



John O'Brien <john.f.obrienjr@gmail.com>

Low-cost fog sensor

Straub, Derek <straubd@susqu.edu>

30 June 2021 at 16:00

To: "John O'Brien Jr." <john.f.obrienjr@gmail.com>

Hi John,

Yes, I'm happy to send you the schematics and other info about the VCNL sensor. There is the VCNL4200 sensor/external IRED PCB, which is then is wired to a breadboard with the microcontroller (Adafruit Metro Mini) and other components (real time clock, microSD card reader for datalogging). At this point it would be easier to get a more advanced microcontroller with everything built in. If you want the Arduino code, let me know and I can send that to you.

I designed the board in Eagle, so I can send you the .brd file, if that's what you're looking for. If you just want a schematic, I can probably export something from Eagle. Let me know what you'd like. Until then, here's a link to the PCB on OSHPark, if you want to take a look at it: https://oshpark.com/shared_projects/GmO8ZgQX. I think you can even order them if you want.

Here are a few details:

The VCNL4200 proximity sensor and the external IRED are mounted on one side and the rest of the components are on the other side.

Right now it's built for a 5 V input, which is regulated down to 3.3 V (with the regulator labeled U2-3.3V) to run the proximity sensor.

There is a separate power supply for the external IRED which is also 5 V. But I used a separate supply because the IRED is switched on and off rapidly and I didn't want that noise affecting the proximity detector. They may be able to share a power supply?

There are a bunch of capacitors (C1 - C6) to stabilize the voltage regulators and reduce noise in the power supplies.

The MOSFET labeled SI2301 is used to activate the external IRED and the big resistor labeled R7 sets the current for the external IRED.

The MOSFETs labeled Q1 - Q3 and resistors R1, R2, and R5 allow the 5 V Metro Mini to read the 3.3 V output (I2C communications) of the proximity sensor

Resistors R3, R4, and R8 are pullup resistors for the I2C output if needed (the jumper JP1 needs to be soldered closed to use them). I didn't use them because I had other pullup resistors on the I2C lines elsewhere in my setup.

The thing on the left side labeled JST-6 is for a connector that the data/power cable plugs into.

I have a second PCB that connects the other end of the data/power cable to pins that can be plugged into a breadboard. Here's the link for that board: https://oshpark.com/shared_projects/68i6QSz5

I have attached a list of the components that I used for the VCNL board.

Regarding the VCNL4200, here's a link to the data sheet: <https://www.vishay.com/docs/84430/vcnl4200.pdf>

And a link to a useful VCNL4200 application note: <https://www.vishay.com/docs/84327/designingvcnl4200.pdf>

And the data sheet for the external IRED: <https://www.vishay.com/docs/84249/vsmy99445ds.pdf>

I hope you're keeping cool,

Derek

From: John O'Brien Jr. [mailto:john.f.obrienjr@gmail.com]

Sent: Monday, June 28, 2021 4:51 PM

To: Straub, Derek <straubd@susqu.edu>

Subject: Low-cost fog sensor

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