iOLab 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 comport 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.
- Force probe thread: M3

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 $\dot{x}$, $\dot{y}$, $\dot{z}$, 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)
- EKG daughter board mates with header (3 or 6 differential channels + ground ref, each 12 bits, TI-INA333 instrumentation amplifiers, up to 800 Hz sample rate).
- DC coupled high gain differential amplifier (gain = 1,400, f3dB = 100Hz), up to 4.8 kHz sampling.
- 6 analog input pins on header (sampled by 12 bit ADC at up to 4.8 kHz).
- 6 digital I/O pins on header.
- DAC output on header (8 bit resolution).
- Two pushbuttons (software readable).
- Two tri-color LED's.
- FTDI interface on header (standard configuration).
- Over the air re-programming of both sensor microcontrollers (i.e. no special hardware needed to redesign & modify the open source firmware).
- Device designed to be opened; threaded metal bushings for all screws; easy to disassemble and reassemble.

Software

- Open source firmware & software (i.e. go ahead and re-design it).

- Free download and info at www.iolab.science