Bohunt School (Wokingham)

Project: Solar-Powered Weather Station

Stage 1: Using a solar panel to charge a Li-Ion battery and power a Wemos D1 Mini

I'm one of the students who has been attending the (after-school) IoT Computer Club at Bohunt Wokingham academy here in the UK.

This is a write-up of my personal project to design and build a solar-powered weather station.

Objectives

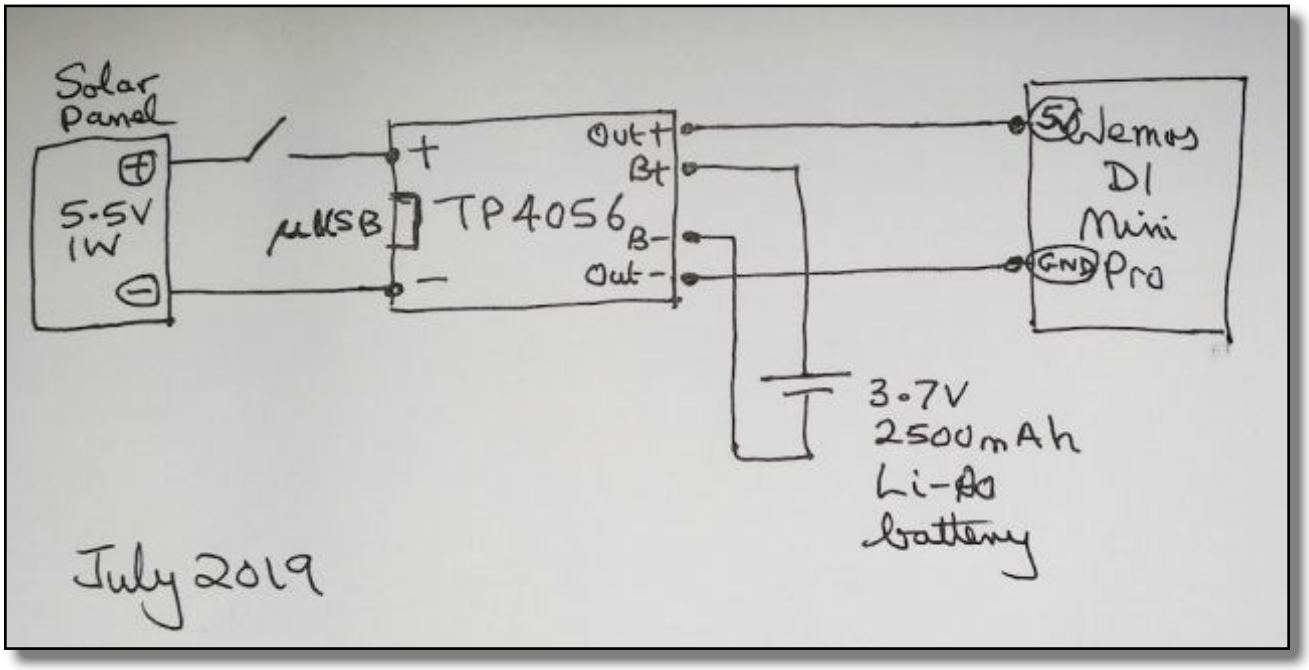
My overall objective is to build a solar-powered weather station that will be located in one of the school's gardens to measure temperature, humidity and air pressure. The data will be sent via WiFi to the 'Cloud' and by writing some programs the information should be made available locally or remotely.

The task I'm going to describe in this particular document is:

- ***Using a solar panel to charge a Li-Ion battery and power a Wemos D1 Mini.***

Circuit Diagram

Here's a freehand sketch of the charging circuit.



I wired a simple switch in series with the solar-panel so I could isolate it if I needed to charge the battery using a micro-USB connector. It was fairly easy to wire-up the TP4056 (*lithium battery charging management)* board as all the connections were identified really well. Although there were separate connections for the battery (i.e. B+ and B-) and the output (Out+ and Out-) I discovered that they were in fact joined together. (i.e. Out+ and B+ are joined and Out- and B- are joined on the printed circuit board).

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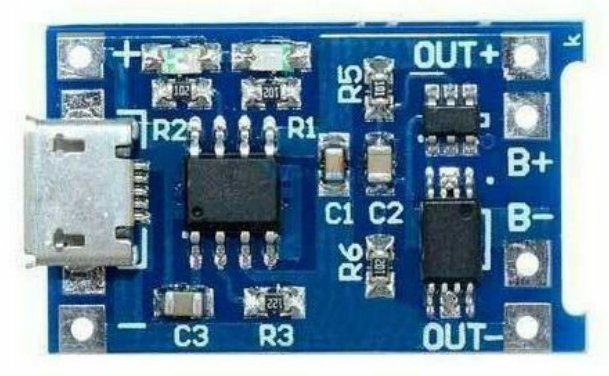
Here's a close-up photo of the TP-4056 showing the various connections and the micro-USB connector (on the left-hand edge).

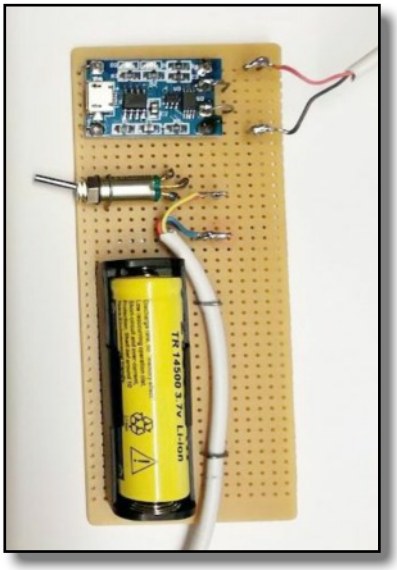


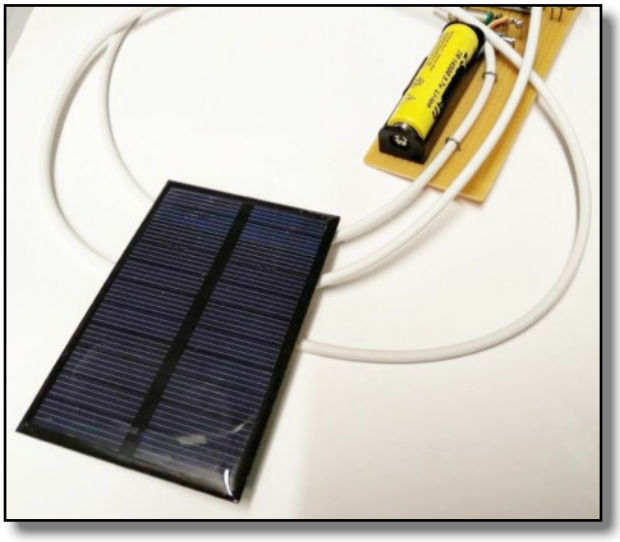
Initially I connected a 3V3 voltage regulator (LD1117AV33) to Out+ to produce a stabilised output voltage. My idea was to regulate the voltage and apply it directly to the 3V3 pin on the Wemos.

Mr D pointed out that the Wemos D1 Mini Pro had an onboard regulator that will accept an input up to +5.5V and produce a regulated +3V3 for the device.

So in order to reduce the number of components I removed it.

Photos of the charging circuit and solar-panel





The circuit worked first time. What was really useful was a red LED on the TP-4056 that indicated the battery was being charged. A green LED came on (and the red one went off) when the Li-Ion battery was fully charged.

The next thing you need to do is read the write-up for Stage-2.
"*Putting the Wemos D1 Mini into 'deepsleep' to conserve battery's charge*"

I need to thank Mr D for helping and encouraging me with this project