

USER GUIDE

Warning

This device is not waterproof or water resistant. Do not submerge.

This device takes 2 AA batteries. Do not mix old and new batteries. Do not dispose of the device or its batteries in domestic waste.

Operates on 2.4 GHz ISM Band.

The Basics

Please refer to www.iolab.science for the latest information and to download our software.

Remove the battery pull tab to allow the device to operate. Remove the protective plastic film from the label on the top of the device to avoid the appearance of ripples.

Your IOLab has two key components. The “remote” (the main body of the device) and the “dongle” (the removable drive that plugs into the USB port of your computer). The serial number for the remote is located in the cavity under the dongle. The serial number for the dongle is inside the plastic housing.

To remove the dongle, simply press firmly with your thumb on the metal piece, thus releasing the dongle from the remote housing. (To replace the dongle when you are finished using it, simply angle it in to the cavity and press in back into place.)

Quick Start Guide

Go to www.iolab.science and download the driver (install once per computer if using Windows) and the IOLab application (Windows or Mac). The steps required for this (also described below) are shown in videos linked under “Getting Started” on the IOLab YouTube channel linked on the website.

Plug in the dongle and press the power button on the remote (the right-hand button on the front). In order to use the system, your dongle and remote need to be paired. If remote is properly communicating with a paired dongle the LED’s on your remote will flash in sequence once per second – first the left LED immediately followed by the right LED. If the remote is not communicating with a paired and powered dongle, the left and right LED on the remote will flash simultaneously once per second. If this is the case please follow the instructions on pairing the remote and dongle found in the “Getting Started “ YouTube videos.

Start the application as indicated on www.iolab.science. Note that the process is slightly different for Mac and PC. When running the IOLab application for the first time on a given computer you should follow the calibration instructions shown in the “Getting Started” videos.

Select the sensors you want to read; charts to display the data from the selected sensors will be created.

Click on the Record button to start data acquisition, and click on the Stop button to stop.

The Data Smoothing button selects how many points are included in the smoothing average.

To take another set of data, click Reset once. To clear your sensor choices and start again, click Reset twice.

For more usage information on Navigating the Plots, Calibrating Sensors, Saving Your Data, and other key features of our software, please refer to www.iolab.science for the most up to date information.

System Overview

- Wireless IOLab unit communicates with USB dongle using 2.4GHz ISM band.
- Powered by 2xAA batteries.
- TI-MSP430F5329 microcontroller, TI-CC2543 radio.
- Dongle communicates with PC/Mac via simple virtual comports interface (i.e. no special USB programming required).
- Individual sensors synchronized and read out in various predefined configurations.
- Up to 4.8 kHz sensor sampling.
- One dongle can synchronously read data from two IOLab remotes.
- Wireless range up to 100 feet. RSSI included in data.
- Size 30 mm x 75 mm x 130 mm, Weight: Remote 148 g (w/o batteries), Dongle 8 g.

Sensor Parameters

- 3D accelerometer (14 bit signed, 2/4/8g ranges, 1.56-800 Hz sample rate)
- 3D magnetometer (16 bit signed, 1000 uT range, 0.63-80 Hz sample rate)
- 3D gyroscope (16 bit signed, measures ω_X , ω_Y , ω_Z , 250/500/2000 deg/sec ranges, 95-760 Hz sample rate).
- Rolls on 3 wheels along Y-axis; optical encoder measures displacement velocity & acceleration, 1 mm/count, 100 Hz sample rate.
- Force probe (Range ± 10 N parallel to Y axis, 12 bit signed, up to 4.8 kHz sample rate)

- Light intensity sensor (12 bit, up to 4.8 kHz Hz sample rate)
- Atmospheric pressure sensor (0.15 kPa resolution, 1-100 Hz sample rate)
- Temperature sensor (die temperature, w/ 400 Hz over-sampling).
- Microphone (12 bit, 20-20kHz, up to 4.8 kHz Hz sample rate).
- Speaker/Buzzer (programmable pitch & duty cycle, 35Hz – 8.4 kHz)
- DC coupled high gain differential amplifier, up to 4.8 kHz sampling.
- 6 analog input pins (sampled by 12 bit ADC at up to 4.8 kHz).
- 6 digital I/O pins on header.
- DAC output (8 bit resolution).
- Two tri-color LED's & two pushbuttons (software readable).
- FTDI interface on header (standard configuration).
- Over the air re-programming of all three system microcontrollers.

FCC STATEMENT

1. This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
 - (2) This device must accept any interference received, including interference that may cause undesired operation.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital, 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 the 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:

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