

# Labs Land

Real labs on the  
Internet

FOR SCHOOLS

OCTOBER 2021

# Available laboratories



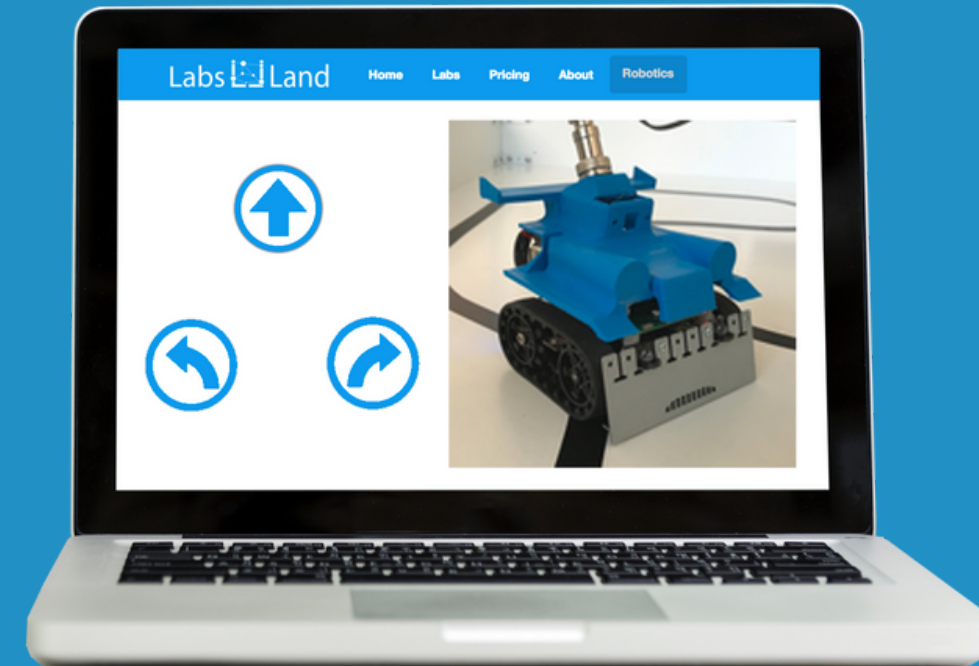
- Technology Labs
  - Arduino Robot
  - Arduino Basic
  - Electronics
  - AC Electronics
  - 3D Printer
- Biology Labs
  - Planarians
  - Microscope
- Chemistry laboratories
  - Gay Lussac's Law
  - Boyle's law
  - Acid-base titration
  - Diffusion
  - Water Heating and Cooling Curves
- Physics labs
  - Radioactivity
  - Kinematics
  - Archimedes
  - Pendulum
  - Newton's pendulum
  - Lens types
  - Spring
  - Basic buoyancy
  - Advanced buoyancy
  - Boyle's Law
  - Rolling car
  - Electronics
  - AC Electronics
  - Snell's Law
  - Conservation of Momentum

# LabsLand

Visualize and interact  
with real devices

Use from anywhere and  
at any time

The equipment is  
real, not simulated.  
They are in  
LabsLand or in  
partner institutions.

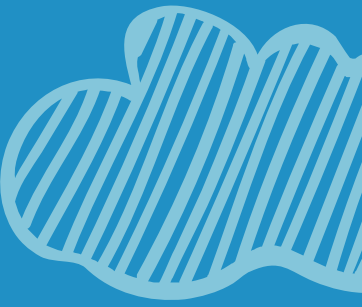


Our product focuses on real-time access to laboratories. The labs that are part of the LabsLand platform have been provided and developed by different agents, typically educational institutions such as universities, in collaboration with LabsLand. This approach enhances the creation of labs, so that LabsLand's offering can grow faster. At the same time, the institutions obtain in return various advantages that encourage them to participate in this way.





# Our product: An example



Lab example: Robotics: Students write code and observe how it works on a real robot, being possible to interact with it.



01:24 Leave now

## Arduino Robot

06/10/2023 05:08:43  
Zuno4 11.8.7.5

Your own programs

**Your program**  
This is the last program that you just prepared in the code editor.  
[Program into the arduino](#)

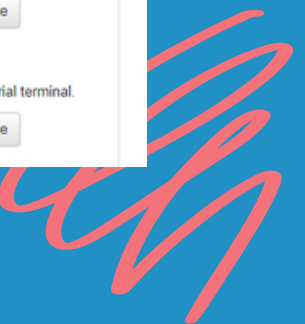
Demonstration programs

**Line follower**  
[Program into device](#)

**Avoid crashing**  
Moves fast, using the proximity sensors to turn before reaching the walls.  
[Program into device](#)

**Serial echo**  
Echoes whatever you write to the serial terminal.  
[Program into device](#)

← ↑ → ↓

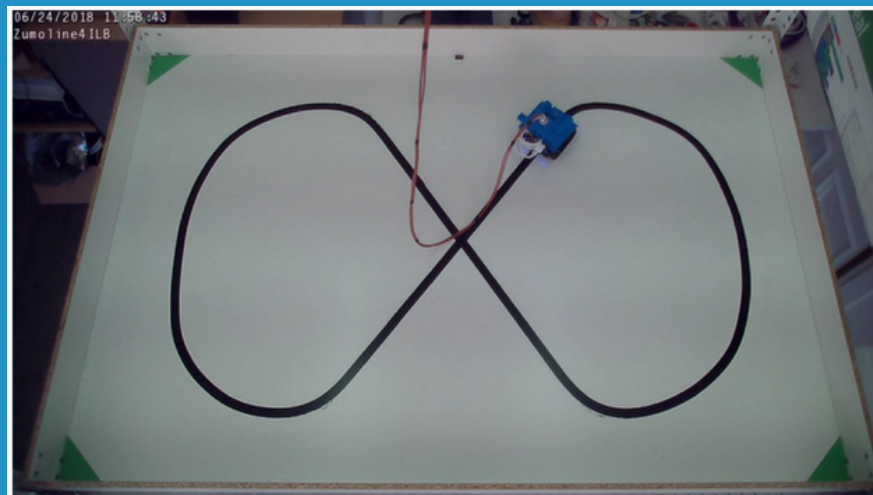




# Technology labs

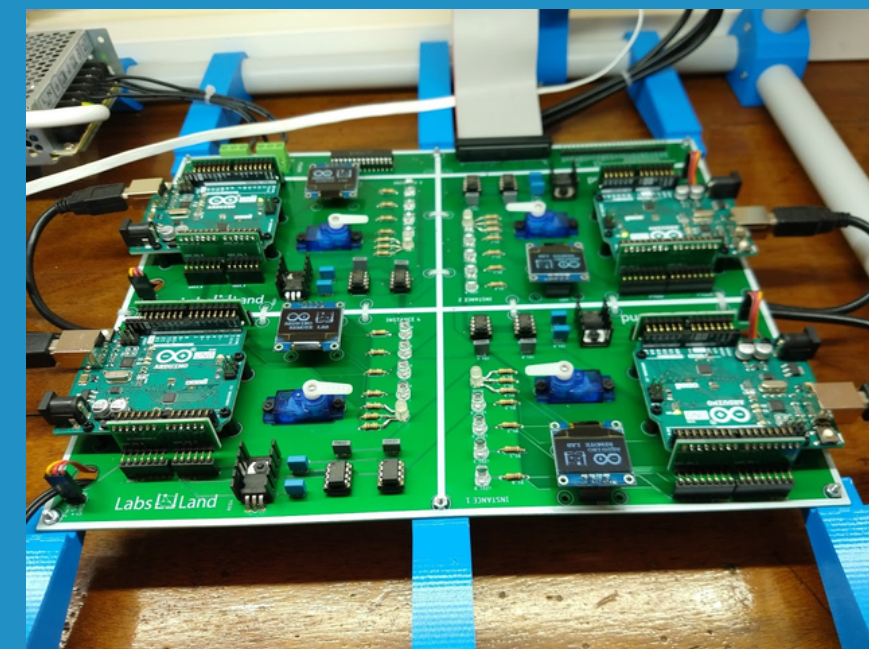
## \* ARDUINO ROBOT

- You can make your robot avoid obstacles, compete in race circuits, find the exit of a maze and even (coming soon) fight against other robot.
- How? The Arduino-based robotics lab allows you to develop multiple experiments with a real mobile robot. Define the robot's task by programming in Arduino and download your program directly on the robot to see through a camera its behavior.
- It is possible to use both visual language and code language.



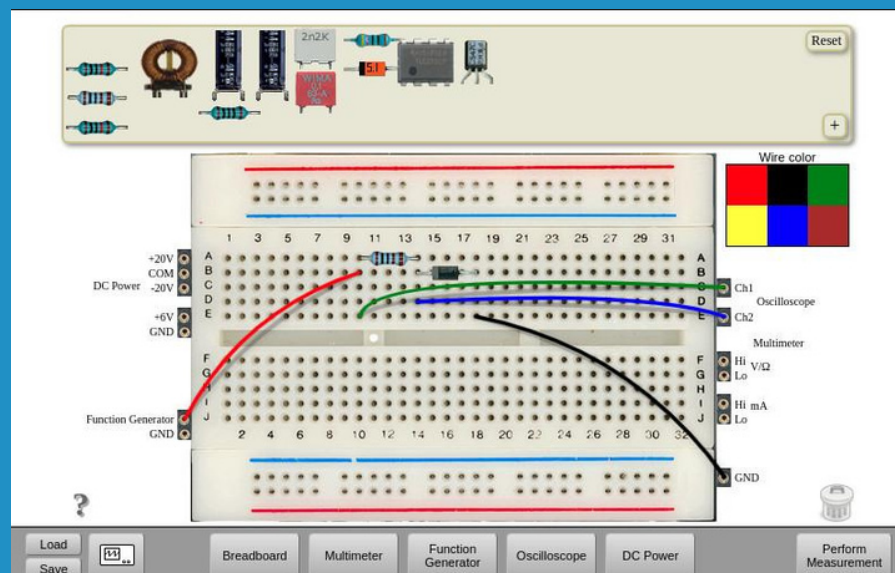
## \* ARDUINO BOARD

- With this laboratory, you can program a real Arduino Uno board.
- It also includes several input and output peripherals, similar to those that are often included in Arduino starter kits.
- What do these peripherals include?
  - LEDs
  - Switches
  - A small OLED display
  - A servo motor ....



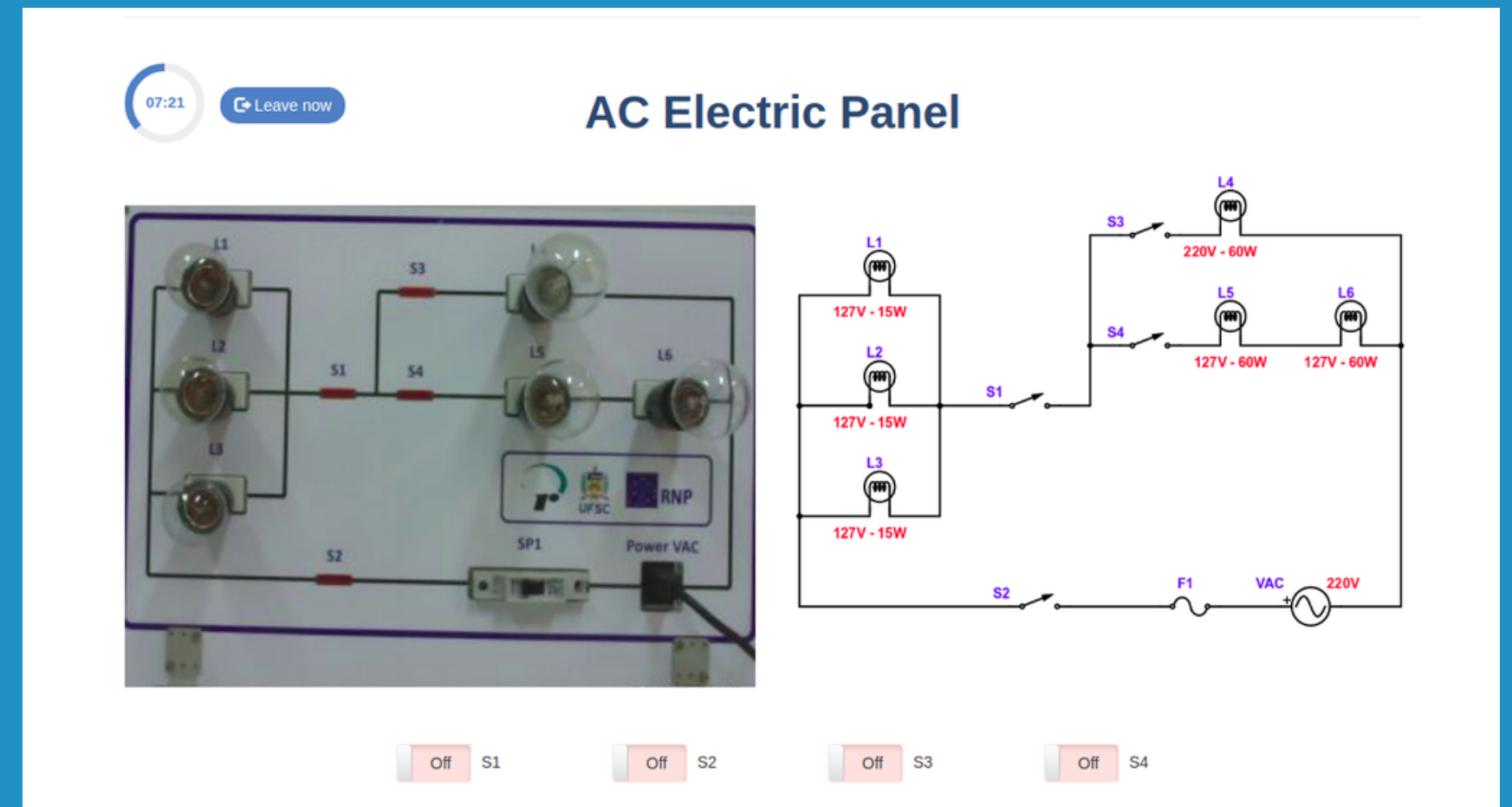
## \* ELECTRONICS

- Remote laboratory for experimenting with the laws and principles that define analogic electronics: resistor association, Ohm's Law, Kirchoff, maximum potency transmission, components characterisation, etc.
- Through this laboratory you will be able to create real electronic circuits using typical components: resistors, capacitors, coils, diodes... and to check their behaviour using real instruments such as a function generator, oscilloscope, power source or multimeter.
- For this, you will be able to rely on an advanced graphical interface which will allow you to use the laboratory through the Internet, in the same way you would use a hands-on laboratory.



## \* AC ELECTRONICS

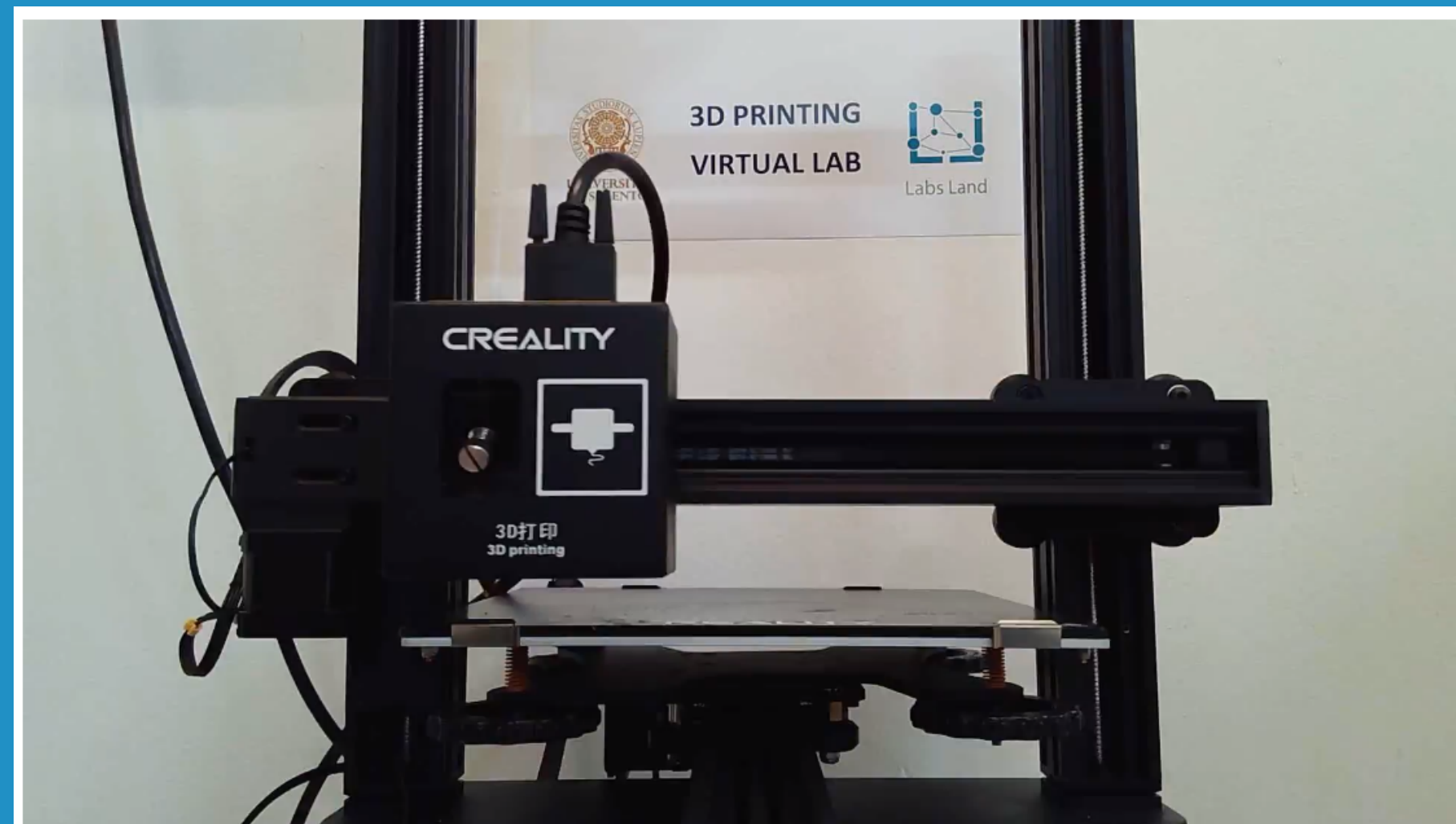
- Study how alternating current (AC) works by experimenting with several bulbs connected in series and / or parallel.
- Opening or closing the switches you want, you can see the effect on the intensity of light of each of the bulbs of the created circuit.





## 3D PRINTER

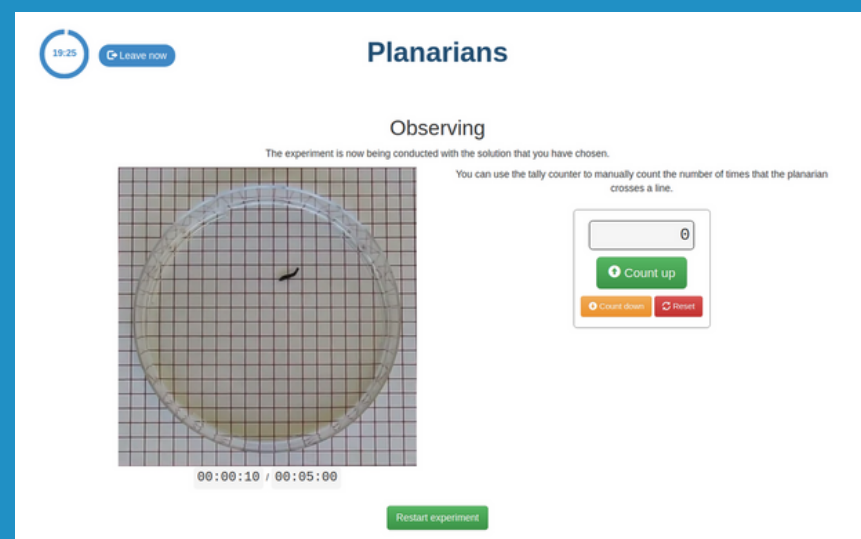
- This lab allows you to choose among different 3D printing settings.
- You can observe the printing process and the result from different angles.
- In addition, you can also control the playback speed.
- Finally, you have the option to download the Ultimaker Cura project file for further experimentation.



# Biology labs

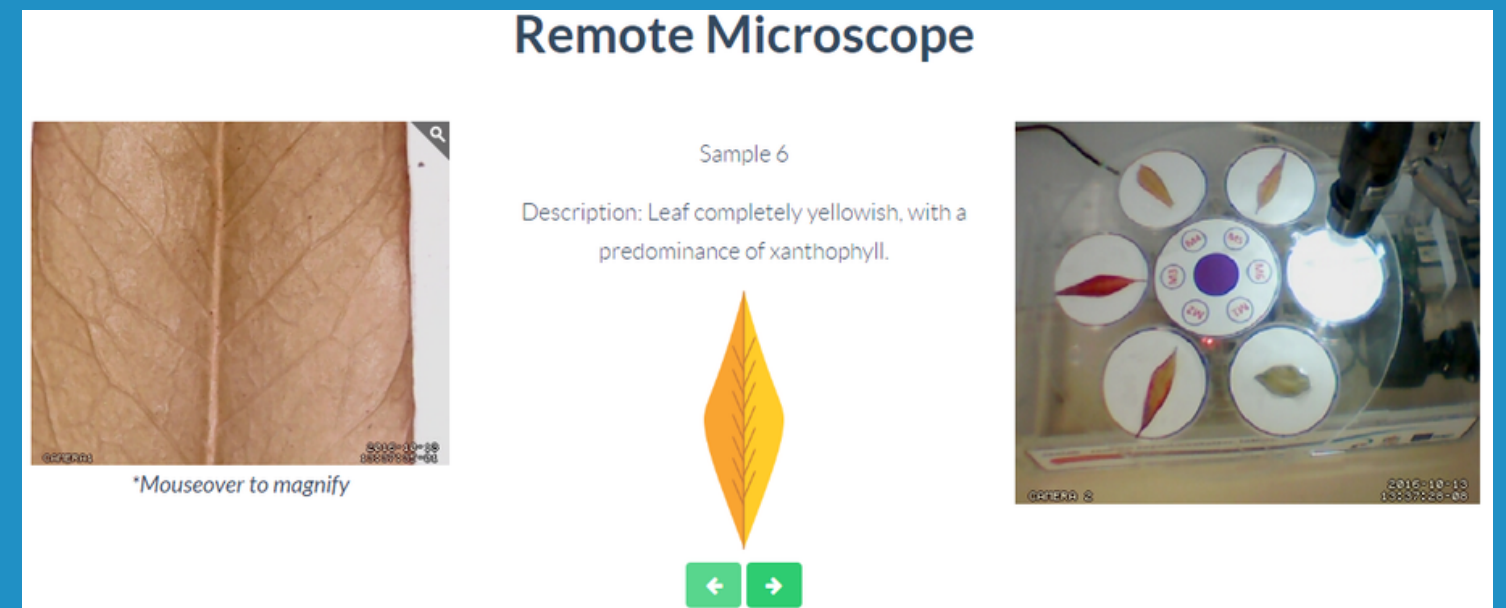
## \* PLANARIANS

- Planarians are flatworms that can be used to study the effect of different substances on the nervous system.
- In this remote laboratory, you can choose the solution into which to place the planarian worms.
- The solutions are aqueous and have different excitatory or inhibitory substances, with different concentrations, dissolved into them.
- In this version of the planarian lab there is a manual counter that students can use to count the number of times planarians cross a line (to estimate their activity level).



## \* MICROSCOPE

- Through this remote laboratory you can control the samples under observation of a microscope.
- The available samples allow to analyze 6 different samples of leaves, comparing their different pigments and colorations.

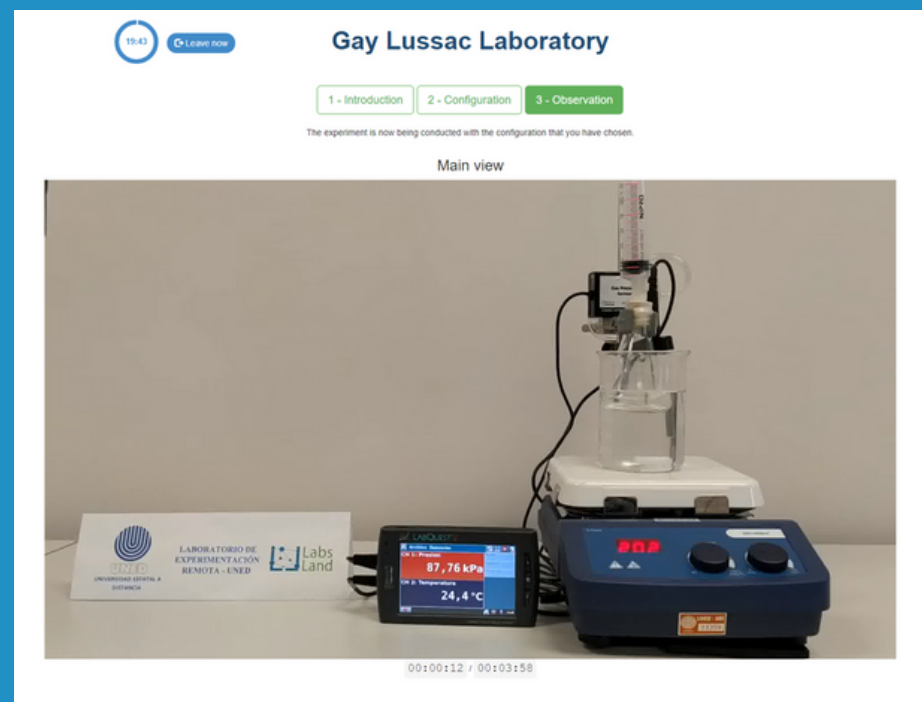




# Chemistry labs

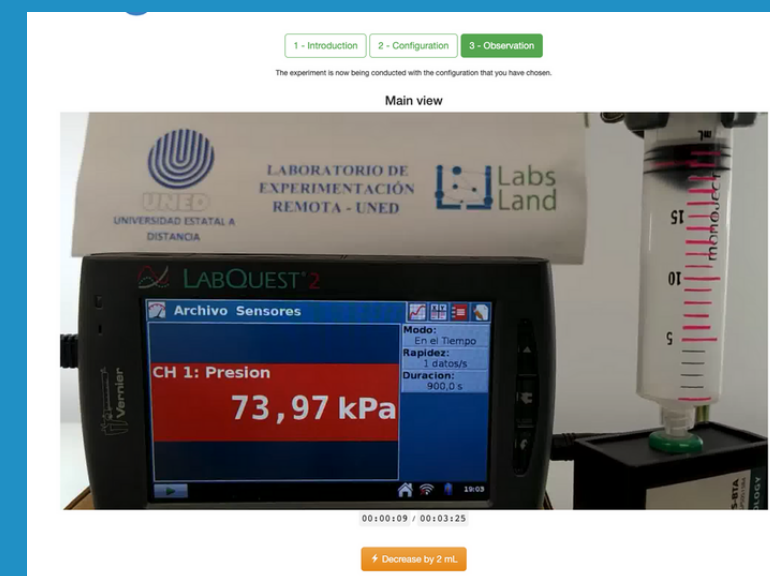
## GAY-LUSSAC'S LAW

- Gay-Lussac's law allows us to study the behavior of gases and is often studied in physics and chemistry.
- It relates the pressure of a gas with its temperature, while other parameters such as volume and amount of substance remain constant.
- In this experiment it will be verified that, for a given amount of the gas, the pressure is directly proportional to the temperature.



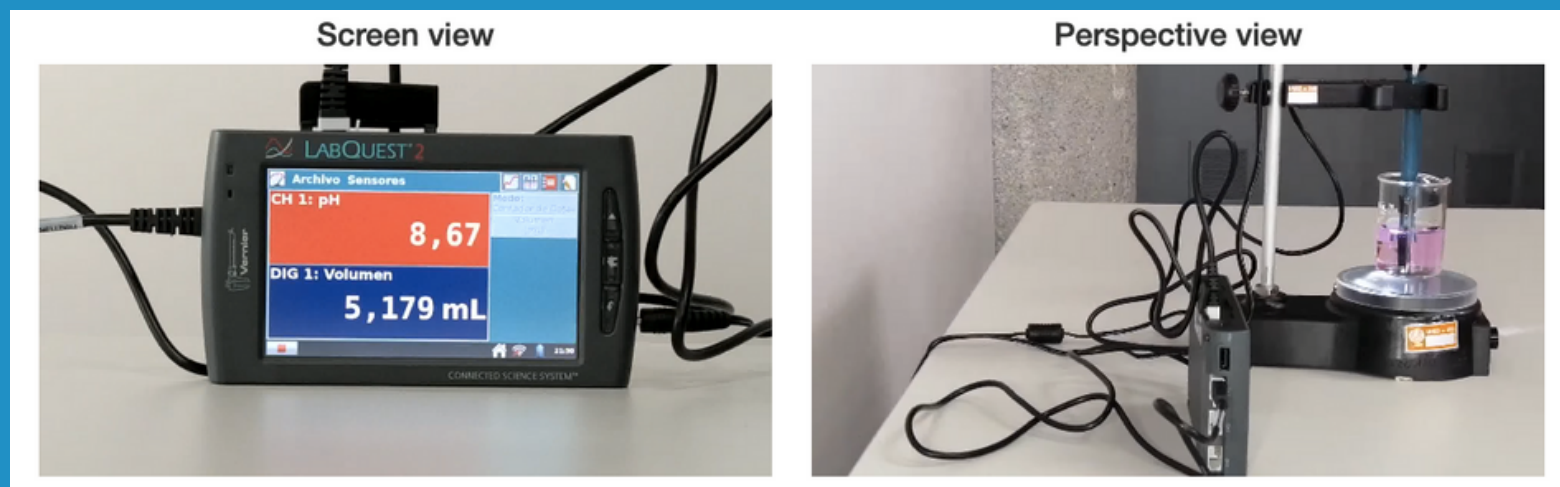
## BOYLE'S LAW

- Boyle's Law is a law that allows you to study the behavior of gases. It is frequently studied in physics and chemistry.
- It links the pressure of a gas with the volume, while other parameters remain constant, such as the temperature and the amount of substance.
- This experiment it will be probed that, for a given amount of gas, the pressure is inversely proportional to the volume.
- The experiment is carried out at room temperature and constant, in the graphical analysis this behavior is reflected in an isotherm.



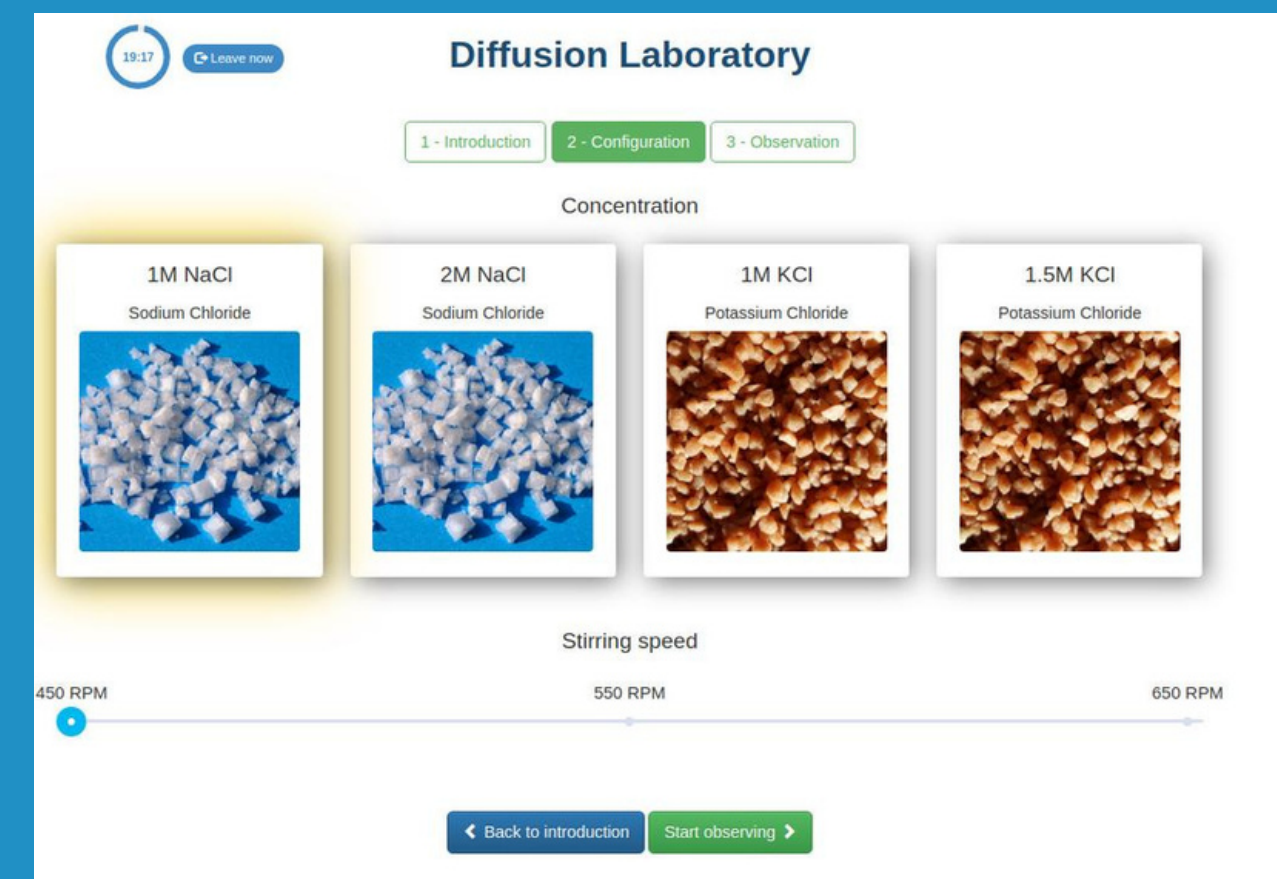
## TRITATION

- Through this laboratory you will be able to calculate the concentration of an unknown solution given its volume and the volume and concentration of a standardised titration.
- You will be able to choose between different titrants and different analytes.
- This technique consists of using a solution with a known concentration of titrant, which is poured over the analyte until it is neutralised. The point at which it is neutralised is known as the "equivalence point".
- A phenolphthalein indicator is used for titration.



## DIFUSSION

- Diffusion is an irreversible system of molecule and solute transport, in which molecules move from a region of high concentration to region of lower concentration. This movement is continuous unless the temperature is absolute 0.
- Diffusion allows a gas or a substance in solution to expand in order to fill the entire free volume. The origin of diffusion is the natural movement of molecules.





## WATER HEATING AND COOLING CURVES

- This lab will allow you to apply both heat and cold to water in different states and observe the effect on the temperature.
- If you apply heat, you have the option to choose between low heat or high heat, and if you apply cold, ice will be used as the material to cool the water.
- The temperature can be observed with a thermometer.
- It is also possible to control the playback rate.

Cámara de proceso



Cámara de temperatura



00:12:01 / 00:12:01

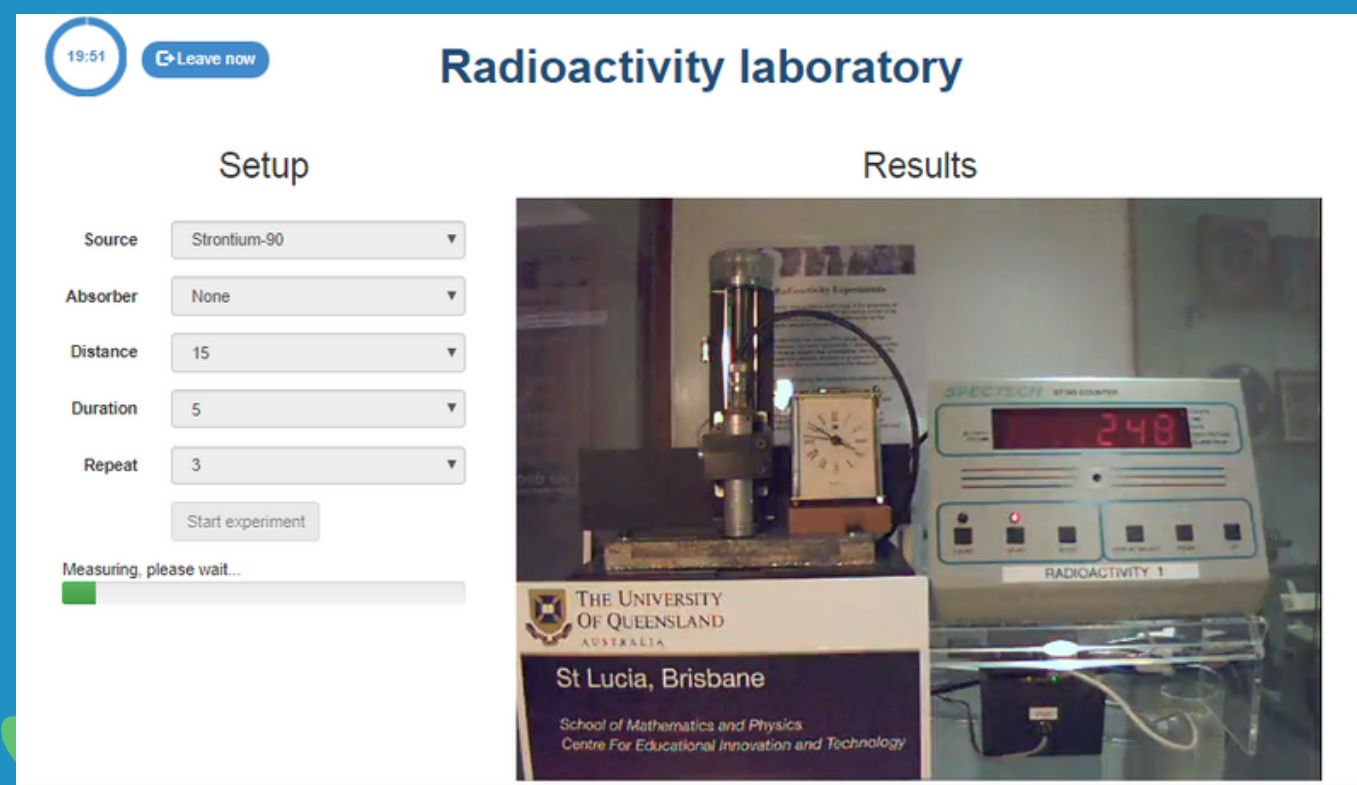
Choose the playback rate:

1x 5x 10x 15x

# Physics laboratories

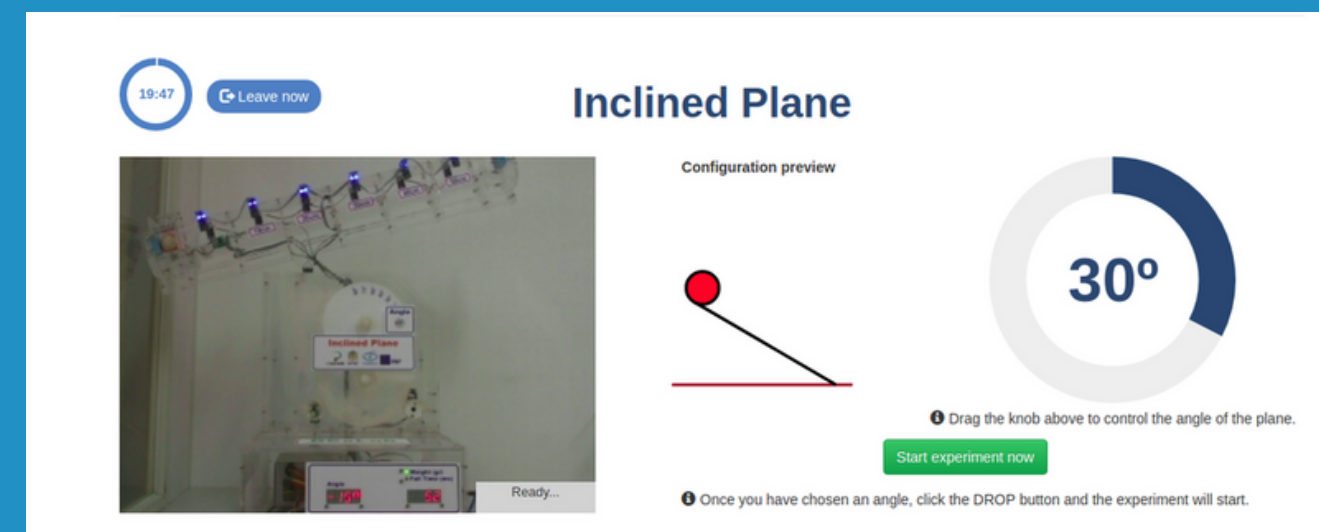
## \* RADIOACTIVITY

- Check the amount of particles emitted by different radioactive materials and captured by a real Geiger counter.
- Modify the distance between the sample and the counter, as well as the exposure time.
- You can also put an absorbent material between the sample and the counter and see the effect it has on the measurements.



## \* KINEMATICS

- You will be able to experiment with Newton's second law in a system that allows you to observe and analyze the behavior of a ball moving along an inclined plane or in a free fall
- The parameters to be analyzed are: time, velocity and acceleration of the ball during the fall.
- The angle of inclination is configurable by the user, reaching up to  $90^\circ$  and allowing to experience a free fall scenario.
- Check if the ball rolls while moving along the inclined plane or only moves down the plane.





## ARCHIMEDES

- Experiment with Archimedes' principle: raise and lower balls of different materials, sizes and weights and see what happens when they are introduced into a liquid.
- Does it sink? Does it float? Why? Could you determine its weight? And the volume of the displaced liquid? The pushing force?
- Try to answer all these questions by observing the experiment and using the values given by the available sensors.

Toggle to **show** or **hide** each tube

1st Tube 2nd Tube 3rd Tube 4th Tube 5th Tube 6th Tube

### 1st Tube

Sensors

Liquid Level	18.0 cm
Ball Weight	134.0 g

Liquid/Tube

Density	1 g/cm <sup>3</sup>
Internal Diameter	7 cm

Ball

Mass	113.3 g
Diameter	6 cm
Density	1.001 g/cm <sup>3</sup>
Volume	113.09 cm <sup>3</sup>

### 2nd Tube

Sensors

Liquid Level	18.1 cm
Ball Weight	135.23 g

Liquid/Tube

Density	1 g/cm <sup>3</sup>
Internal Diameter	7 cm

Ball

Mass	108.9 g
Diameter	6 cm
Density	0.982 g/cm <sup>3</sup>
Volume	113.09 cm <sup>3</sup>

### 3rd Tube

Sensors

Liquid Level	18.0 cm
Ball Weight	131.27 g

Liquid/Tube

Density	1 g/cm <sup>3</sup>
Internal Diameter	7 cm

Ball

Mass	84.8 g
Diameter	6 cm
Density	0.749 g/cm <sup>3</sup>
Volume	113.09 cm <sup>3</sup>

### 4th Tube

Sensors

Liquid Level	17.7 cm
Ball Weight	134.0 g

Liquid/Tube

Density	1 g/cm <sup>3</sup>
Internal Diameter	7 cm

Ball

Mass	2.4 g
Diameter	5.5 cm
Density	0.027 g/cm <sup>3</sup>
Volume	87.11 cm <sup>3</sup>

## PENDULUM

- Using this lab, you will be able to control the angle from which to release a real simple pendulum.
- The experiment will provide you a set of real data that you can use to analyze the behavior of the pendulum depending on the oscillation time, velocity, of oscillation length, etc.
- You can also add weights to the pendulum.

19:36 Leave now

## Pendulum

1 - Introduction 2 - Pendulum 3 - Parameters 4 - Observation

Configuration preview

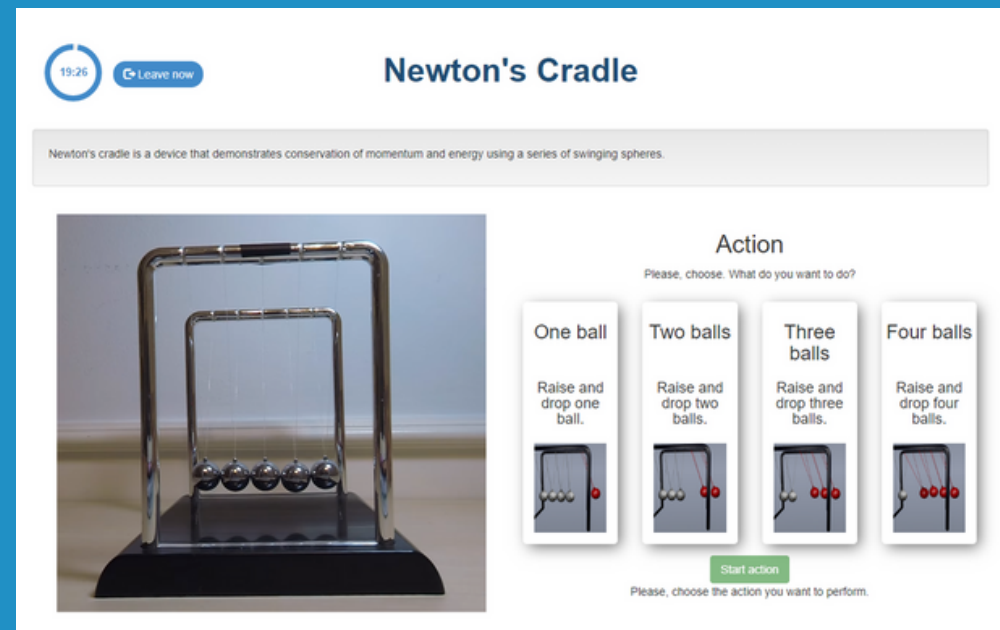
26°

Drag the knob above to control the angle of the pendulum.

Back to pendulum selection Start observing

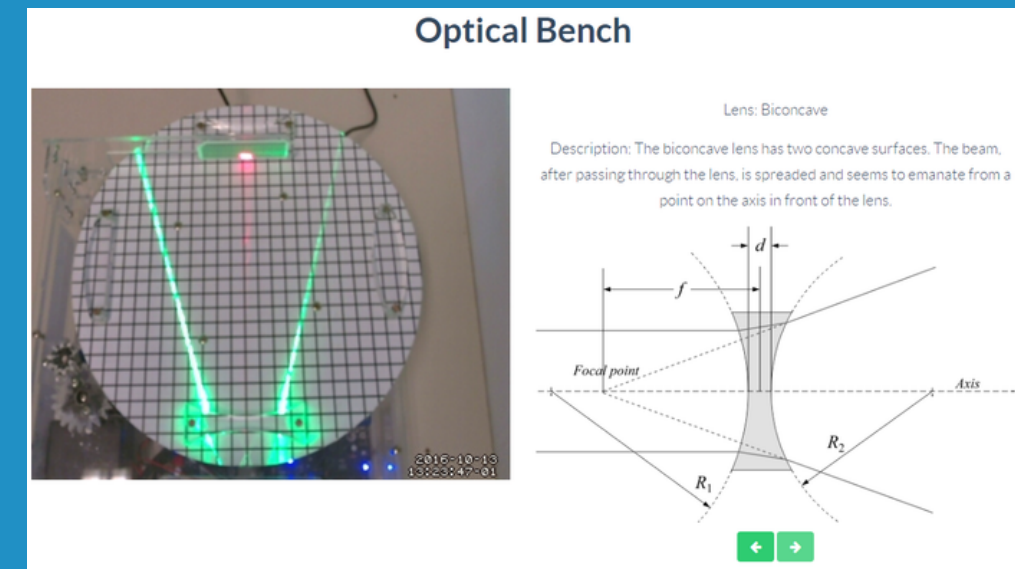
## NEWTON'S CRADLE

- Newton's cradle is a device that demonstrates the laws of conservation of momentum and energy, using a series of swinging spheres.



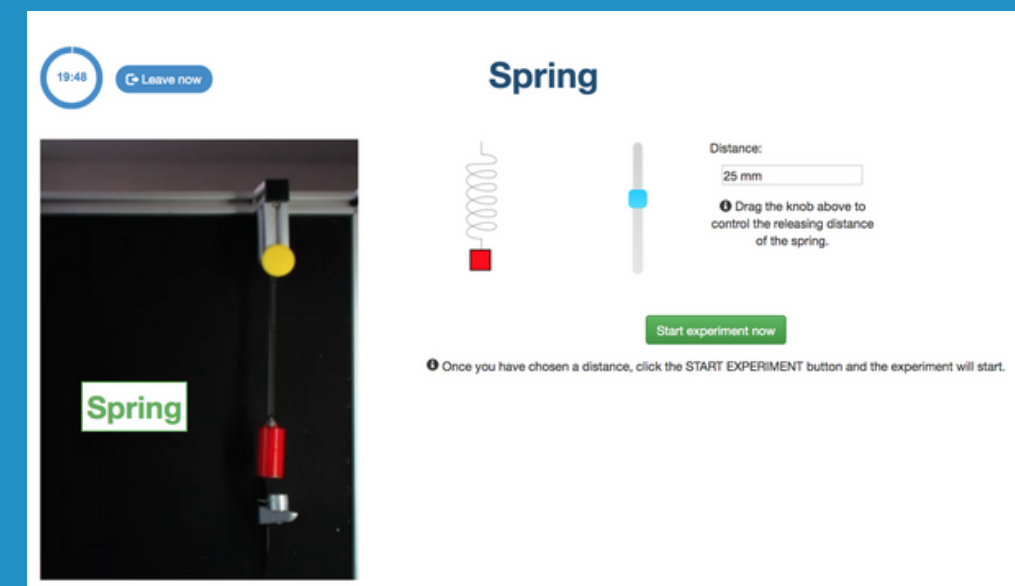
## LENS TYPES

- Through this remote laboratory you will be able to experiment what happens with two light rays passing through a biconvex, biconcave or convex lens.
- You will be able to control the lens to be analyzed at any time..



## SPRING

- You can control the distance at which to move a spring, and see and measure its behavior once it is released.
- This experiment will provide a set of real data, which can be used to analyze the behavior of the spring depending on distance, time and other variables.





## BASIC BUOYANCY

- Suitable laboratory to start getting familiar with the concepts of buoyancy, volume and density.
- Experiment with various objects of different densities, and intuitively understand why they float or not, without getting into complicated numerical calculations..

## ADVANCED BUOYANCY

- Experiment with buoyancy, Archimedes' Principle, and similar physical laws.
- Take related measurements, conduct experiments, and start doing relatively advanced calculations.
- The experiments in this advanced version will normally display more data (such as data from liquid sensors and object weight sensors) and the proposed activities will involve numerical calculations of varying difficulty.

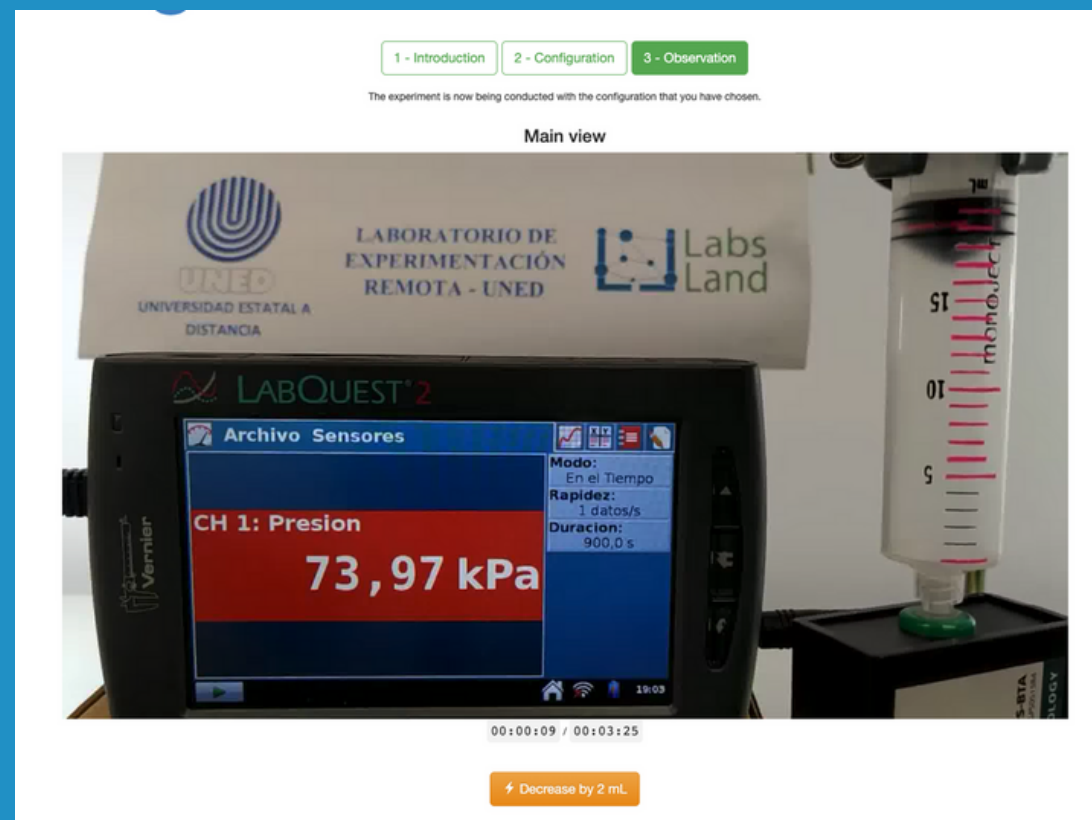
19:42 [Leave now](#)

### Buoyancy Laboratory

Object 1	Object 2	Object 3
<b>Ball almost-filled with water</b>	<b>Big ball made of wood</b>	<b>Ball filled with alcohol</b>
Mass: 108 g Volume: 113.09 cm <sup>3</sup>	Mass: 81 g Volume: 113.00 cm <sup>3</sup>	Mass: 93 g Volume: 113.00 cm <sup>3</sup>
Liquid: water	Liquid: water	Liquid: water

## \* BOYLE'S LAW

- The Boyle's Law laboratory belongs to both the chemistry and physics sections.
- In this experiment it will be verified that, for a given amount of gas, the pressure is inversely proportional to the volume.
- The experiment is carried out at room temperature and constant, in the graphical analysis this behavior is reflected in an isotherm.



## \* ROLLING CAR

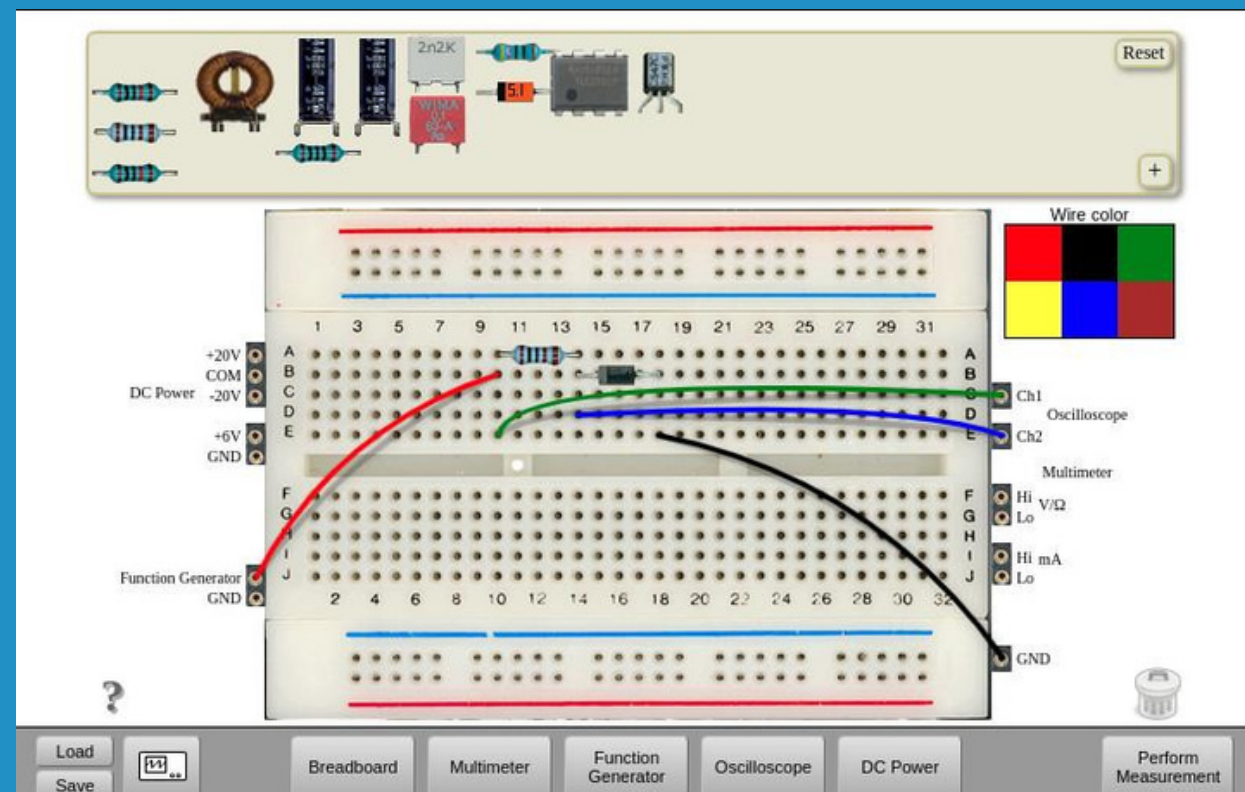
- This lab allows the study of basic kinematics by letting a small car fall down a ramp.
- This results in a linear accelerated motion.
- The timer can be used to manually measure how long the car takes to fall.
- Alternatively, after each experiment, the lab will display the almost exact time it took.

The screenshot shows the 'Rolling Car' experiment interface. At the top left, there is a clock showing '19:38' and a 'Leave now' button. The title 'Rolling Car' is centered at the top. Below the title, there is a text box explaining the experiment: 'The rolling car laboratory lets you study basic kinematics by letting a small car fall down a ramp. This will result in a linear accelerated motion. Use the built-in timer (chronometer) to measure the time for the car to fall. After each experiment is over the software will display the actual falling time.' To the right of this text is a small image showing a car on a ramp with points A and B marked. Below the text box, there are two views: 'Front view' and 'Perspective view'. At the bottom, there are two sets of radio buttons for configuration: 'Choose an angle:' with options 1.45°, 1.77°, 2.08°, 2.80°, 5.50°, and 8.76°; and 'Choose a car weight:' with options 11 g and 134 g. A 'Start experiment now' button is located at the bottom right.



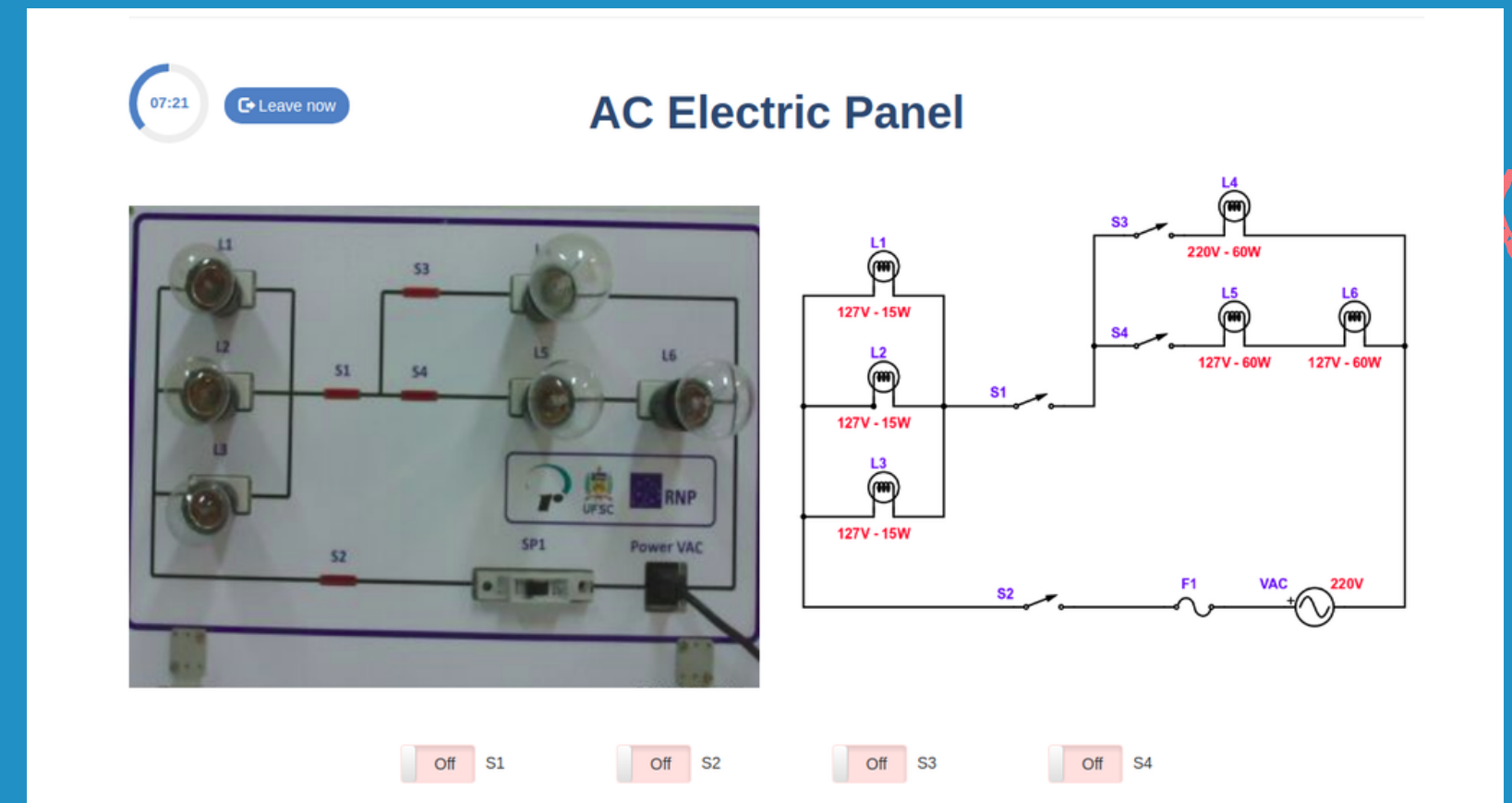
## \* ELECTRONICS

- The electronics lab described in the technology labs section also serves for this section.
- Through this lab you will be able to create real electronic circuits using typical components: resistors, capacitors, coils, diodes, etc. and test their operation using real instruments such as the function generator, oscilloscope, power supply or multimeter.



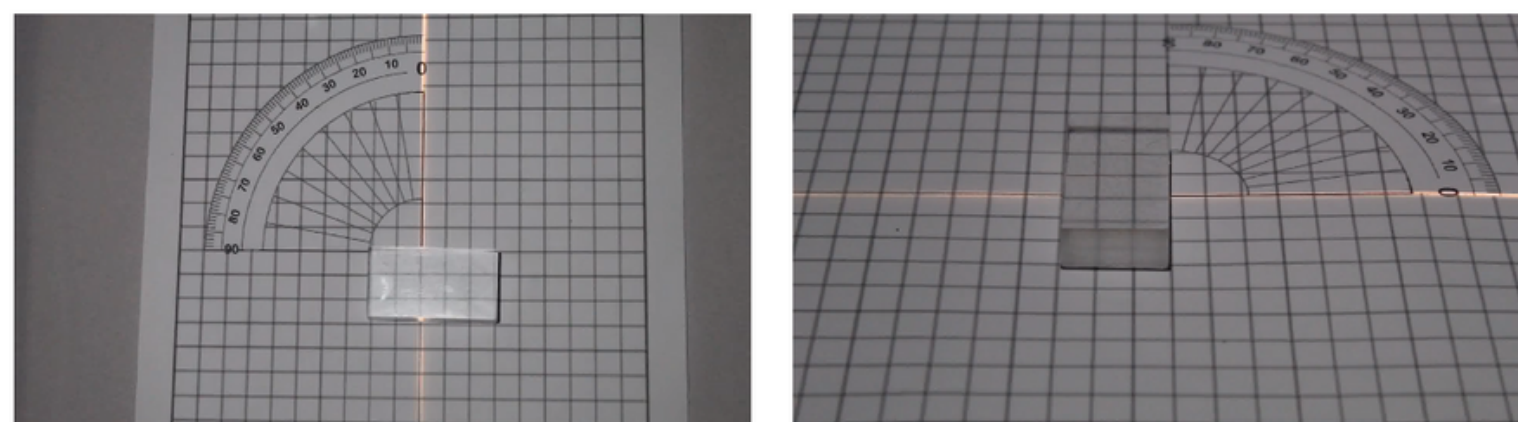
## \* AC ELECTRONICS

- The AC electronics lab described in the technology labs section also serves for this section.
- Study how alternating current (AC) works by experimenting with several light bulbs connected in series and/or parallel.



## SNELL'S LAW

- It is also known as the Law of Refraction.
- This lab allows you to study the relationship between angles of incidence and angles of refraction.
- You will be able to experiment with two different types of lenses (a solid lens or a water-filled lens) to determine their refractive indices..



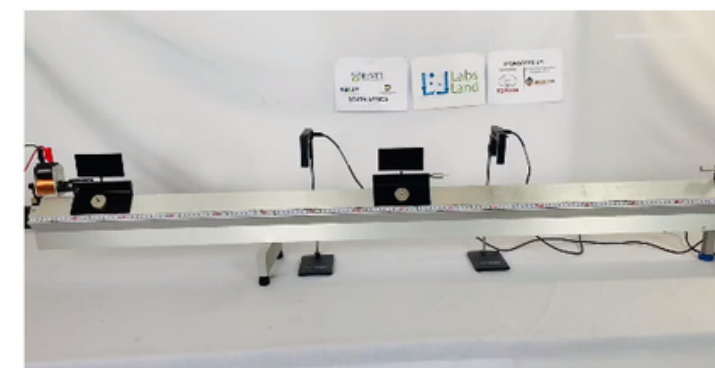
El actual ángulo de incidencia es: 0°



## CONSERVATION OF MOMENTUM

- Through this laboratory you will be able to make two cars collide in an elastic or inelastic collision, and also varying certain experimental variables, such as the mass of the cars (from 50 g to 150 g).
- You can then experimentally test whether or not the total momentum changes after the collision.

Vista frontal



 Enter full screen

Vista Perspectiva



 Enter full screen



# Contact us



<https://labsland.com>  
[contacta@labsland.com](mailto:contacta@labsland.com)

