DESIGN: Monitoring Station Packaging

Great Lakes Data Watershed (gldw.org)

Instrument Toolkit Program

Revised: June 10, 2019

The Instrument Toolkit Program has been created to support the development of high quality monitoring devices based on commonly available hardware and utilizing VDAB dataflow programming and customized nodes for instrument construction.

**This document describes the three different monitoring station packages that will be supported by the toolkit.**

All of these stations will support acquisition from up to four different sensors. The Integrated and Standalone PI3 Stations based stations will include VDAB and would be capable of serving as a Hub for other stations in the vicinity. The standalone Mayfly station would include sketch components making it easy to communicate with VDAB running on another station or standalone hub.

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| --- | --- | --- | --- |
|  | **Integrated Station** | **PI3-VDAB Hub** | **Mayfly Logger** |
| Station Size | * Station size 6”x6”x3” | * Station size 4”x4”x2” | * Station size 3”x3”x2” |
|  |  |  |  |
| Power Consumption | * Moderate | * Moderate | * Low – Very Low |
| Battery | * Rechargeable Moderate | * Rechargeable Moderate | * Disposable * Rechargeable Small |
| Solar Power | * 12x12 panel | * 12x12 panel | * 4x4 panel |
| Uplink Radio | * Lora Wan * 4 G LTE | * Lora Wan * 4 G LTE | * Lora Wan * 4 G LTE * WiFi (requires hub) * ZigBee (requires hub) |
| Downlink Radio (as Hub) | * Lora Wan * WiFi * Zigbee and ZWave | * Lora Wan * WiFi * Zigbee and ZWave | NA |
| Link Protocol | * VDAB * MQTT * HTTP | * VDAB * MQTT * HTTP | * MQTT * HTTP |
| Software | * VDAB | * VDAB | * C Sketches |
| Acquisition channel | * 4 Analog * IC2 | NA | * 4 Analog * IC2 |
| Optional Station  Features | * Fluid Control * Serial Control * Mechanical Control | NA |  |

# Integrated Stations

In this configuration both a EnviroDIY Mayfly and a PI3 running VDAB are housed in the same station container. They communicate using a USB port and the Mayfly draws power from the PI3.  
With the flexibility and computing power available with the PI3, additional features including fluid and mechanical control can be added to the station.

**Integrated Station**

Mayfly

PI3 -VDAB

**Integrated Station**

Mayfly

PI3 -VDAB

**Integrated Station**

Mayfly

PI3 -VDAB



# Mayfly Data Loggers and VDAB Hub

In this configuration, the Mayfly dataloggers communicate using Wifi and connect to a VDAB hub either A) indirectly or B) directly with the PI3 Hub acting as an access point. While wifi communication is ubiquitous and most straightforward other radio types can be supported. Communication between the Mayfly data logger and the VDAB hub can be accomplished using either HTTP or MQTT protocols and a standard sketch will provide those options.

## VDAB Hub using PI3 as an Access Point



**Data Logger**

Mayfly

**VDAB AP/Hub**

PI3 –VDAB

**Data Logger**

Mayfly

**Data Logger**

Mayfly

## VDAB Hub through Cloud Connection

**Data Logger**

Mayfly

**VDAB Hub**

Any Computer

**Data Logger**

Mayfly

**Data Logger**

Mayfly



# NOTES AND SUPPORTING INFO

Create something similar to WaspMote based on Pi hardware.

Things needed..

* Input for up to 4 electrode
* node to calculate result from voltage.
* Different radio types.
* 3D printing of a waterproof case?

