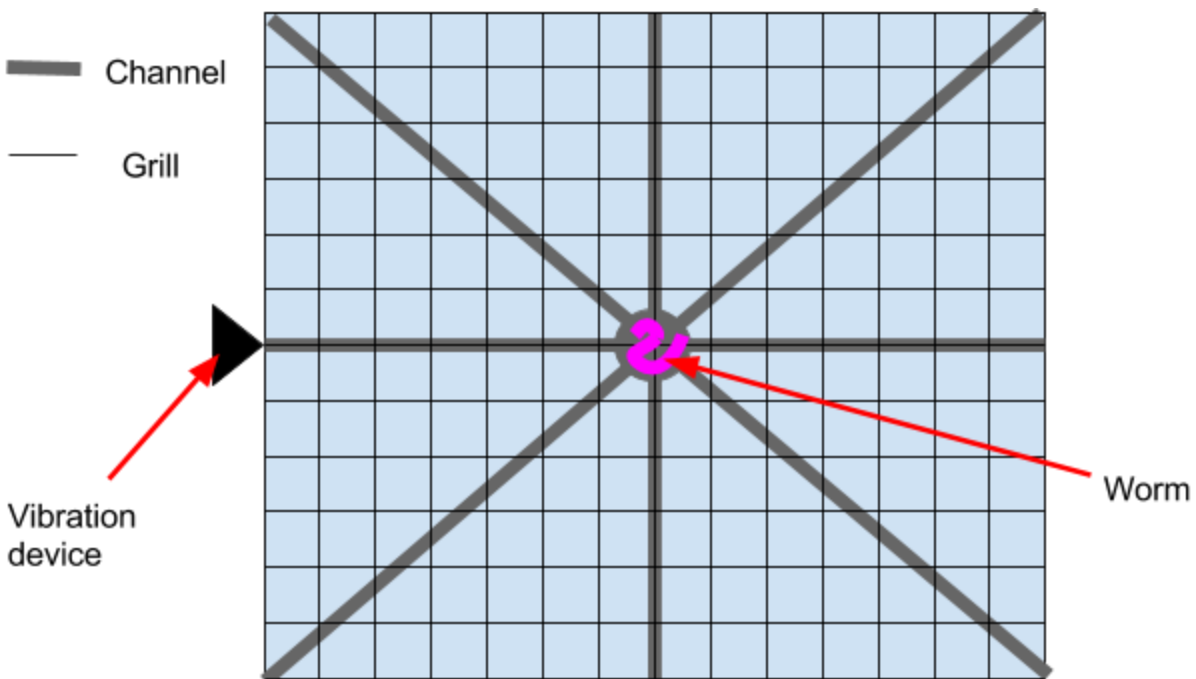
Negative control : no vibration

We make the hypothesis that the worm will go on the opposite direction of the origin of the vibration, if the intensity is high enough to be sense.

Protocol:

Which one of a *Lumbriculus variegatus* and 2 piezo element device is the most accurate to detect the origin point of a vibration.

We will use a square plan area (named observation area), divided in several subsquares and with 6 channels representing the directions where the worm can go.



We put a *Lumbriculus variegatus* in the middle of the grid. We put a motor device that makes vibration when controlled by an Arduino. The worm will have the choice of 6 different directions to flee or go towards the

origin of the vibration. Then, we record the movement with a camera and analyse it with a tracking software : speed of movement and distance between the vibration device and the worm.

Tested intensity: we will test 3 different intensities : low, medium and high (**unities to define**)

Positive control : we put the *Lumbriculus variegatus* in the middle and switch on the vibrating device at maximum intensity (intensity = amplitude in décibel). We film the *Lumbriculus variegatus* during 3 minutes and observe its moving.

Negative control : we put the *Lumbriculus variegatus* in the center and film during 3 minutes without activating the vibrating device.

Step of the experiment for biological sensor:

1. Put the worm
2. Start the camera
3. Activate vibrating device at intensity 1 during 3 minutes
4. Repeat step 1 to 3 five times in order to have 5 replicates, changing the worm each time
5. Change worm
6. Repeat step 1 to 4 with intensity 2
7. Change worm
8. Repeat step 1 to 4 with intensity 3
9. Set the worm free

Then, we repeat the experiment with the Piezo vibration sensor instead of the worm. We put the piezo in the middle of the grid. With a voltmeter, we gather the value given by the piezo and then have an intensity of vibration.

We will compare the value given by the piezo and the movement of the worm to the value of vibration that we put on the arduino controlling the vibrating device.

Material list:

- *Lumbriculus variegatus* individuals
- Terrarium to stock the *Lumbriculus variegatus*
- Food and water for worm
- A aluminium board
- A camera (go pro?)
- 1 vibration generators (a motor)
- 2 piezo element
- 1 arduino
- 1 voltmeter
- Printing channels.

Time needed in the lab:

- 3 different intensities + 2 replicates
- 5 replicates for each intensity and each replicate
- 3 minute of shooting by worm

- $5 \times 5 \times 3 = 75$ min + preparation : 1h
- 3h in total in the lab (to be large).

Budget :

- Worms