

Verifying Newly Built Smart Rocks

- It is recommended to do this verification in batches for time efficiency and consistency

Items tested

Circuit

- Circuit power
- I2C bus and devices
- Date and Time
- Temperature sensor responsiveness
- Pressure sensor responsiveness
- Electrical Conductivity sensor responsiveness
- Turbidity sensor responsiveness
- SD card logger

Data

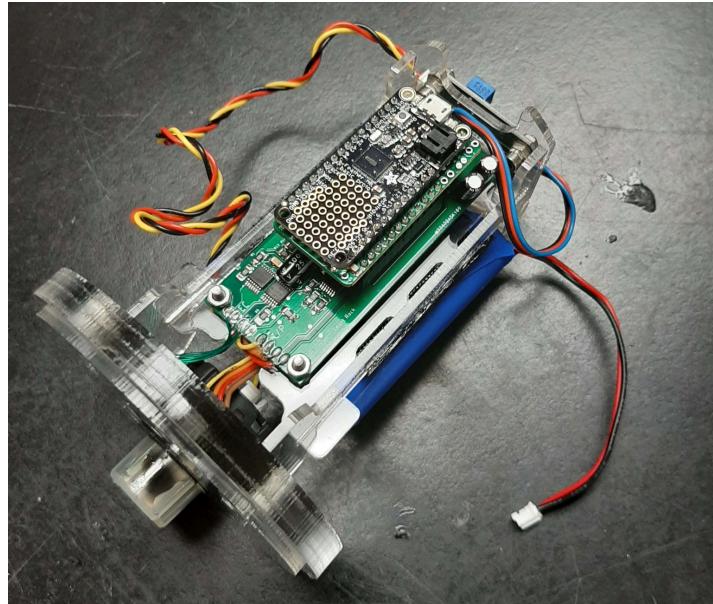
- Temperature sensor data
- Pressure sensor data
- Electrical Conductivity sensor data
- Turbidity sensor data

Hardware

- Waterproof housing

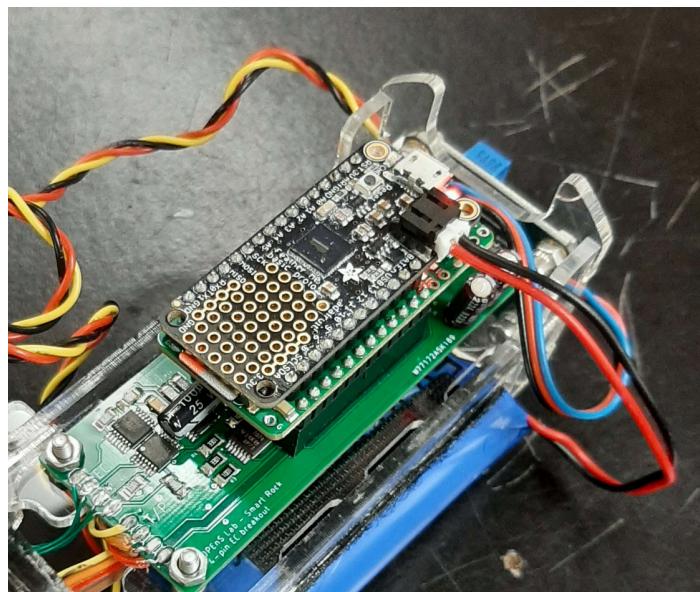
Procedure

Begin with fully prepared devices, including the Feather M0 and Hypnos breakouts.
It is recommended to use short data collection intervals for this procedure.



Circuit Verification

- 1) **Circuit Power:** Begin by plugging the battery into the Feather M0 and checking that all of the LEDs in the picture below turn on.



- 2) **I2C Bus:** Connect your computer to the Hypnos via microUSB and open the serial monitor. After a few seconds you should see some text, followed by data being taken at the configured interval. Scrolling to the top, you should see all devices, including the SD card and RTC, initialized properly. Also verify that the date and time of the data packets are correct. Check the reference image below.

```
[SD Manager] Initializing SD Card...
[SD Manager] Successfully initialized SD Card!
[SD Manager] Data will be logged to SmartRock6.csv
[DEBUG] [Loom_Hypnos.cpp:initializeRTC:179] Initializing DS3231....
[DEBUG] [Loom_Hypnos.cpp:initializeRTC:206] DS3231 Real-Time Clock Initialized Successfully!
[2024.05.22 15:01:19] [DEBUG] [Loom_Hypnos.cpp:initializeRTC:209] Custom time successfully set to: 2024.05.22 15:01:19
[2024.05.22 15:01:19] [DEBUG] [Loom_Manager.cpp:initialize:217] ** Initializing Modules **
[2024.05.22 15:01:19] [DEBUG] [Loom_ABS1115.cpp:initialize:21] Successfully initialized sensor!
[2024.05.22 15:01:19] [DEBUG] [Loom_MS5803.cpp:initialize:22] Successfully Initialized!
[2024.05.22 15:01:22] [DEBUG] [Loom_Manager.cpp:initialize:223] ** Setup Complete **
[2024.05.22 15:01:22] [DEBUG] [Loom_Hypnos.cpp:getSleepIntervalFromSD:490] Sleep interval successfully loaded from SD!
[2024.05.22 15:01:22] [DEBUG] [Loom_Hypnos.cpp:registerInterrupt:104] Registering interrupt...
[2024.05.22 15:01:22] [DEBUG] [Loom_Hypnos.cpp:registerInterrupt:115] Interrupt successfully attached!
Taking data[2024.05.22 15:01:22] [DEBUG] [Loom_Manager.cpp:measure:68] ** Measuring **
[2024.05.22 15:01:23] [DEBUG] [Loom_Manager.cpp:measure:85] ** Measuring Complete **
[2024.05.22 15:01:23] [DEBUG] [Loom_Manager.cpp:package:95] ** Packaging **
[2024.05.22 15:01:23] [DEBUG] [Loom_Manager.cpp:package:125] ** Packaging Complete **
calculating ECtemp_adjustedtemp_adjustedtemp_adjustedtemp_adjustedtemp_adjustedtemp_adjusted[2024.05.22 15:01:23] [DEBUG] [Loom_Manager.cpp:display_data:198] Data Json:
{
  "type": "data",
  "id": {
    "name": "SmartRock",
    "instance": 2
  },
  ...
}
```

- 3) **Responsiveness:** While data is being collected and displayed to the serial monitor, check that there is an ample change to each respective data while doing the following:
- Lightly blowing on the MS5803 (Temp)
 - Lightly pressing your finger onto the MS5803 (Pressure)
 - Lightly pressing your finger onto the EC tab (EC)
 - Sliding a piece of paper or another material between the two nodes of the turbidity sensor (Turbidity)
- 4) **SD logs:** Unplug the device from your computer and then the battery. Remove the SD card and open with your computer. Check that the most recent .xlsx file was generated at the time you turned on the device, and make sure the file is not empty.

Data Verification

- Get a large bucket of water (tap water is fine), the new Smart Rock, and an already verified Smart Rock.
- Turn both devices on and submerge them into the water for at least 5 data cycles.
- Remove both SD cards and compare the two Smart Rocks' data **only while they were in water**. The data from the new Smart Rock should be within our specified tolerance of the verified Smart Rock for all sensors.

Leak testing

- 8) Remove the Hypnos, Feather M0, and 10500mAh battery from the device.
- 9) Fill a bucket with hot water and fully submerge the devices in the water
 - a) It is recommended to use a weight to ensure they stay submerged
- 10) Let the Smart Rocks sit in the water for 48 hours
- 11) Retrieve the Smart Rocks and check for any water inside.
- 12) If water did get in, was it through the faceplate? PVC threads? Dry internals, test to make sure they still work, and fix the leak.