Turbidity-Sensor User Manual

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Parts List:
Microcontroller: adafruit-feather-huzzah-esp8266
Light sensor: tsl2591
Pressure sensor: MS5803-05BA
RTC real time clock : DS3231
3.7V 2000mAh battery
LEDS
PVC pipe housing
Specialized 3d printed part(s)
Epoxy

1.Download Thonny and WebREPL

The microcontroller can be connected through Thonny (USB) or WebREPL (WIFI), to start download Thonny through https://thonny.org/ and download WebREPL through https://github.com/micropython/webrepl Thonny allows users to directly coding in the microcontroller, and WebREPL allows users to send base commands to the microcontroller and transfer files between PC(Laptop) and the microcontroller. For more information about connecting to microcontroller, please read the data sheet of microcontroller which is included in https://github.com/LULULULUKELI/Turbidity-sensor

2.Download libraries and upload to the microcontroller through Thonny or WebREPL

Go to https://github.com/LULULULUKELI/Turbidity-sensor and download the libraries and code for the microcontroller in the libraries branch and upload those files to the microcontroller through Thonny or WebREPL

3. 3D printing parts

Go the the same github link above and download the CAD files in 3D printing branch and print out the parts needed for this instrument, the T shape CAD files is a main part in our instrument, if you have another replacement , skip to the next step

4.Build the circuit

Build the circuit on a breadboard or perfboard, the specific schematic of the circuit is included in the Electric Sche branch of https://github.com/LULULULUKELI/Turbidity-sensor

5. Code instruction and personalize

The light sensor, pressure sensor and clock are connected to the microcontroller by SCL and SDA pins and the function of the instrument is controlled by the turbidity_code in the main branch of the github link above. In Line 17 of the code, you can change the name of the file that

you want data to be stored. In Line 19, the loop controls the sampling time of the instrument. In Line 31, the sleep function controls the sampling frequency. Current sampling frequency has been set to 1 sample per second and 5 minutes(300 seconds) sampling time in total.

6. Assembling instrument

Use epoxy to waterproof wires of light sensor and LED light and attach the light sensor and LED light to the side of the T shape

Seal one side of the PVC pipe with epoxy and another side should use a waterproof cap. The housing will be lowered into the water so a pressure and waterproof test for the housing and sensors is needed. After waterproofing, connect the microcontroller on breadboard or perfboard to the light sensor and LED. Wires are color coded, check the electric diagram in step 4 for more information.

7.Deployment

Modify the sampling frequency and time as you need.Use battery to power the microcontroller and use webREPL to connect with microcontroller.
In the WebREPL page, type the following code to command the microcontroller :

```
from turbidity_code import read_light
read_light()
```

This code will allow you to get light sensor, pressure sensor(depth) and clock reading , also print them in your webREPL window.
Bind the electronic housing on top of the T shape, and use a rope connected to the instrument to lower or lift it.
The microcontroller will lose WIFI connection to your laptop device when the instrument is deployed into water, so make sure you connect the instrument and call the read_light() function before you lower it into water. The microcontroller will keep sampling and save data in the file you named in step5 and you can reconnect to it and extract the data after you retrieve the sensor.