EnviroDIY ModularSensors: A Library to give Environmental Sensors a Common Interface of Functions for use with Arduino-Compatible Dataloggers

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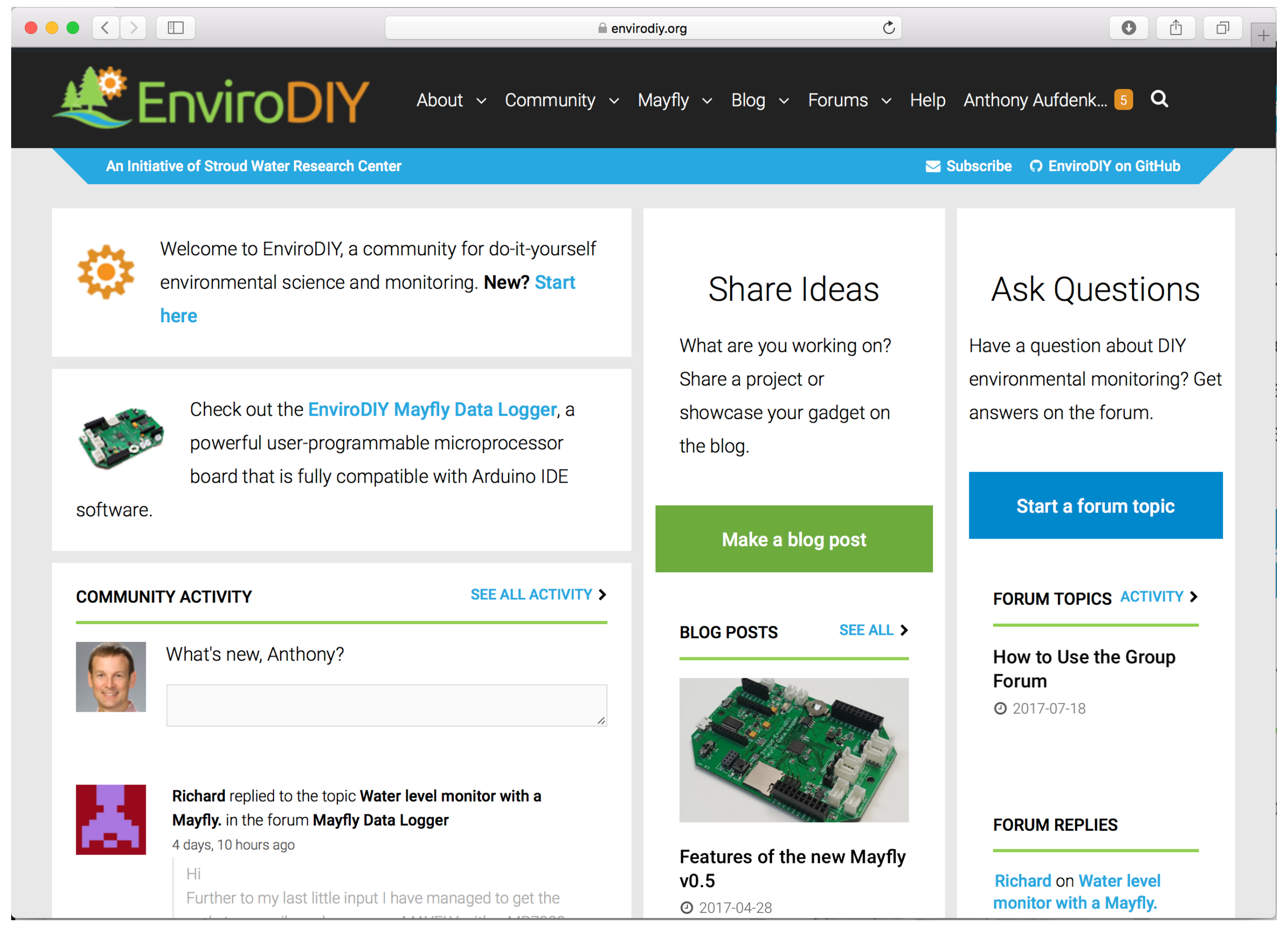
The Challenge

- Arduino-based devices for Do-It-Yourself environmental science and monitoring are very appealing to academics and citizen science groups.
- It is challenging to program Arduinos to simultaneously perform all required functions of a solar-powered, wireless, multi-sensor logger!
- Arduino code examples are available for all the functions individually, but they often have conflicts and internal inconsistencies!

ARDUINO OPEN-SOURCE COMMUNITY

- The community needs an easy-to-use, high-level library that unifies all data logging code into a set of common functions that work for a wide variety of Arduino boards and environmental and sensors.

EnviroDIY.org Community


envirodiy.org

EnviroDIY About Community Mayfly Blog Forums Help Anthony Aufdenk... 5

An Initiative of Stroud Water Research Center

Subscribe EnviroDIY on GitHub

Welcome to EnviroDIY, a community for do-it-yourself environmental science and monitoring. **New?** Start here

Check out the EnviroDIY Mayfly Data Logger, a powerful user-programmable microprocessor board that is fully compatible with Arduino IDE software.

COMMUNITY ACTIVITY SEE ALL ACTIVITY ›

What's new, Anthony?

Richard replied to the topic **Water level monitor with a Mayfly.** in the forum **Mayfly Data Logger**
4 days, 10 hours ago
Hi
Further to my last little input I have managed to get the

Share Ideas

What are you working on? Share a project or showcase your gadget on the blog.

Make a blog post

BLOG POSTS SEE ALL ›

Features of the new Mayfly v0.5
2017-04-28

Ask Questions

Have a question about DIY environmental monitoring? Get answers on the forum.

Start a forum topic

FORUM TOPICS ACTIVITY ›

How to Use the Group Forum
2017-07-18

FORUM REPLIES

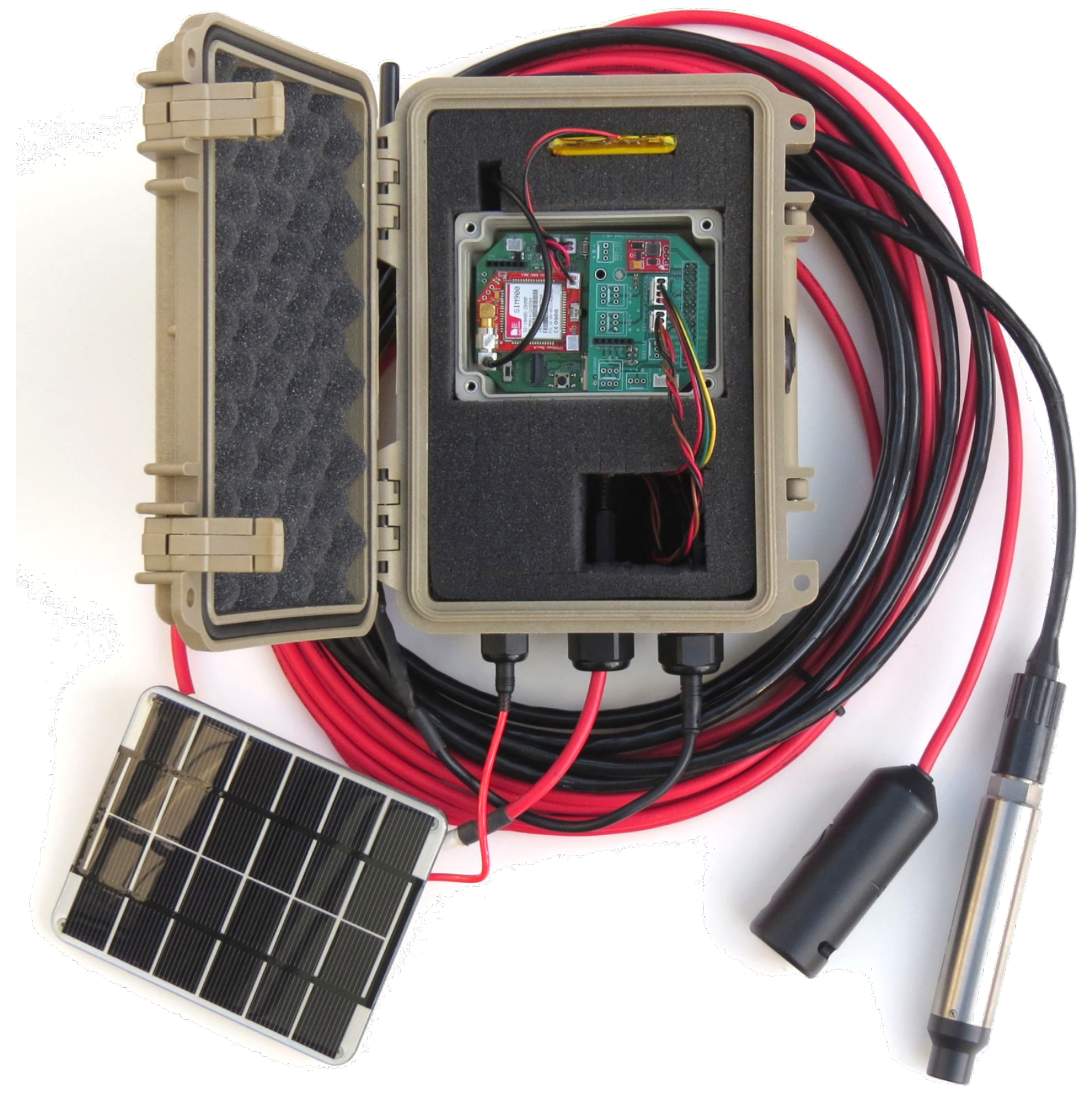
Richard on Water level monitor with a Mayfly.

EnviroDIY ModularSensors Library for Arduino

The easy-to-learn Arduino programming language is built on the extremely powerful C++ language. We leverage C++ object-oriented class-subclass structures to provide over 50 functions that work identically for for all sensors, variables, boards and radios.

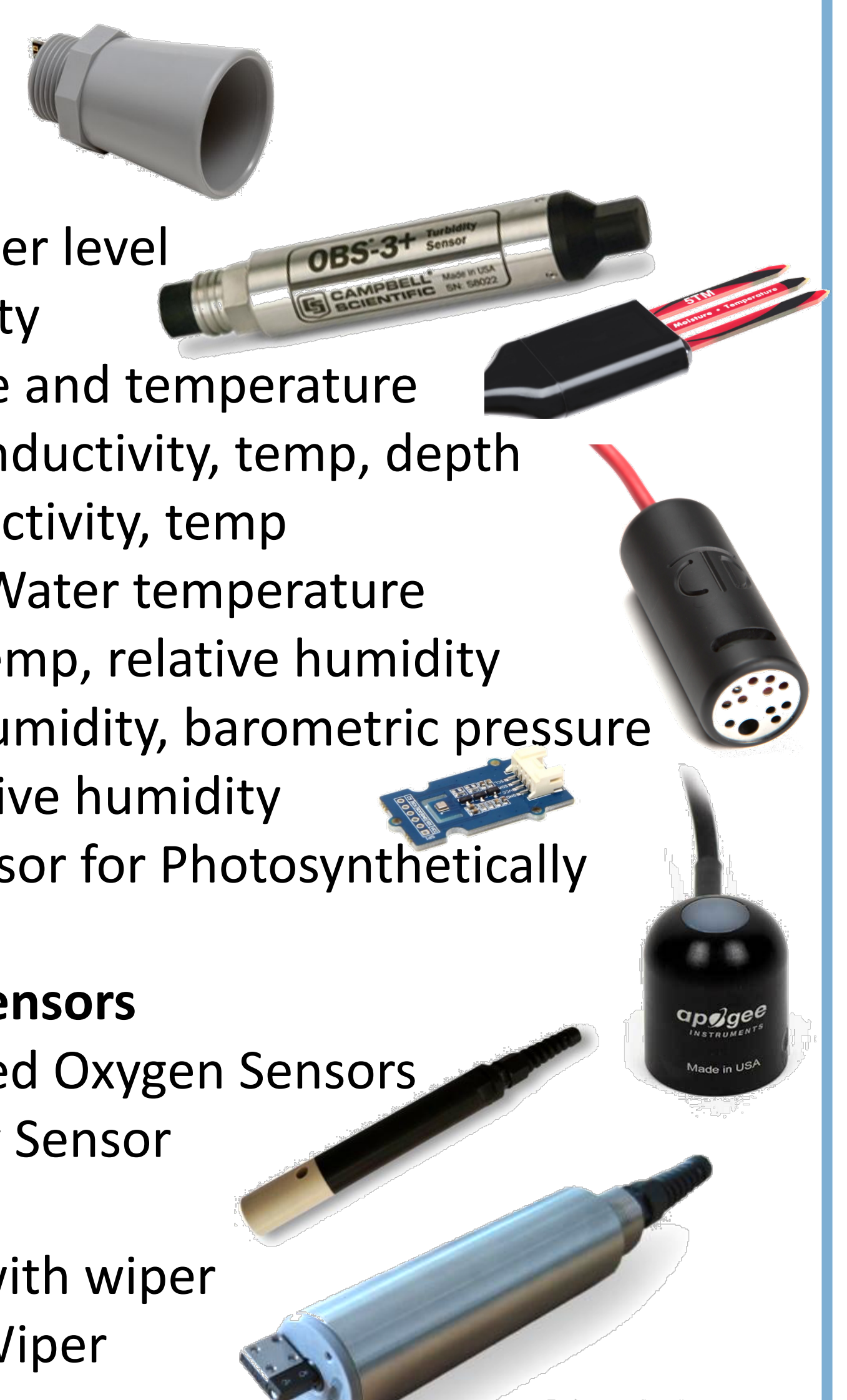
High-Level Functions (selected examples)

- **setupSensors()** - This sets up all of the variables in the array and their respective sensors by running all of their setup() functions.
- **sensorsSleep()** - This puts all sensors to sleep (i.e., cuts power), skipping repeated sensors.
- **sensorsWake()** - This wakes all sensors (i.e., gives power), skipping repeated sensors.
- **connectNetwork()** - Connects to the internet via WiFi or cellular network. Returns true if connection is successful.
- **setTimeZone(int timeZone)** - Sets the timezone that you wish data to be logged in (in +/- hours from UTC). *This must always be set!*
- **syncRTClock()** - This calls getNISTTime() and then synchronizes the DS3231 real time clock with the NIST provided timestamp.
- **generateSensorDataCSV()** - This returns an Arduino String containing comma separated list of sensor values.
- **logToSD(String rec)** - This writes a data line containing "rec" the the SD card and sets the "file modified" timestamp.
- **postDataEnviroDIY()** - Creates proper headers and sends data to the EnviroDIY Water Quality Data Portal (http://data.envirodiy.org). Returns an HTML response code.

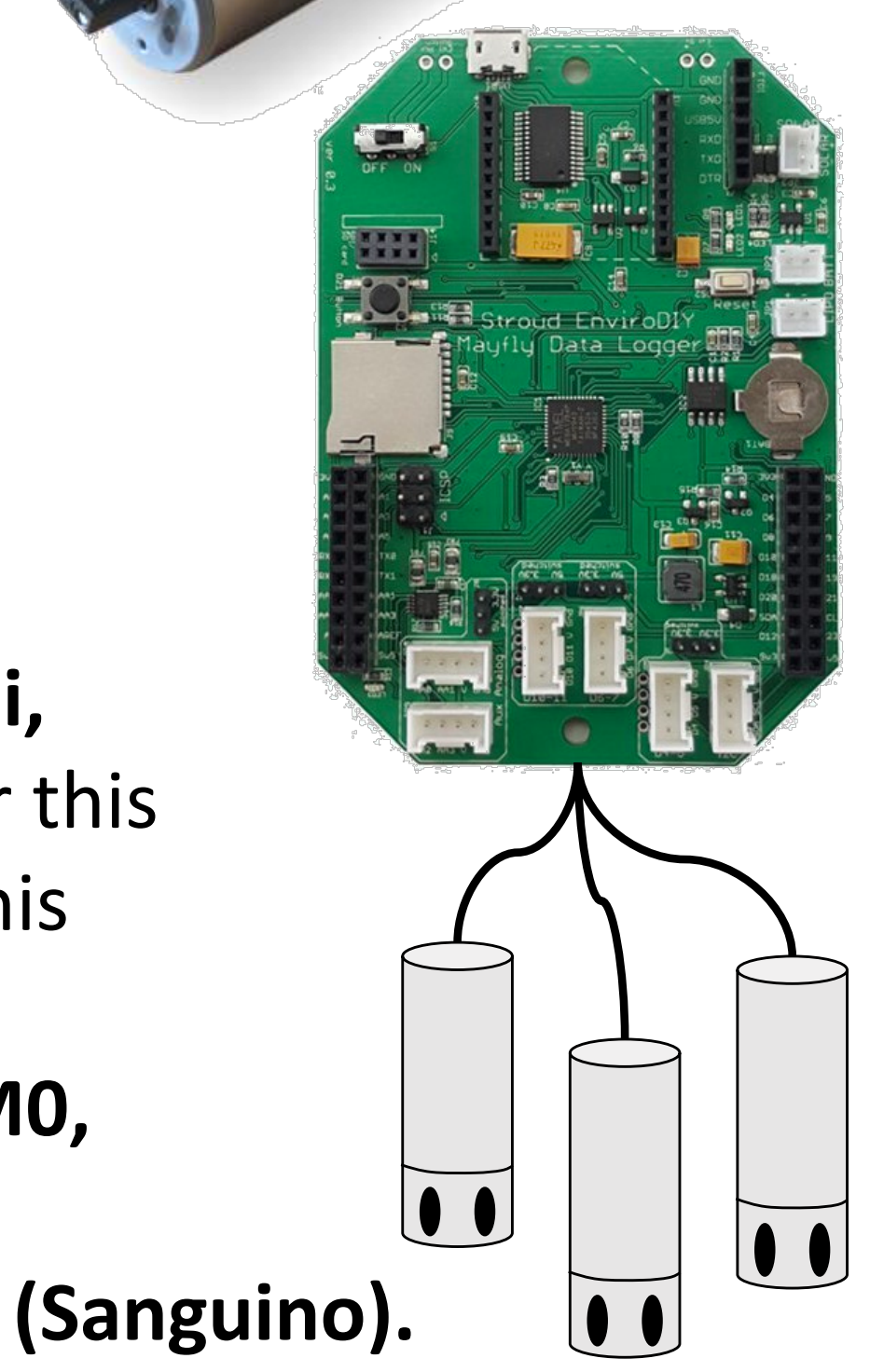


All Code & Documentation at https://github.com/EnviroDIY

Sensors in Library



- **MaxBotix MaxSonar**: Ultrasonic water level
- **Campbell Scientific OBS-3+** : Turbidity
- **Meter / Decagon 5TM**: Soil moisture and temperature
- **Meter / Decagon CTD-10**: Water conductivity, temp, depth
- **Meter / Decagon ES-2**: Water conductivity, temp
- **Maxim DS18 Temperature Probes**: Water temperature
- **AOSong AM2315**: Encased I2C Air temp, relative humidity
- **Bosch BME280**: Air temp, relative humidity, barometric pressure
- **AOSong DHT**: Air temperature, relative humidity
- **Apogee SQ-212:** Quantum Light Sensor for Photosynthetically Active Radiation (PAR)
- **Yosemitech Brand Environmental Sensors**
  - Y502-A or Y504-A Optical Dissolved Oxygen Sensors
  - Y5820-A 4-Electrode Conductivity Sensor
  - Y510-B Optical Turbidity Sensor
  - Y511-A Optical Turbidity Sensor with wiper
  - Y514-A Chlorophyll Sensor with Wiper
  - Y532-A Digital pH Sensor
- **Maxim DS3231 Real Time Clock**
- **Processor data** Treated as Sensors
- More in development!



Processor / Board Compatibility

- **AtMega1284p (EnviroDIY Mayfly, Sodaq Mbili, Mighty 1284).** The Mayfly *is* the test board for this library. *Everything* is designed to work with this processor.
- **AtSAMD21 (Arduino Zero, Adafruit Feather M0, Sodaq Autonomo).** Fully supported.
- **AtMega2560 (Arduino Mega) & AtMega644p (Sanguino).** Should be fully functional, but untested.
- **AtMega328p (Arduino Uno, Duemilanove, LilyPad, Mini, Seeeduino Stalker, etc.) & AtMega32u4 (Arduino Leonardo/Micro, Adafruit Flora/Feather, etc.).** All functions are supported, but processor doesn't have sufficient power to use all of the functionality of the library. You will only be able to use a small number of sensors at one time and may not be able to log data.

Unsupported Processors:

- **ESP8266/ESP32, AtSAM3X (Arduino Due), ATtiny, Teensy 2.x/3.x, STM32,** Anything else not listed as supported.

Other EnviroDIY Libraries

EnviroDIY/Libraries

- A collection of links to specific releases or modifications of 3rd-party libraries that are all tested for compatibility with EnviroDIY ModularSensors, and available for a single, easy download.

EnviroDIY/Arduino-SDI-12

- Arduino library for SDI-12 communications to a wide variety of environmental sensors. This library provides a general software solution, without requiring any additional hardware.

EnviroDIY/SensorModbusMaster

- This library is designed to use an Arduino as a Modbus master to communicate with a sensor/slave via Modbus RTU, designed to help users who are largely unfamiliar with the Modbus protocol and want an easy way to get information from a Modbus device.

Contribute to EnviroDIY!

- Join the EnviroDIY.org community!
- Test ModularSensors code & report issues!
- Test Boards for Compatibility!
- Add sensors to ModularSensors Library!

We recommend using the open-source **PlatformIO IDE** Integrated Development Environment

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(1) LimnoTech, Oakdale, MN; (2) Stroud Water Research Center; (3) Utah State University, Logan, UT