Globisens

Made for iPad

Labdisc gensci

for general science

Labdisc Gensci Plus GlobiLab Software

Quick Start Guide

Contents

1. Labdisc Hardware Overview

1.1 What's in the Pack

① **Labdisc** data logger

② Warranty

③ Quick start guide

④ **Labdisc** AC charger

⑤ Software CD

⑥ Air pressure tube

⑦ Plastic rod, stand and screw

1.2 Ports and Controls

The picture below reviews the **Labdisc** ports, sensors, keypad and display:

① On/Off and Escape key

② Scroll key

③ Select key

④ Sensor selection keys

⑤ Graphical display 128 x 64 pixels

⑥ Rotating ring

⑦ USB port (factory use only)

⑧ Plastic leg

⑨ M5 screw insert

⑩ Distance sensor

⑪ Microphone, sound level sensors

⑫ Relative humidity sensor

⑬ External temperature input (unused)

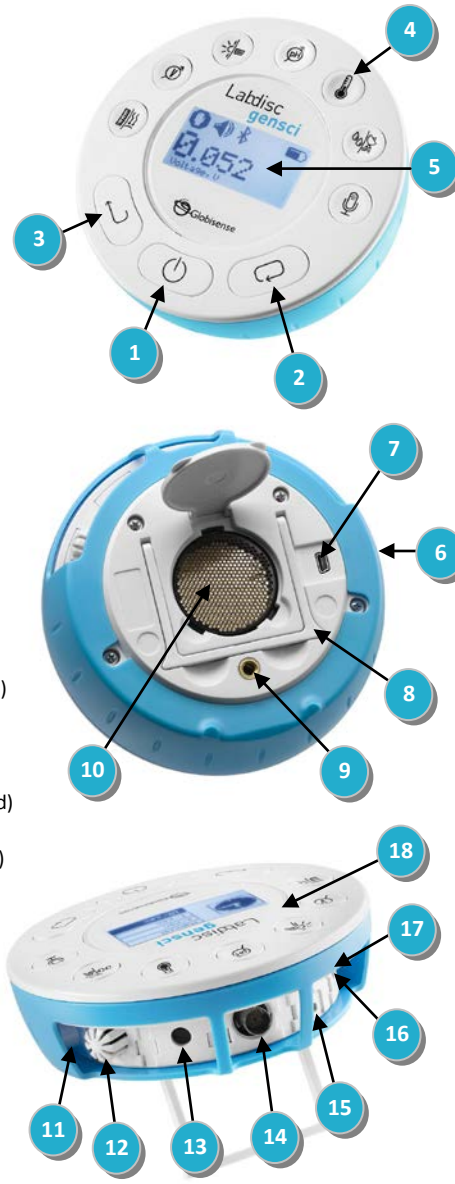
⑭ pH input (unused)

⑮ Light sensor, universal input (unused)

⑯ Current and voltage sensor (unused)

⑰ Air pressure sensor

⑱ GPS sensor



1.3 Built-in Sensors

Icon	*Type*	*Range*	*Description*	*Max. Sample Rate*
	Air pressure	0 to 300 kPa	Measuring air pressure	10/s
	Current (unused)	-1 to +1 A	Measuring electric current	24,000/s
	Distance	0.4 to 10 m	Measuring distance	25/s
	External temp. (unused)	-25 °C to 110 °C	General purpose stainless steel temperature probe	100/s
	GPS	N/A	Measuring 6 different parameters: Longitude, latitude, course, speed, date and time	1/s
	Internal temp.	-10 °C to 50 °C	Measuring ambient temperature	100/s
	Light	0 to 55,000 lux	Measuring light level	24,000/s
	Sound	Sound level 56 to 93 dB	Measuring sound level	10/s sound level
	Microphone	Sound wave 0 to 5 V	Measuring sound waves	24,000/s
	pH (unused)	0 to 14 pH	Measuring pH level	10/s
	Relative humidity	0 to 100% RH	Measuring relative humidity	100/s

Icon	Type	Range	Description	Max. Sample Rate
	Universal input (unused)	0 to 5 V	Connecting Fourier or Vernier analog sensors	24,000/s
	Voltage (unused)	-30 to +30 V	Measuring electric voltage	24,000/s

1.4 Using the Labdisc

CHARGE THE LABDISC BATTERY BEFORE STARTING

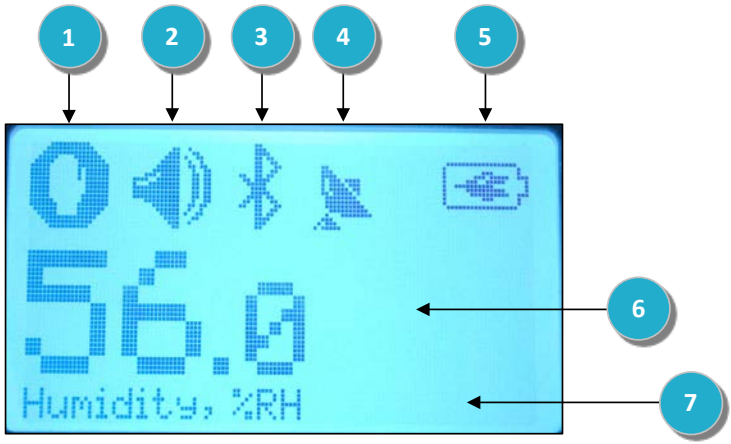
Before working with the **Labdisc** for the first time, the unit should be charged for six hours with the supplied 12 V charger. The **Labdisc** charging input is located to the left of the ***On/Off*** key. Simply rotate the orange ring until the charging input on the **Labdisc** is exposed and then connect the charger plug to the charging input.

The **Labdisc** charger will accept any input voltage ranging from 100 to 240 VAC 50/60 Hz, making it functional worldwide.

Note: The Labdisc is not operational while charging

1.4.1 Labdisc display

The **Labdisc** LCD display allows users to see the different sensor readings and to setup or re-configure the Labdisc parameters.



① **Run/Stop icon** – shows  when the **Labdisc** is logging data, or  when the Labdisc is not logging sensor data.

② **Sound Status** – shows  active sound beep when the key is pressed and  when the sound beep is disabled.

③ **Communication Status** – shows  when Bluetooth communication is enabled

④ **GPS Status** – shows  when the GPS is enabled,  when locked to GPS satellites and provides valid positioning parameters.

⑤ **Battery Level** – shows battery capacity at 3 levels  when the **Labdisc** is connected to the external charger.

⑥ **Sensor Value** – shows the selected sensor value.

⑦ **Sensor Name and Unit** - shows the selected sensor name and unit.

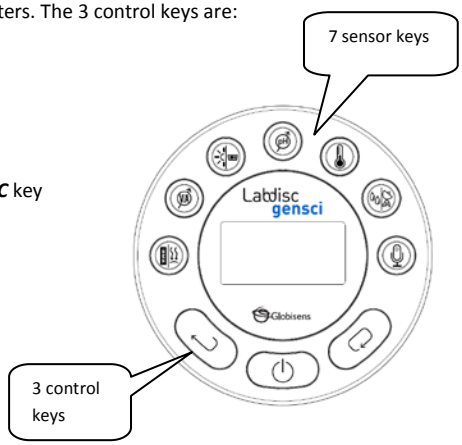
1.4.2 Labdisc keys

The **Labdisc** 10 keys are divided into 7 sensor keys and 3 control keys. Using the sensor keys users can select and view different sensor readings. The control keys are used to turn on/off the **Labdisc**, setup the device for the next logging session and cofigurate all its parameters. The 3 control keys are:

Select key

On/Off and ***ESC*** key

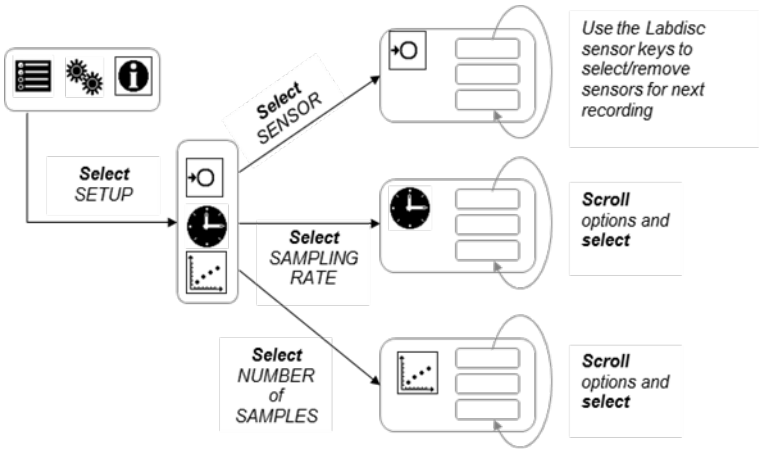
Scroll key



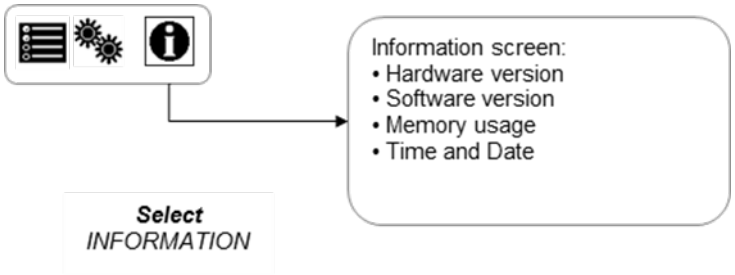
1.4.3 Labdisc menu

Press the ***Scroll*** key to enter the Labdisc menu. Then use the ***Scroll*** key to scan menu options, the select key to choose a menu option and the ***ESC*** key to go one level up in the menu.

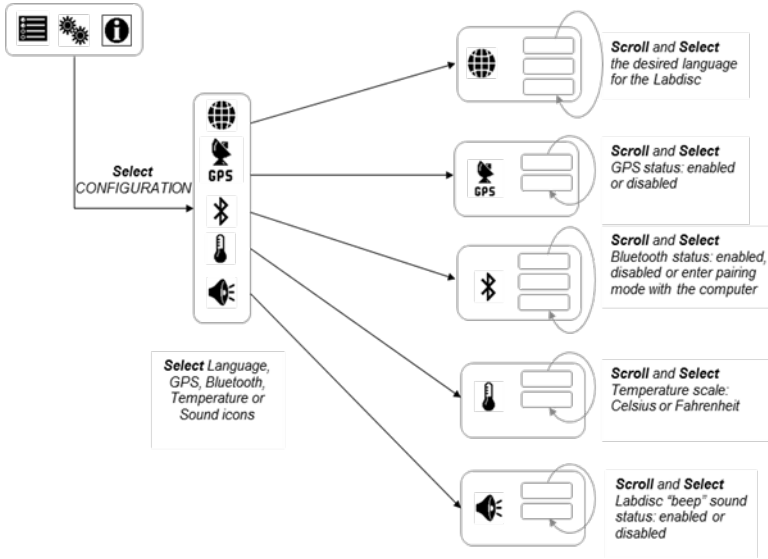
1.4.3.1 Setup the Labdisc for the next logging session



1.4.3.2 Labdisc information



1.4.3.3 Configuration of the Labdisc



2. GlobiLab Analysis Software

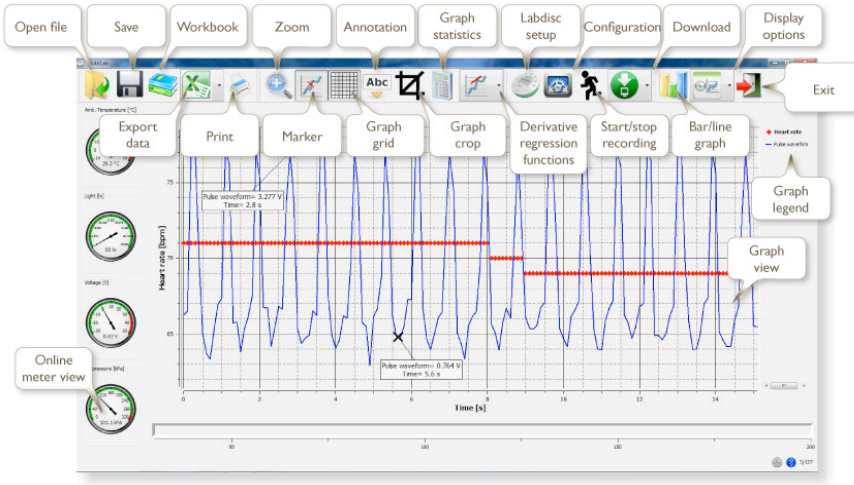
2.1 Software Installation

To install the software, users should run the following installers:

- For PC: GlobiLab-en-1.0-setup.exe
- For Mac: GlobiLab-en-1.0-setup

Then follow the simple installation instructions. These instructions take the user through the installation of the **GlobiLab** software.

2.2 Software Functions



2.3 Software Popular Icons and their Functions

	Selecting the ***Open-project*** icon opens the stored activity *.XML files and displays all its graphs and graphical attributes.

	Selecting the ***Workbook*** icon opens the activities folder, where users can choose from a variety of PDF activities.
	Clicking the ***Display-options*** small triangle icon allows the user to select one of the following six display options: 1.  Meter view 2.  Table view 3.  Graph view 4.  Map view 5.  Mixed Meter and Graph view 6.  Mixed Table and Graph view
	Selecting the ***Marker*** icon enters into ***Marker*** mode. Left mouse click, near any of the graphs, will place a marker on the graph. Hovering over any of the markers, while pressing and holding the left mouse button and dragging the mouse, will move the marker over the graph. Selecting the ***Marker*** icon again, exits the ***Marker*** mode.
	Selecting the ***Annotation*** icon activates the ***Annotation*** *mode*. Left mouse click opens a dialog box where users can enter text and images. Pressing the ***Annotation*** icon again exits the ***Annotation*** *mode*.

	Pressing the ***Function-options*** small triangle icon allows the user to apply the mathematical functions listed below between the graph markers: 1.  Selecting the ***Linear regression*** icon will display the best linear line that fits the graph between the locations of two markers. Next to the line the software will open a small text box displaying the linear line equation: Y= aX+b. 2.  Selecting the ***Quadric regression*** icon will display the best parabolic line (2^{nd} degree) that fits the graph between the locations of two markers. Next to the line the software will open a small text box displaying the parabolic line equation: Y= aX^2+bX+c.
	Selecting the ***Run*** icon launches a new data collection session.
	Selecting the ***Stop*** icon ends the current data collection session.
	Selecting the ***Selective download*** icon opens a table listing all stored recordings. Selecting one of the lines on the table and pressing download will download this specific recording to the computer.
	Setting up the **Labdisc** is done by selecting the ***Setup*** icon. The software will open a dialog box, where users can select/remove sensors, set the sampling rate and the amount of samples for the next data recording.

	Selecting the ***EXCEL*** icon saves the file in a *.CSV format, prompts the user for a file name and then automatically opens EXCEL and exports the experiment data into the spreadsheet.
	**GlobiLab *status bar***, is located at the bottom right corner of the software. It includes 3 icons: 1. **Bluetooth indicator** – where blue indicates a Bluetooth wireless communication between the computer and the **Labdisc**. A right mouse click on this icon will open a list of recognized **Labdiscs**, click on one to connect. 1. **Memory info** – shows how many experiments are stored in the **Labdisc** memory, out of a maximum of 127. In the example above there are 7 stored experiments out of 127. A right mouse click on this section will allow users to erase all stored data or just the last recording.

2.4 GlobiLab Software for iPad

The **GlobiLab** software for iPad (iPad, iPad 2 and 3rd generation iPad models) is available in the App Store and makes K-12 science experiments mobile, convenient and immediate. **GlobiLab** wirelessly integrates between the **Labdisc** data logger and the iPad. Allowing full **Labdisc** management (setup of all data logging parameters, online display of current measurements and download of the **Labdisc** sample memory), together with graph manipulations (markers, zoom, crop, text and image annotation) and data analysis (statistics and curve fitting etc.).

GlobiLab software for iPad was specifically designed to engage students and help visualize complex science concepts by harnessing the iPad built-in accelerometer sensor, data display, multimedia and multi-touch features. The following steps provide a guide on the installation and implementation of the **GlobiLab** App for iPad.

	***Download and install of the GlobiLab application*** • Tap the iPad App Store icon  • Search for **"GlobiLab"** • Press the FREE green key to install the application
	***Set wireless communication between the Labdisc and the iPad*** • Go to *iPad Setting - Bluetooth* and select your **Labdisc** from the Devices list • The iPad should immediately connect to your **Labdisc** and change its status to "connected" • Close the setting and open the **GlobiLab** software
	***Meter view*** • Tap Meter view  to see the current values of the **Labdisc** sensors • Tap one of the Meters and scroll the sensor wheel to select a different sensor type for an existing Meter • Select a different Meter type  from the horizontal line of icons

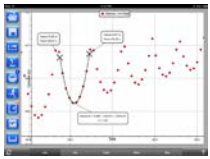
Data collection

- Tap the SETUP icon and enter the SETUP screen. This dialog box allows you to select the Sensors, Sampling rate and amount of samples for the next data recording.
- Tap the RUN icon to start recording and observe the graph build up on the screen
- You may switch the display to a Bar Graph view by tapping the Bar Graph key Bar
- You may switch the display to a Table view by tapping the Table key Table
- To stop recording tap the STOP icon

Download Labdisc stored measurements to the iPad

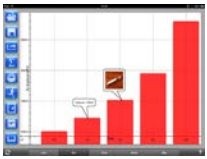
The **Labdisc** can store up to 127 different experiments. This is very useful when conducting outdoor data collection or long measurements.

- Tap the Download icon
- The iPad will list all **Labdisc** stored experiments Each line on this list shows what sensors were recorded, at what sampling rates and for how many samples. In addition it indicates the date and time of the recording.
- Click on one of the lines in the list. The **Labdisc** transfers the data to the iPad.
- After all data is transferred, the iPad will show a graph of the collected measurement



Data analysis (markers, curve fitting)

- Tap the open icon and select “Free fall”. This graph describes a real recording of a ping-pong ball bouncing on a table, as recorded by the **Labdisc** distance sensor. For more details see the Free Fall movie at: http://www.globisens.com/resources/experiment-videos

	• Long touch on the graph to add a Marker • Touch the Marker to cross and drag it with your finger. View the Marker text box data changing while the marker follows the graph line. • Tap the graph twice to view the actual sampling points • Long touch the graph to add a 2nd Marker • Place both the Markers on the beginning and end of a single ball jump • Tap the Curve Fitting icon and select a Quadric Regression to get the mathematical equation representing the ping-pong ball jump. From this equation we can calculate earth gravitation.
	***Graph Annotation*** • Use a long touch anywhere on the background (not on a graph), create an empty annotation. The edit annotation box opens automatically. From here: o Edit or write an annotation o Add an image using the camera or the image gallery o Remove the annotation
	***Use of Map view in field trip (Environment)*** Recording GPS together with other **Labdisc** sensors, enables the **GlobiLab** software to plot these sensors over the Apple maps. • Make sure the iPad is connected to the Internet • Tap the Open icon and select the "Walk in the park". In this experiment we measured the different climate in a city park compared to a nearby cross road. For more details check the Microclimates movie at: http://www.globisens.com/resources/experiment-videos. • Tap the color scale on the left and select Amb. Temperature. Observe the dramatic temperature change while walking from the city cross-road to

<table>
<tr><td></td><td>the park.
• Tap the colored samples on the map to get a marker with the temperature value.
• Pinch to zoom in/out the map
• See the experiment data in a table, by tapping the Table View 

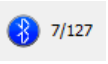
and observe the GPS longitude and latitude values.
• You may show other experiments under this category like” Trip to the Dead Sea” or “Flight from Tel-Aviv to Istanbul”</td></tr>
<tr><td>  </td><td>Online help

GlobiLab offers an online help for each of the 5 views: Line, Bar, Table, Meter and Map.

• Open the relevant View
• Tap on the HELP icon  and observe a list of functions and controls</td></tr>
</table>

3 Labdisc – GlobiLab Communication

3.1Bluetooth Wireless Communication

Before wireless communication with a **Labdisc** for the first time, the **Labdisc** should be added as a device to the computer in a process called pairing. Pairing need be done only once for each **Labdisc**, after which the computer stores the connection information, including a unique name for each **Labdisc**. To connect to a a new **Labdisc**, right click on the Bluetooth icon in the **GlobiLab** ***status bar,*** 

located at the bottom right corner of the screen, then click on the **Labdisc** you want to connect to.

3.1.1 Set the Labdisc to "pairing mode"

1. Turn on the **Labdisc.**
2. Press the ***Scroll*** key to launch the **Labdisc** menu.
3. ***Scroll*** and ***select*** the Configuration  menu.
4. In the configuration menu ***scroll*** and ***select*** the Bluetooth  icon.
5. In the Bluetooth menu select "***BT pairing***". The **Labdisc** will produce a long "beep" sound and switch to "***BT enabled***".

3.1.2 Pairing with a PC running Windows OS

1. Start the **GlobiLab** software.

2. Right click the ***Bluetooth*** 

icon, located on the ***status bar*** at bottom right corner of the **GlobiLab**.

3. This action opens a pop-up menu. From the menu select "***find more Labdiscs***". The computer opens the "***add a device***" dialog box and starts searching for the Bluetooth device.

4. Your **Labdisc** will be displayed as "***Labdisc-xxxx***" where "xxxx" are the 4 last digits of the **Labdisc** serial number sticker. Select this device and press ***Next***.

5. Select the 2nd option: "***Enter the device pairing code***" and press ***Next***.

6. In the next dialog box enter "1234" as the pairing code and click ***Next***. Wait for the computer to finish the process and announce that the **Labdisc** and computer were paired successfully.

7. Right click the ***Bluetooth*** icon on the ***status bar***. Choose the **Labdisc** you've just paired and click on it. The computer will connect to the **Labdisc** and will turn the ***Bluetooth*** icon blue.

3.1.3 Pairing with a Mac OS

1. Open the ***Bluetooth*** menu from the Mac menu bar and select "Set Up Bluetooth Device...".

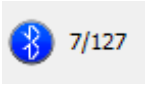
2. A dialog box opens. Your **Labdisc** will be displayed as "***Labdisc-xxxx***" where "xxxx" are the 4 last digits of the **Labdisc** serial number sticker. Select this device and press ***Continue***.

3. Put your **Labdisc** in pairing mode again (see 3.2.1)

4. In the next dialog box press the "**Passcode Options…**" button and select the 3rd option: "***Use a specific passcode***". Enter the passcode "1234", press "**OK**" and "**Continue**".

5. When the wizard action is complete wait for the computer to confirm that the **Labdisc** was added successfully. The **Labdisc** is now paired, and the software can connect to it.

6. Open the **GlobiLab** software.

7. Right click the ***Bluetooth*** icon 

located at the bottom right corner of the software.

8. Choose the **Labdisc** you've just paired and click on it. The computer will connect to the **Labdisc** and turn the ***Bluetooth*** icon blue.

3.1.4 Pairing with an iPad

1. Launch the iPad Setting 

2. Open Bluetooth. Make sure the iPad Bluetooth is on.

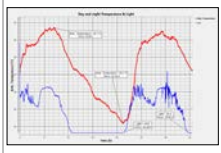
3. From the devices list click the "***Labdisc-xxxx"***, where the xxxx digits match the last 4 digits of your **Labdisc** S/N sticker on the **Labdisc** back cover.

4. The iPad will ask for a PIN code. Enter "1234" and click Pair.

5. The iPad will show **Labdisc-xxxx** connected.

4 Experiment Samples

The GlobiLab software includes experiment samples, for teachers and students to view, analyze, modify or repeat. This section reviews some interesting recorded experiments found in the GlobiLab application. To open a recorded experiment, simply press the ***Open*** icon in the GlobiLab software and select the files below:



Day and Night Temperature Changes

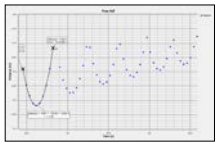
A long 48-hour recording of temperature and light levels, with the Labdisc located on the window shelf:

- ***Sensors selected:*** Light, ambient temperature
- ***Sampling rate:*** 1/min
- ***Amount of samples:*** 1000
- ***Experiment duration*:** 48 hours
- ***Communication:*** Offline, data downloaded at recording's end
- **Data Analysis:** Use the ***Markers*** to show min/max. values

Walk in the Park

Micro climate activity. Comparing temperature and Relative humidity at a city cross-road and park:

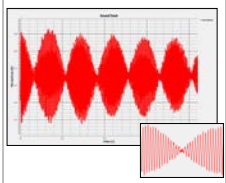
- ***Sensors selected:*** External temperature, relative humidity, GPS
- ***Sampling rate:*** 1/sec
- ***Amount of samples:*** 1000
- ***Experiment duration*:** 15 minutes
- ***Communication:*** Offline, data downloaded at recording's end
- **Data Analysis:** Temp./humidity changes in GlobiLab map view



Free Fall

A classic activity for Newton's 2nd Law. Measuring the free fall acceleration of a ping pong ball bouncing on a wooden surface, with the distance sensor located 1.5 m above it:

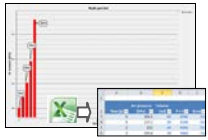
- ***Sensors selected:*** Distance
- ***Sampling rate:*** 25/sec
- ***Amount of samples:*** 1000
- ***Experiment duration:*** Seconds
- ***Communication:*** Online, preferably via wireless Bluetooth
- ***Data Analysis:*** Use ***Markers*** and ***Crop*** functions to focus on the ball bounces. Then use ***quadric regression*** on a single bounce, to get the bounce equation and extract the free fall acceleration.



Sound Beat

Sound wave recording of 2 tuning forks, producing slightly different harmonics, of 440 Hz and 435 Hz.

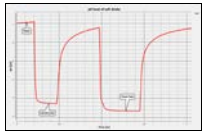
- ***Sensors selected:*** Microphone
- ***Sampling rate:*** 25,000/sec
- ***Amount of samples:*** 10,000
- ***Experiment duration:*** < 1 second
- ***Communication:*** Offline, data downloaded at recording's end
- ***Data Analysis:*** Use ***Zoom*** to see the sound sine wave and ***Markers*** to measure amplitude and frequency.



Boyle's Gas Law

Verifying the ideal gas law: P x V = CONSTANT. Using a 100ml syringe connected to the air pressure sensor. Manually recording air pressure while decreasing the syringe volume by 10ml at a time.

- ***Sensors selected:*** Air pressure
- ***Sampling rate:*** Manual
- ***Amount of samples:*** 10
- ***Communication:*** Online, preferably via wireless Bluetooth
- ***Data Analysis:*** Use ***Bar-Graph*** view to see air pressure values***.*** Use ***Annotation*** to add the volume for each bar and ***Export to Excel*** to calculate P x V multiplication.



pH level of Soft Drinks

A fun and interesting activity, comparing the acidity of water, lemon juice and Coca-Cola.

- ***Sensors selected:*** pH
- ***Sampling rate:*** 10/sec
- ***Amount of samples:*** 1000
- ***Experiment duration:*** 2 minutes approx.
- ***Communication:*** Online, preferably via wireless Bluetooth
- ***Data Analysis:*** Using the ***Markers*** to measure the acidity level of the different liquids

The FCC Wants You to Know:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

a) Reorient or relocate the receiving antenna.
b) Increase the separation between the equipment and receiver.
c) Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
d) Consult the dealer or an experienced radio/TV technician.

FCC Warning

Modifications not expressly approved by the manufacturer could void the user authority to operate the equipment under FCC Rules.

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

INSTRUCTIONS CONCERNING HUMAN EXPOSURE TO RADIO FREQUENCY ELECTROMAGNETIC FIELDS

A distance of at least 20cm. between the equipment and all persons should be maintained during the operation of the equipment.

Made for
iPad (3rd generation)
iPad 2
iPad

iPad is a trademark of Apple Inc., registered in the U.S. and other countries.

"Made for iPad" means that an electronic accessory has been designed to connect specifically to iPod, iPhone, or iPad, respectively, and has been certified by the developer to meet Apple performance standards. Apple is not responsible for the operation of this device or its compliance with safety and regulatory standards. Please note that the use of this accessory with iPod, iPhone, or iPad may affect wireless performance.