

# DESIGN: Monitoring Station Packaging

Great Lakes Data Watershed (gldw.org)  
Instrument Toolkit Program  
Revised: June 18, 2019

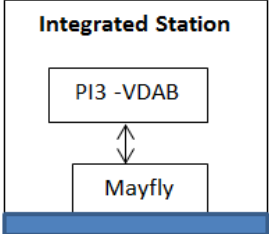
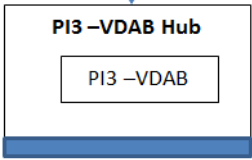
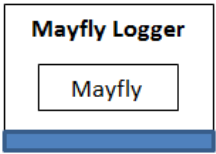
## Overview

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 are capable of serving as a Hub for other stations in the vicinity. The standalone station is based on the **Stroud™ Water Research Center's Mayfly** data logger and would include sketch components making it easy to communicate with VDAB running on another station or standalone hub.

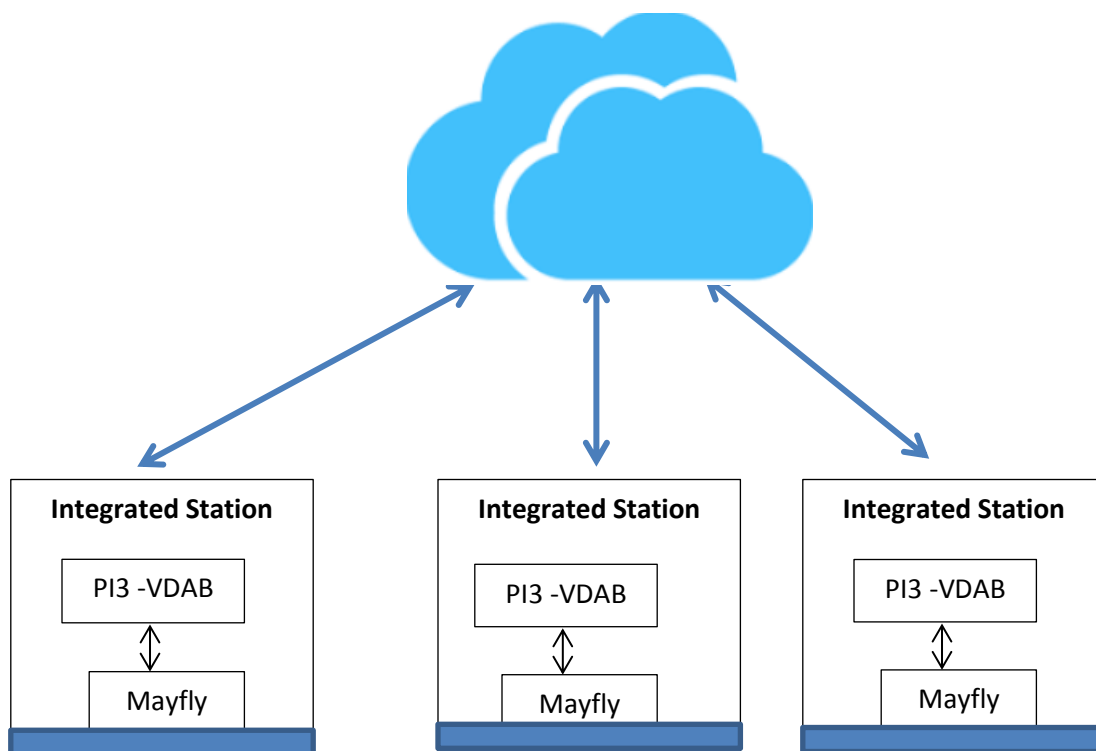
## Monitoring Configurations

	Integrated Station	PI3-VDAB Hub	Mayfly Logger
Station Size	<ul style="list-style-type: none"><li>Station size 6"x6"x3"</li></ul>	<ul style="list-style-type: none"><li>Station size 4"x4"x2"</li></ul>	<ul style="list-style-type: none"><li>Station size 3"x3"x2"</li></ul>
			
Power Consumption	<ul style="list-style-type: none"><li>Moderate</li></ul>	<ul style="list-style-type: none"><li>Moderate</li></ul>	<ul style="list-style-type: none"><li>Low – Very Low</li></ul>
Battery	<ul style="list-style-type: none"><li>Rechargeable Moderate</li></ul>	<ul style="list-style-type: none"><li>Rechargeable Moderate</li></ul>	<ul style="list-style-type: none"><li>Disposable</li><li>Rechargeable Small</li></ul>
Solar Power	<ul style="list-style-type: none"><li>12x12 panel</li></ul>	<ul style="list-style-type: none"><li>12x12 panel</li></ul>	<ul style="list-style-type: none"><li>4x4 panel</li></ul>
Uplink Radio	<ul style="list-style-type: none"><li>Lora Wan</li><li>4 G LTE</li></ul>	<ul style="list-style-type: none"><li>Lora Wan</li><li>4 G LTE</li></ul>	<ul style="list-style-type: none"><li>Lora Wan</li><li>4 G LTE</li><li>WiFi (requires hub)</li><li>ZigBee (requires hub)</li></ul>
Downlink Radio (as Hub)	<ul style="list-style-type: none"><li>Lora Wan</li><li>WiFi</li><li>Zigbee and ZWave</li></ul>	<ul style="list-style-type: none"><li>Lora Wan</li><li>WiFi</li><li>Zigbee and ZWave</li></ul>	NA
Link Protocol	<ul style="list-style-type: none"><li>VDAB</li><li>MQTT</li><li>HTTP</li></ul>	<ul style="list-style-type: none"><li>VDAB</li><li>MQTT</li><li>HTTP</li></ul>	<ul style="list-style-type: none"><li>MQTT</li><li>HTTP</li></ul>
Software	<ul style="list-style-type: none"><li>VDAB</li></ul>	<ul style="list-style-type: none"><li>VDAB</li></ul>	<ul style="list-style-type: none"><li>C Sketches</li></ul>
Acquisition channel	<ul style="list-style-type: none"><li>4 Analog</li><li>IC2</li></ul>	NA	<ul style="list-style-type: none"><li>4 Analog</li><li>IC2</li></ul>
Optional	<ul style="list-style-type: none"><li>Fluid Control</li></ul>	NA	

Station Features	<ul style="list-style-type: none"> <li>• Serial Control</li> <li>• Mechanical Control</li> </ul>		
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## Integrated Station Configuration

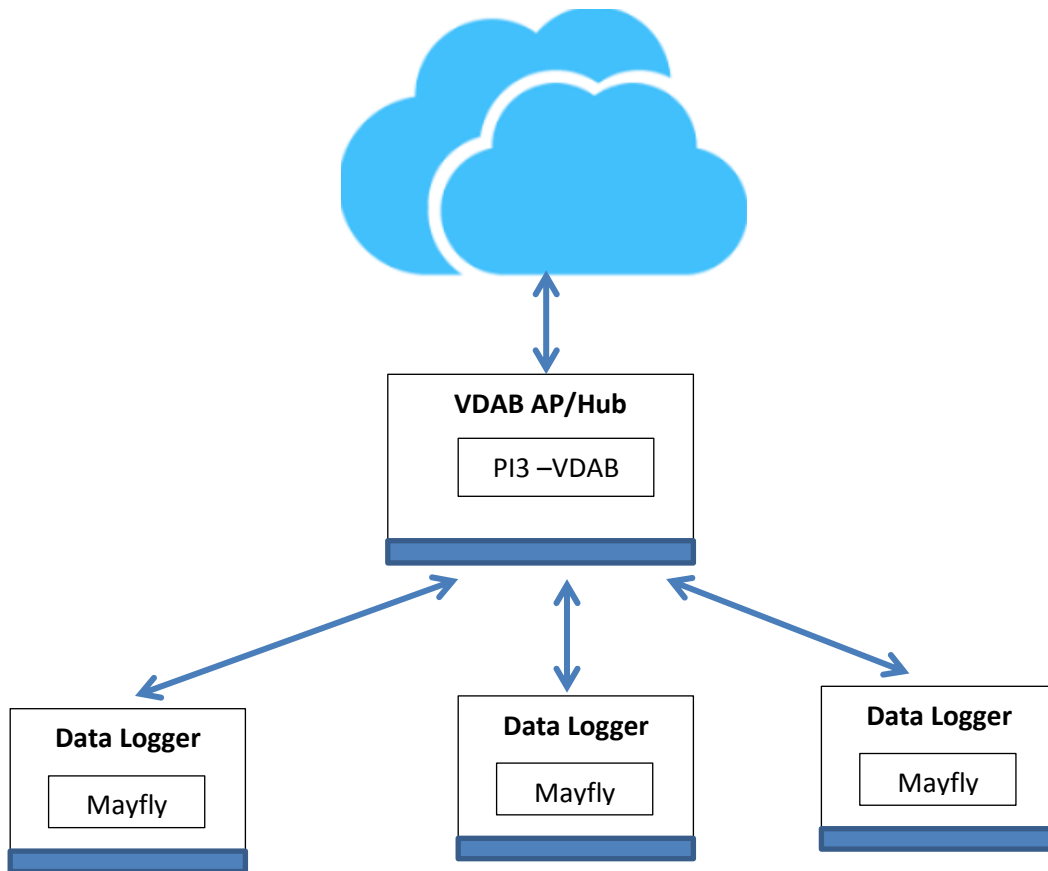
In this configuration both a EnviroDIY Mayfly and a PI3 running VDAB are housed in the same station container. They communicate using a USB port using serial communication. the Mayfly draws power from the PI3. With the flexibility and computing power available with the PI3, additional features including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



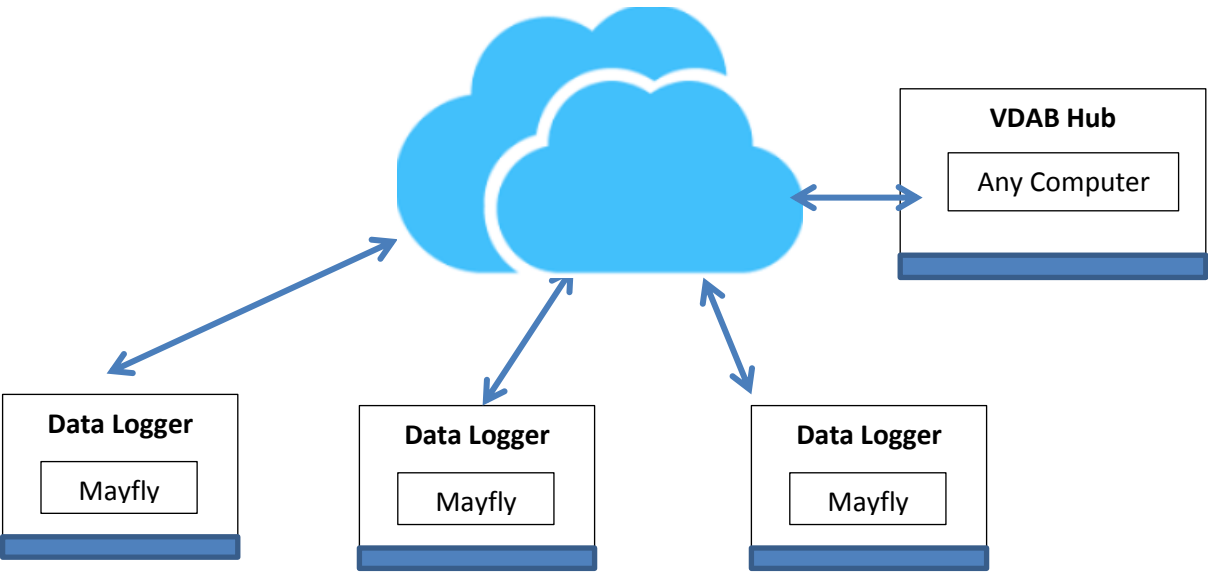
## Mayfly Data Loggers and VDAB Hub

In this configuration, the Mayfly Data Loggers communicate using Wi-Fi and connect to a VDAB hub either A) indirectly or B) directly with the PI3 Hub acting as an access point. While Wi-Fi 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 as options.

### VDAB Hub using PI3 as an Access Point



VDAB Hub through Wi-Fi Cloud Connection



## 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?

