Aquaponics Lab

How to Make a wireless pH sensor

This guide will show you how to construct the hardware for a pH sensor that sends readings over radio to a basestation.

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TOOLS:

- Drill (1)
- Drill Bit (1)
  10mm
- Round file (1)
- Soldering Iron (1)
- Hacksaw (1)

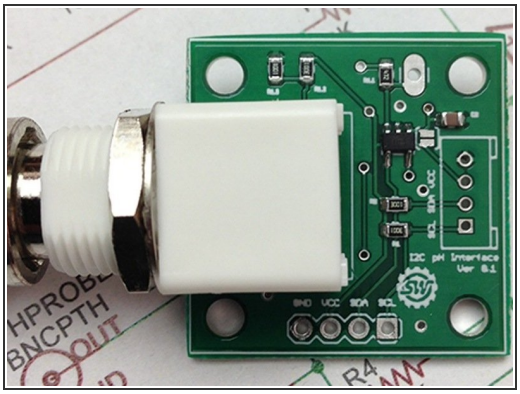
PARTS:

- JeeNode (1)
  v6
- MinipH circuit (1)
- Enclosure for pH sensor (1)
  PC001W
  Also available in Black
- 1200 mAh lipo battery (1)
- JST PH 2 pin right angle connector (1)
- wire approx 3cm (4)
- pH probe (1)

Step 1 — Overview of the sensor

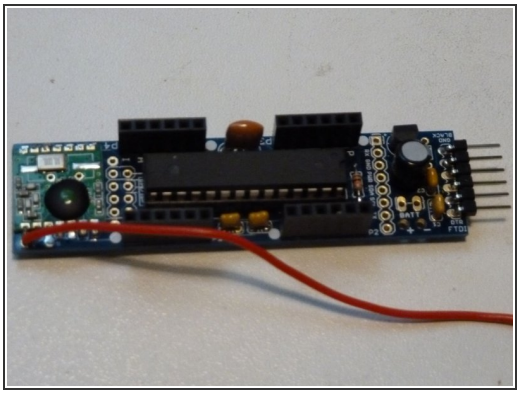
- This sensor combines a JeeNode v6 with a MinipH sensor circuit from Sparky's Widgets. The circuit is very accurate once calibrated and rivals much more expensive meters!
- It uses a 1200mAh Lithium polymer battery for a long lifetime between charges. Depending on how often the sensor is set to wake up and send a reading, the time between charges can easily be many months.

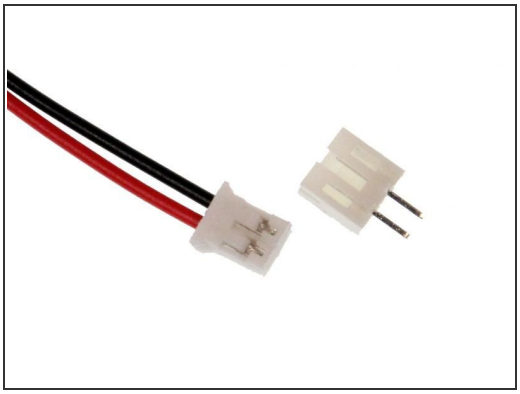
Step 2 — Drill the case and cut the circuit board!

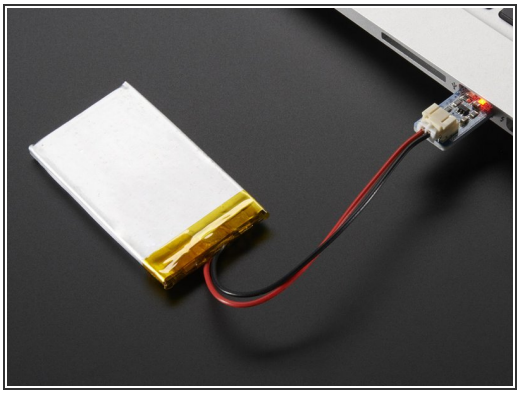


- I fell in love with this narrow case from cpc. However, to fit the pH circuit into the case I had to cut a corner from the board. Luckily there are no traces in this section!
- We didn't use the case with the battery compartment built in because we wanted to try to make it mostly waterproof.
- Drilling a 12mm hole in the exact centre of the split halves of the case is hard - so just drill a smaller hole in approximately the right place and then measure very carefully. The plastic can be filed down easily so just take your time and you can end up with a perfect hole - even including a flat section to match the BNC connector if you like!

Step 3 — Adding a power socket to the jeenode

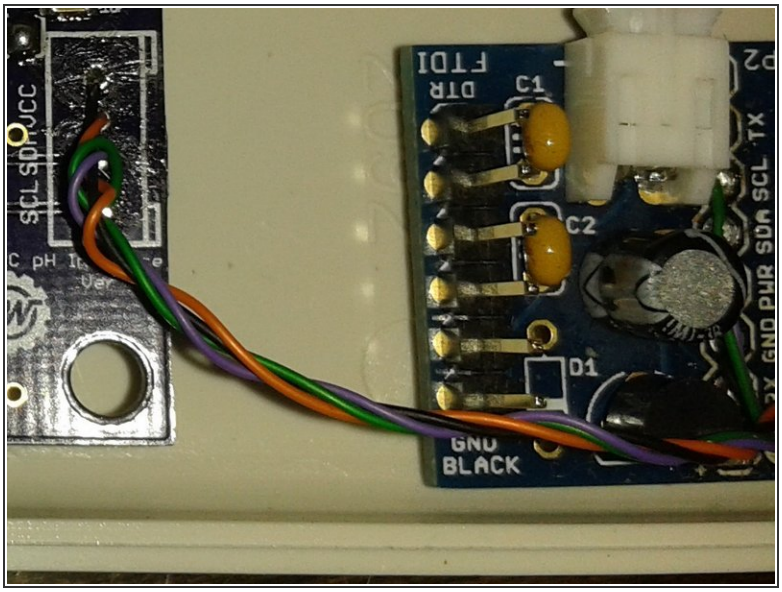


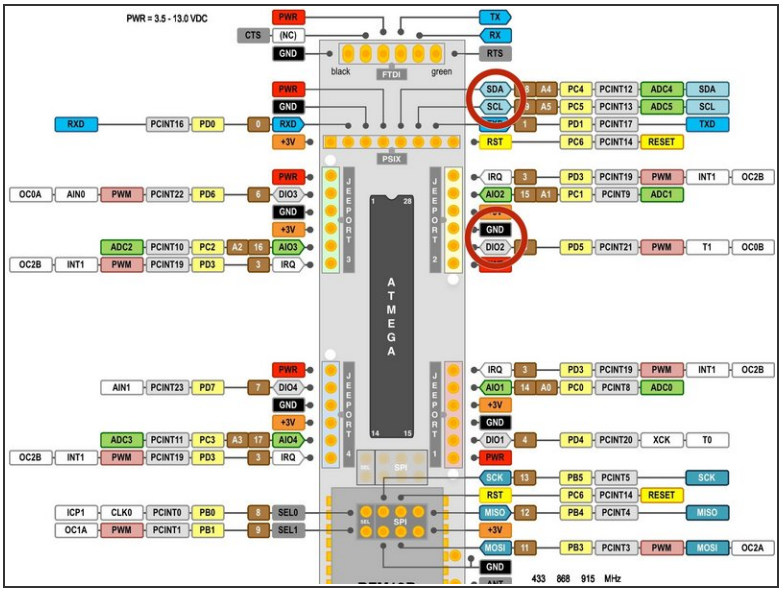




- If you are soldering your own JeeNode together from a kit then you don't need to add the header sockets, but if you buy one assembled don't worry, they don't get in the way much.
- Either way, you'll need to solder a JST PH 2 way socket to the jeenode - I prefer right angle ones like these - to connect the battery
- The adafruit batteries are great because I feel they can keep on top of quality and reliability issues (lipo batteries can be another market with lots of fakes) - plus they have the jst plug already connected.
- Adafruit also do a dinky lipo charger that we use - it charges at 500mAh which takes 2.5 hours for a full charge.

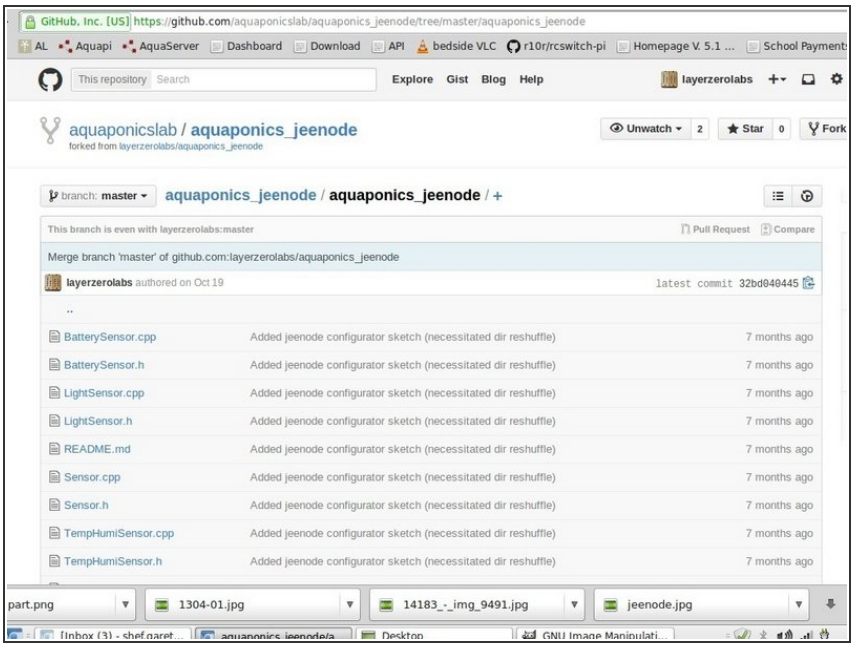
Step 4 — Connecting the two circuit boards





- Here you can see the detail of the wires between the two boards
- In order to minimise the power consumption of the sensor, the pH circuit is powered by a digital output pin on the jeenode. When the JeeNode sleeps, the pH circuit is switched off by sending a 0 to this digital output. You can get away with this trick with low-powered circuits - not more than a few milliamps!
- Connect the SDA and SCL lines (these carry the data and clock signals) as well as the Ground and Power lines to the GND and DIO2 pins. If you've got a header here you can try pushing wires into it but you may be better removing it altogether so you can solder wires directly to the holes in the board.

Step 5 — Upload software, configure and go!



- You can use our software from git - it comes in two parts though.
- First upload the configurator sketch and open up a serial monitor. You are able to set various parameters such as channel number, group id etc. Also you can specify the type of sensor, it's I2C address (written on the board by Ryan) and which pin is used to power it.
- Once this is set, upload the main configurator sketch to the board. You can set the sleep delay to any value you like - but be aware that the pH sensor circuit needs approx 10 seconds to 'settle' after turning on. So if you set the sleep delay to 50 seconds then you will get a reading every minute.