PARTICLE PHOTON2 TUTORIAL

MarsMan Temperature Sensor

FireFli PTY LTY ~ FE Basson

Introduction

The purpose of this project is to build a simple, fun and robust temperature sensor based on the WSEN-TIDS development board by Würth Electornik.

The WSEN-TIDS sensor provides excellent measuring accuracy and long-term stability,. Further to this, these sensors provide high precision and accurate output values with intelligent on-chip interrupt functions.

We will display the data on the Wave 2” TFT display.

Prerequisites

You should have a basic understanding of Particle WebIDE or Visual Studio Code and how to import libraries.

You should have a Particle Photon2 and a Particle account. If you do not have an account, visit https://www.particle.io and register and account.

You should have at least one Particle Photon2 claimed and active on your account

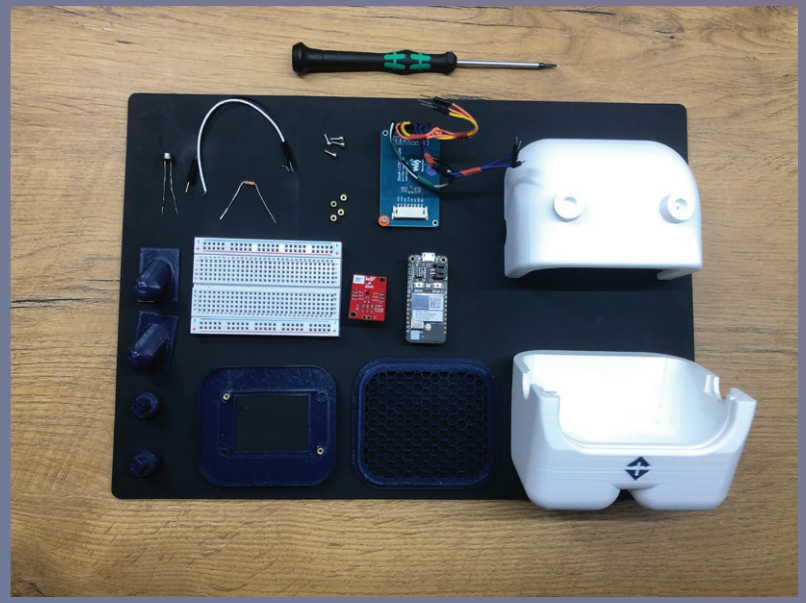
Bill of materials

Items you will need to complete this turorial

1 x Particle Photon2
1 x Breadboard
1 x USB cable
1 x WSEN-TIDS development board
1 x 22k LDR (other value will suffice)
1 x 3.7V LiPo battery (or suitable power supply)
1 x Jumper Wires (male2-male and male-2-female)
4 x M2 x 6mm Machine screws

4 x M2 Heat Inserts (optional ~ only for enclosure)
1 x 3D printed enclosure (optional ~ STL's provided)
1 x 22k Resistor (matching the LDR)

Additional Components: This will depend on you installation.



Software used

Visual Studio Code

Cura Slicer

Autodesk Fusion360

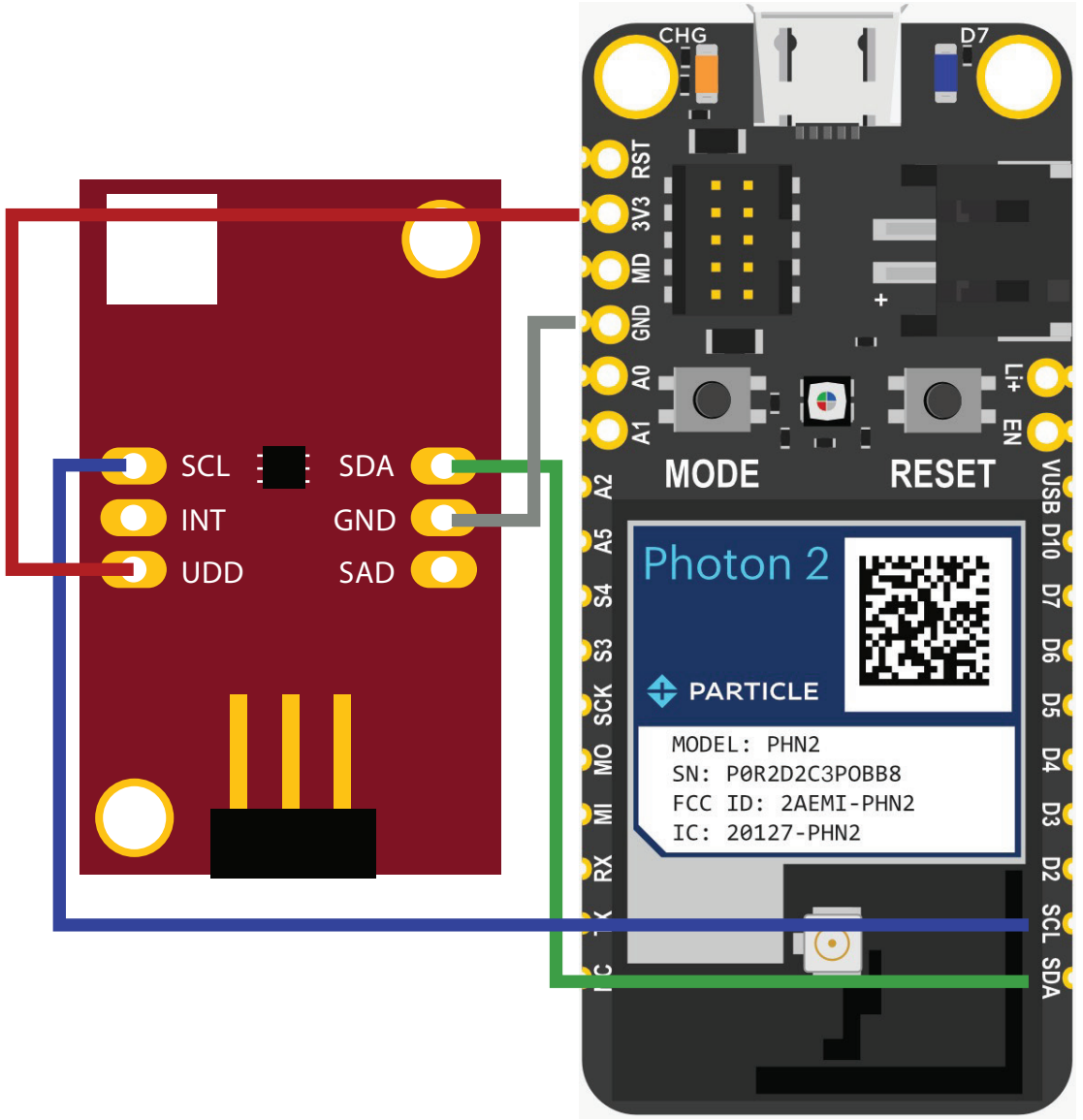
Step 1

WSEN-TIDS wiring

Place your Particle Photon2 on the breadboard and ensure there are exposed holes on either side as we will be connecting wired on both sides of the Photon2.

Make the necessary connections between die Photon2 and the WSEN-TIDS module

Photon 2		WSEN-TIDS
3V3	→	VDD
GND	→	GND
SDA	→	SDA
SCL	→	SCL



NOTE

Depending on the jumper wires you selected, it might look a little different but as long as the pin outs match all should be good

Step 2

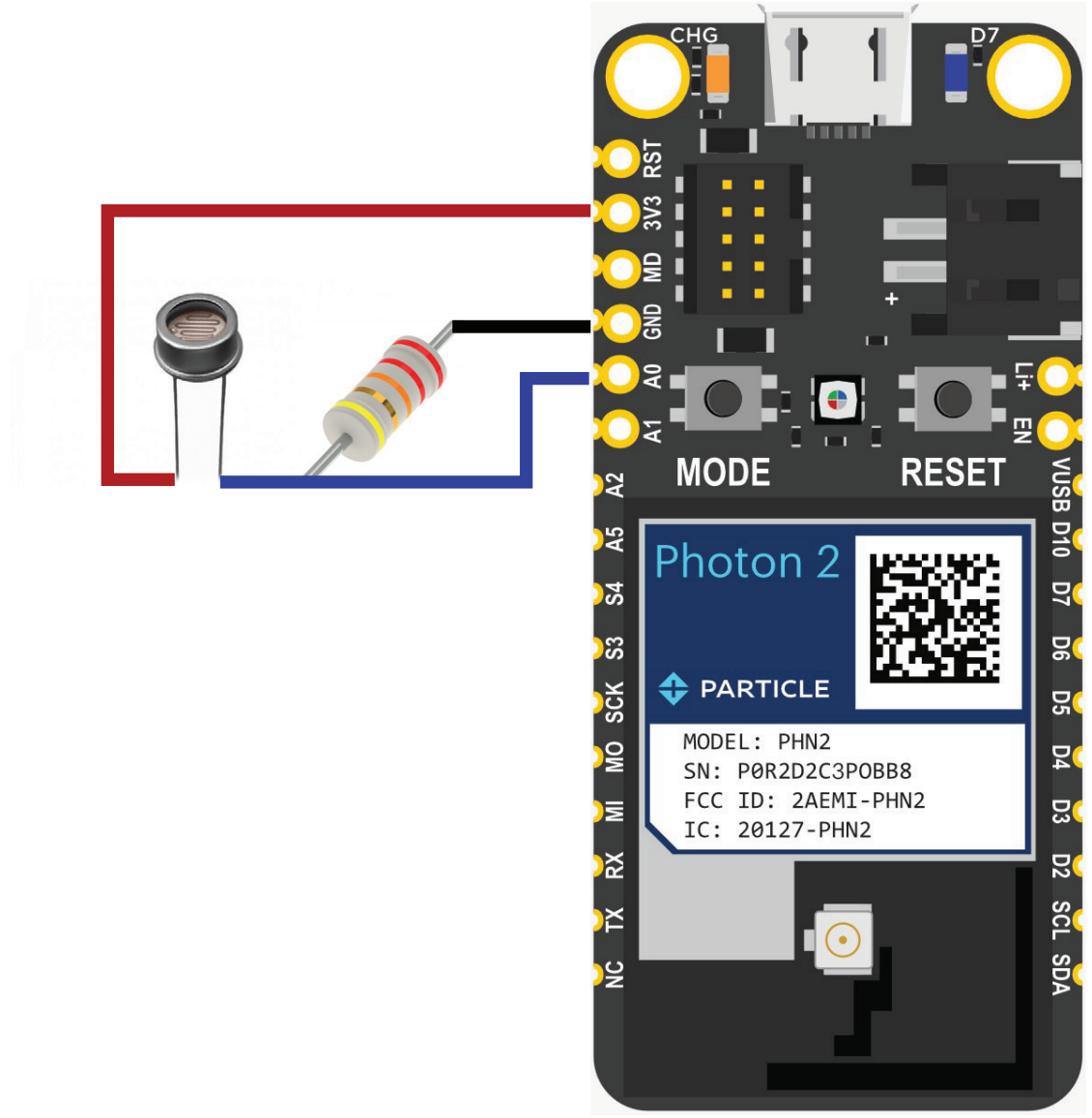
LDR wiring

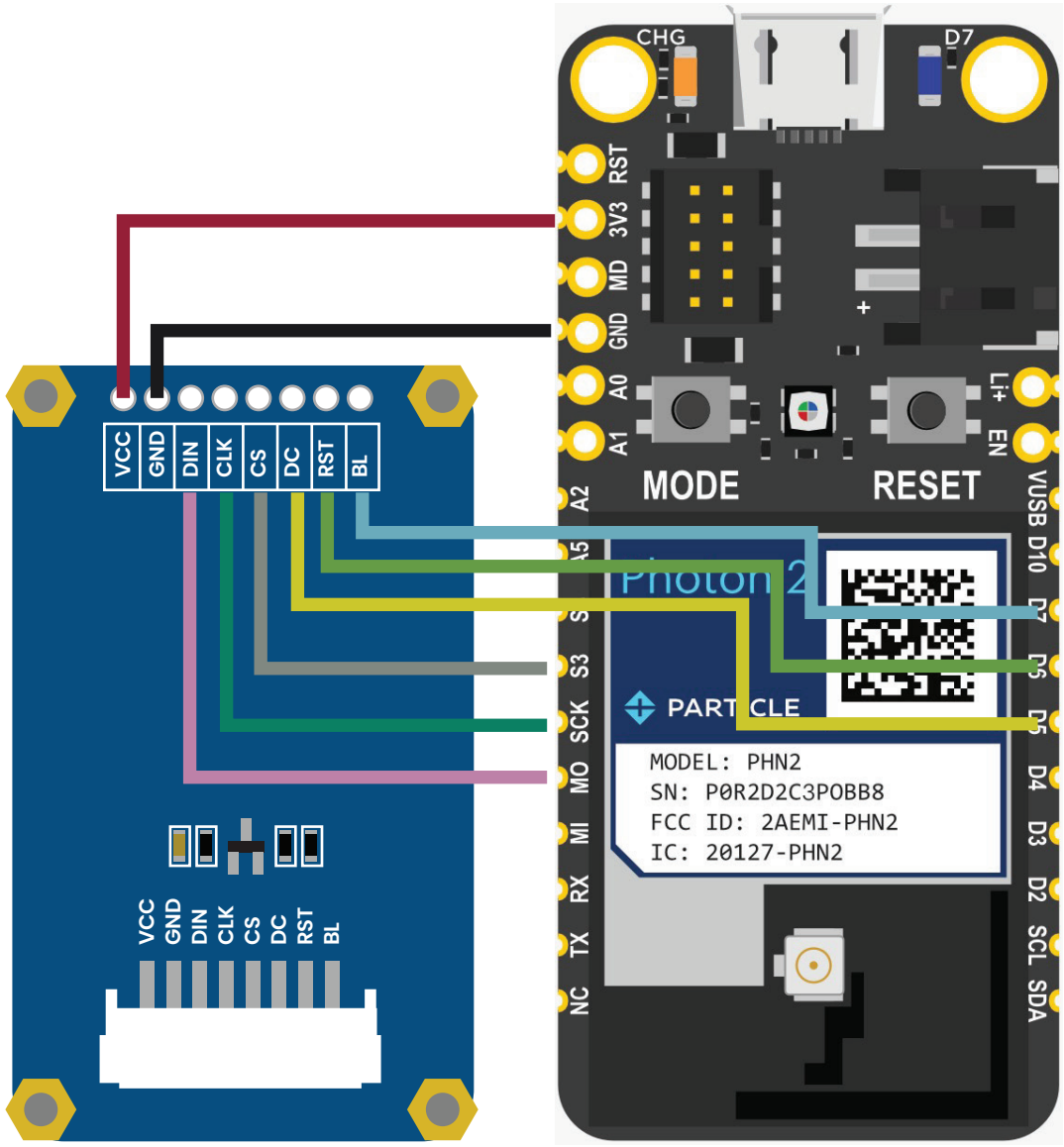
The LDR requires only two connections and a pull down resistors to GND.

Connect the one leg of the LDR to the 3V3 pin on the Photon 2.

Connect the second leg of LDR to the A0 analog pin on the Photon 2.

Lastly, connect a pull down resistor between the A0 pin and GND. This resistor should match the resistance of the LDR.





Step 3

Connecting the TFT Dispay

This part can be a little more involved so pay careful attention to the wiring.

Photon 2	WAVE 2”
3V3	VCC
GND	GND
MO	DIN
SCK	CLK
S3	CS
D5	DC
D6	RST
D7	BL

NOTE

You can use either the connector and wire harness that came with the screen, or solder headers onto board depending on you connection preference

Step 4

Setting up everything on the breadboard

Now that you have all the individual wiring diagrams, we can start to prepare the breadboard.

Depending on the wiring you have on hand, your breadboard might look a little different. I opted for solid core option which can be placed neatly on the breadboard.

For the LDR and TFT screen I opted for normal jumper wires as they are placed away from the breadboard.

Fig 4.1 shows the basic wiring placed on the breadboard connecting the LDR and WSENTIDS module to the Photon 2.

In **Fig 4.2** you can see the wiring of the TFT screen added.

Finally **Fig 4.3** shows the two wires coming from the LDR connecting to the breadboard.

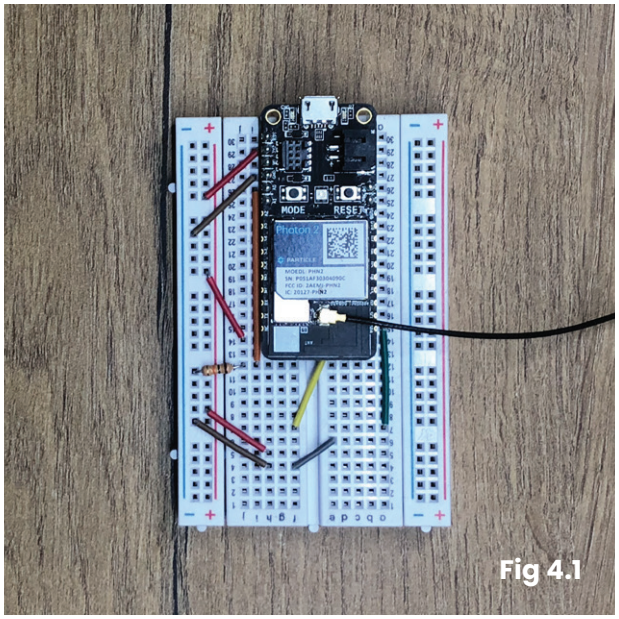


Fig 4.1

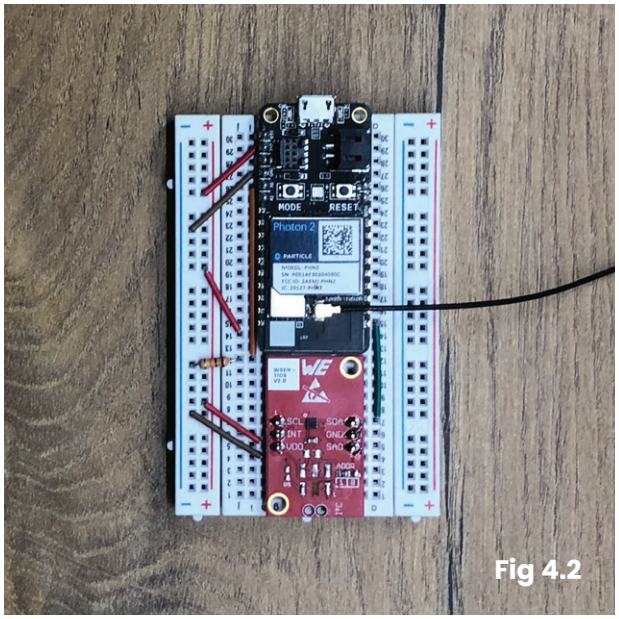


Fig 4.2

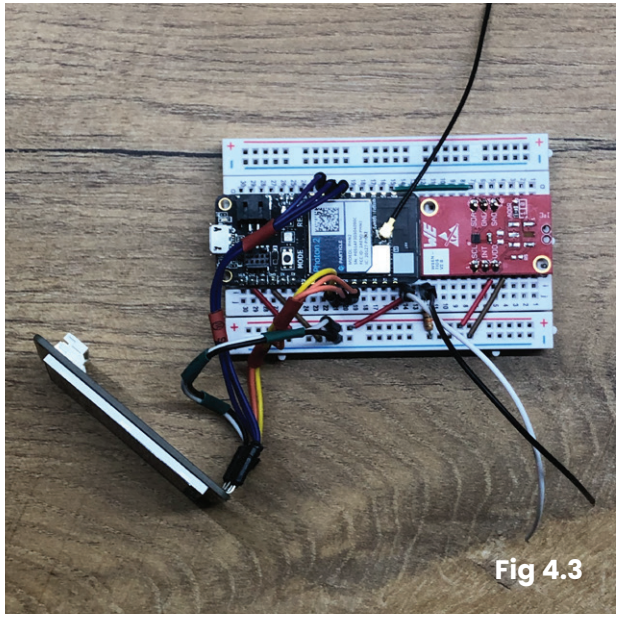


Fig 4.3


Fig 5.1

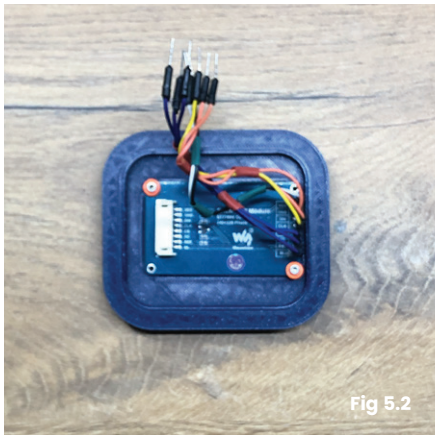


Fig 5.2

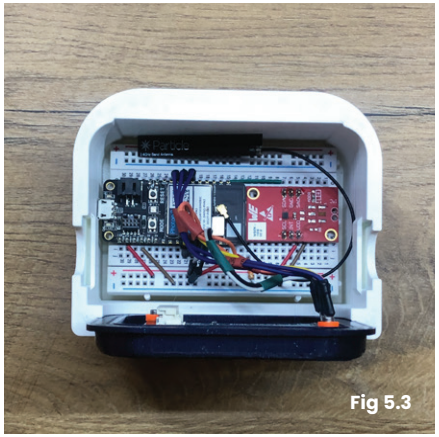


Fig 5.3

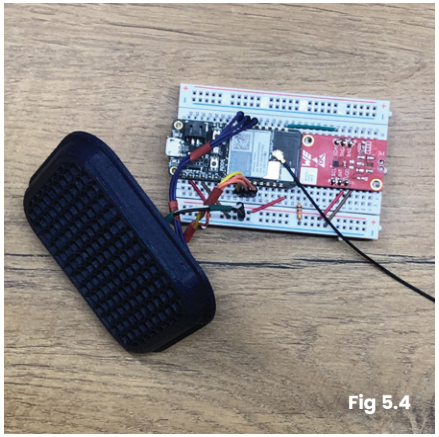


Fig 5.4

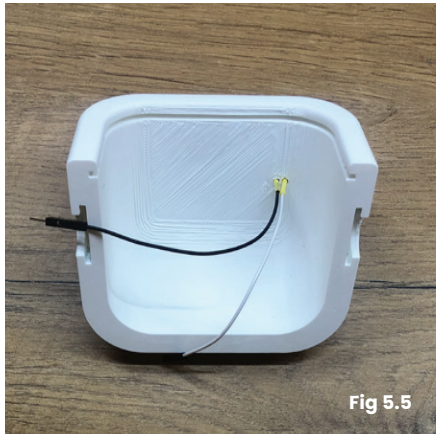


Fig 5.5

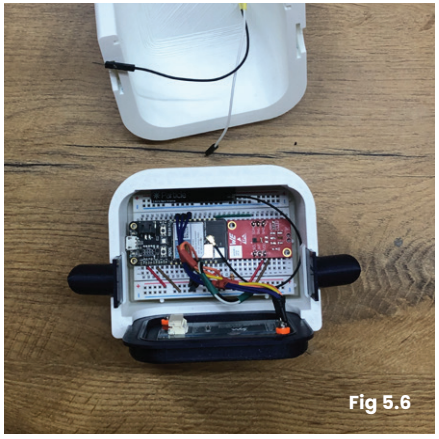


Fig 5.6

Step 5

Installing into the enclosure

Using the M2 screws and heat inserts, mount the TDT display to the Screen Mount part as per **Fig 5.1**

Now insert the Screen Mount into the Visor as indicated in **Fig 5.2**

Fig 5.3 indicates the placement of the breadboard in the bottom part of the enclosure.

Now mount the combined visor-screen with the bottom part and add the arms as shown in **Fig 5.4**

Insert the LDR in either one of the antennae as shown in **Fig 5.5**. Solder wires on the legs of the LDR in order to connect it to the Breadboard.

Fig 5.6 indicates the antenna placed in position on the top part of the enclosure and the LDR wires coming through the top part.

Finally connect the LDR wires to the breadboard and carefully place the top of the enclosure in position. Not adhesive is needed, the arms and visor will keep the two parts in place.

Step 6

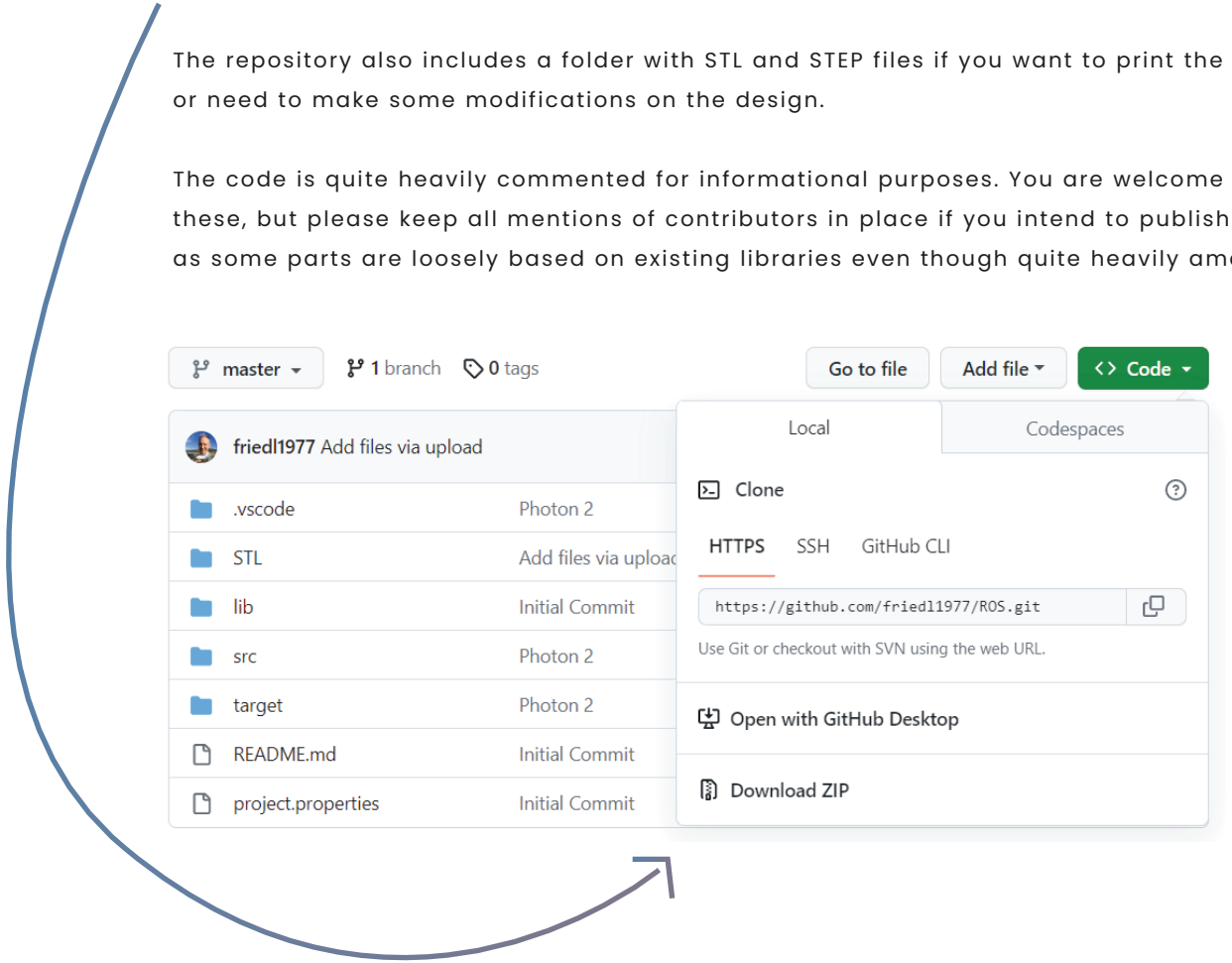
Code

Everything has been done for you. Simply follow the link below and download the entire project from the Github repository.

https://github.com/friedl1977/WSEN_TIDS

The repository also includes a folder with STL and STEP files if you want to print the enclosure or need to make some modifications on the design.

The code is quite heavily commented for informational purposes. You are welcome to remove these, but please keep all mentions of contributors in place if you intend to publish this code as some parts are loosely based on existing libraries even though quite heavily amended.



NOTE

If you are using Visual Studio Code, make sure to use a USB cable to flash. If you use cloud flash, the libraries hosted on the sever will be used and your display will not function as intended.

The library in this project has been amended to accommodate the 2" display

Step 7

Working principal of the sensor

The sensor will detect and display ambient temperature during the day.

At night, MarsMan will go to sleep…. Just like the rest of us :)

The light level thresholds can be set in the code by simply adjusting the variables declared at the start of the code.

Room for imporovement

this is NOT a production ready design :)

Consider using device with Interrupt routine and putting the entire device to sleep at night in order to save battery life.

Use a light sensor with interrupt capabilities in order to use less power.

Add easy access for USB charging to the side of the robot.

If you intend to use this product for any other thane personal use, DESIGN A PCB instead of using a breadboard. While breadboards are acceptable means for rapid prototyping, the present many challenges.

Enjoy the project!!