Shinyei Dust Sensor Air Quality Monitoring
With TI Launchpad MSP430G2

Objective: To know when I need to clean my room. I usually vacuum every two or three weeks, but sometimes am lazy and I need a reminder. The dust sensor will be more motivation to get me to clean, when I see the dust levels increase.

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Parts List:

- Shinyei PPD42NS Air Quality Sensor
- MSP-EXP430G2553 V1.5
- 5V Adaptor (required as MSP is 3.3V only)
- SD Card adaptor
- Ethernet Adaptor
- (optional) 16x2 LCD

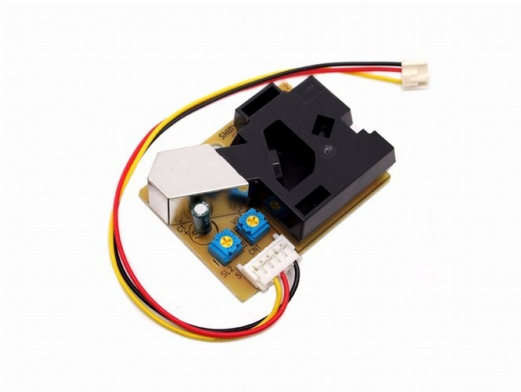


Figure 1: Shinyei PPD42NS Air Quality

Work Log

Here are some things I've learned as I've worked on this project.

IDE
I'm using Energia from energia.nu which is an Arduino IDE clone for TI Launchpads. This will allow for rapid development. And ease me into the TI platform.

MSP-EXP430G2 V1.5
There are different version of this. My particular board is the
and as explained here: http://energia.nu/pin-maps/guide_msp430g2launchpad/ and
http://energia.nu/pin-maps/guide_msp430g2launchpad/
You need to rotate the UART jumpers to get UART to display correctly. Oddly enough you can choose a different chip in the boards list and serial will print out right... But switch the jumpers and the correct board will work with UART. Otherwise, it does not work out of the box for serial.print. Though the blink example sketch works.

Dust Sensor
The code for the dust sensor is found online easily. The pinout is tricky as the colours of the wire are nonsense, but the pinout seems to be the same for all sensors, and is: PIN 1 (closest to black box) GND, PIN 3, VDD (5+V), PIN 4 output A. there is also an output B for different readings (I think size) of dust. I'm not that particular (no pun intended) about my dust so I will go with the one most people are using.

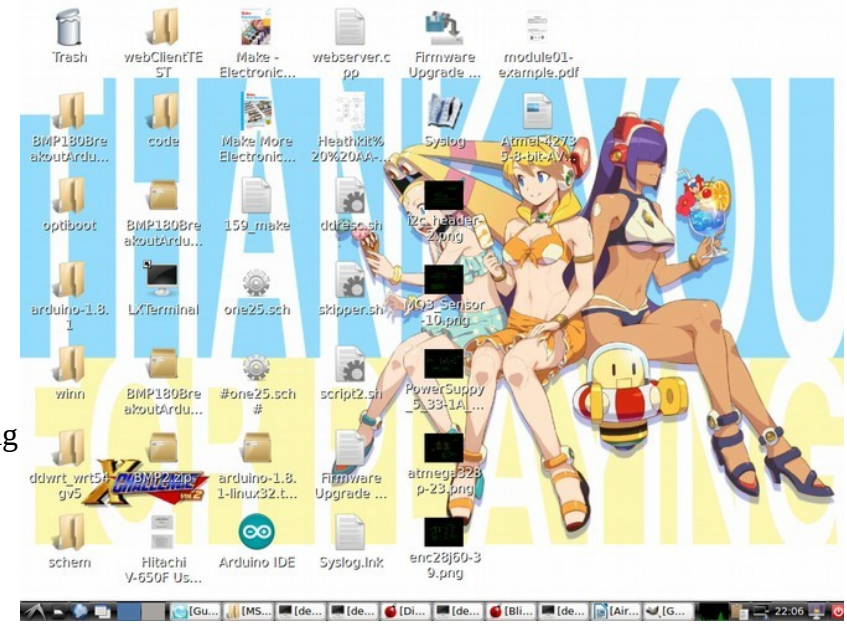
3.3V only on TI
The TI takes input of USB but only outputs 3.3V. Fail. I'll through a 5V PSU on the board. It won't be connected to USB for its use anyways.

POW function
There is a pow function (power exponent) in arduino. In TI, I changed it to powf, and included math.h.

I'm not sure if my change was correct.

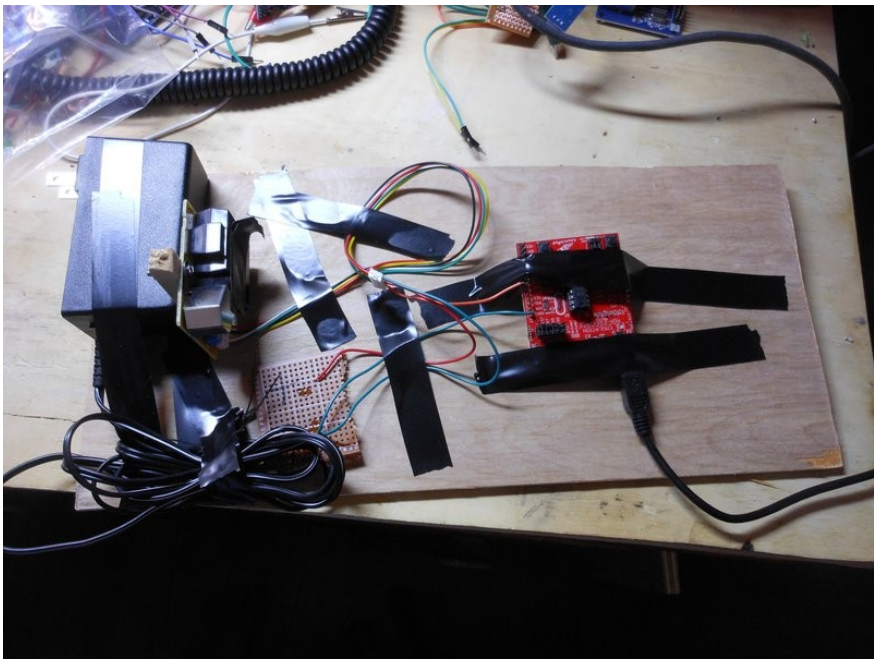
EDIT: looks like there is a LED tied to pin 14. I'm moving to pin 13. I meant to use 13 earlier but accidentally used the wrong pin and kept using it. Oops.
EDIT 2: Actually, I was reading from the wrong pin in software. Maybe I will leave it on the LED pin as you can see when the dust is firing off the sensor. Hm.... Neat.

EDIT 3: Yes, so I had to use powf instead of pow, and it works. The accidental incorrect pin was a bonus as it allows me to see visually how often the sensor is going off. Over time, I should have a vague grasp of the dust levels just looking at the light.



This is an aside, but I realized today that happy pictures make me happy, so I should surround myself with pleasant things. I often keep a blank background, but I realized, that a cute picture will make me happier than a blank or default background. It's the little things. I digress.

Work Log 08/2018
I've put everything on a single piece of plywood, and need to do some more work on the code. I've decided to forgo the SD card, as I don't want to deal with reading a 2MB sd card with the buffer provided by the SRAM. I'm not quite sure how to manage that, and whether it's possible to read such large data files. I did some quick research and did not find what I wanted. It is likely possible, but let's do something simpler. Instead, I will use the EEPROM to store the last 5 minutes of data or so, and then have the server read the data every five minutes. This keeps the client simple, and puts the burden of complexity on the server. In addition, I don't want to read SD cards manually, as that is cumbersome, though possibly scripts could be made.



The PPD42 was made sure to be put vertically.