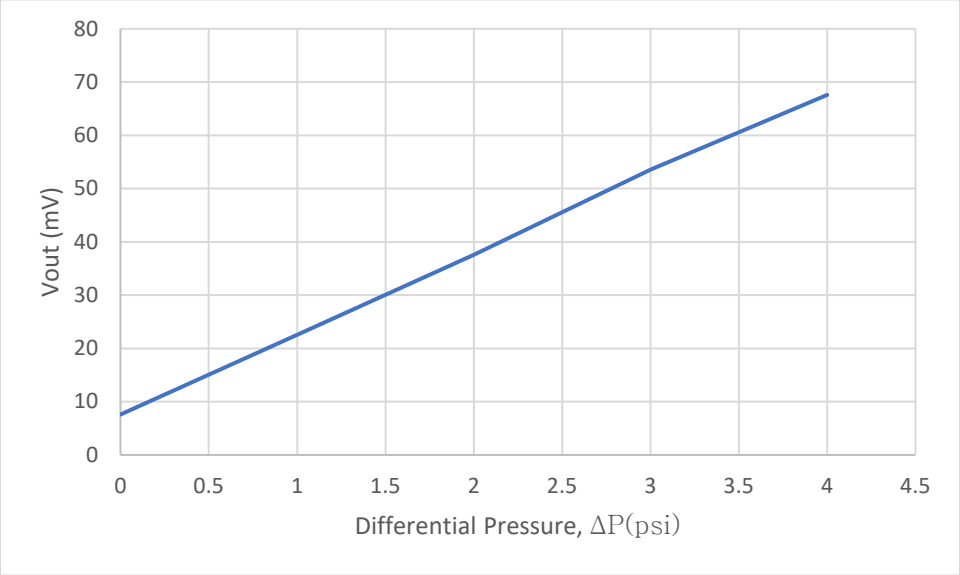
24PCC Differential Pressure Sensor Response



Zero Offset (y-intercept) = 7.59 mV

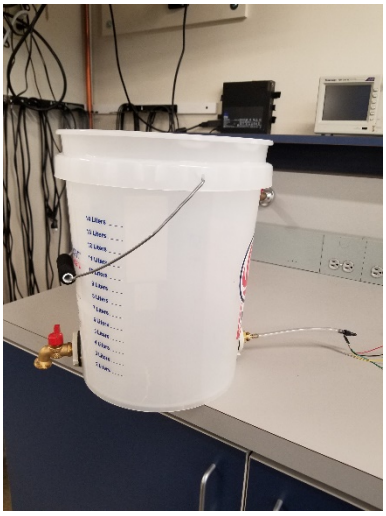
Sensitivity (slope) = 15 mV/psi

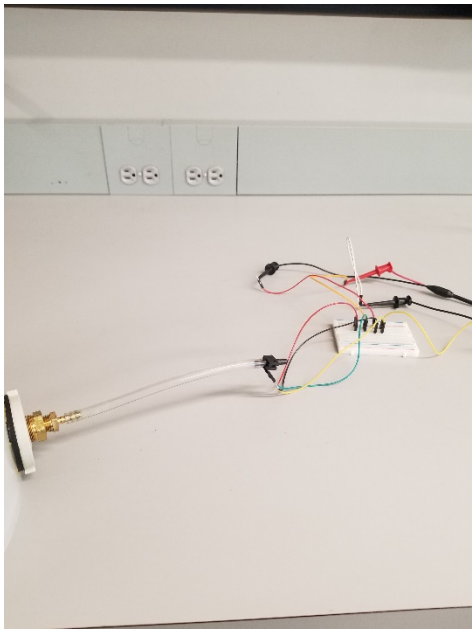
PART A

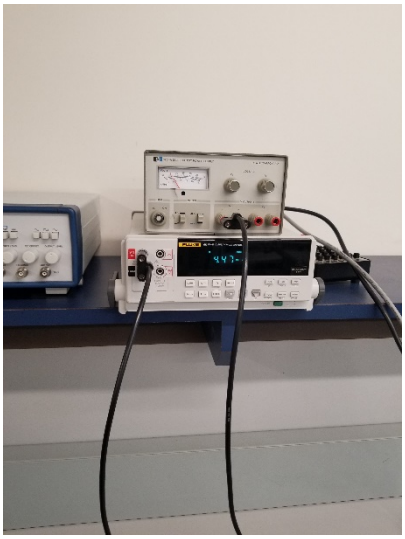
The differential pressure sensor described in the lab handout was used to measure the pressure at the bottom of a bucket filled with water. One inlet of the sensor was open to ambient pressure while the other inlet is connected to a tap at the bottom of the bucket. Thus the resulting pressure measured by the sensor was gauge pressure.

The height of the water was varied and pressure was measured for those different heights (15 measurements). Note that the height was measured from the surface of the water to the center of the pressure tap.

Vout is the output voltage of the sensor. Use the information given in the previous page to convert the sensor's output voltage to a pressure measurement. The data from the experiment is given below.







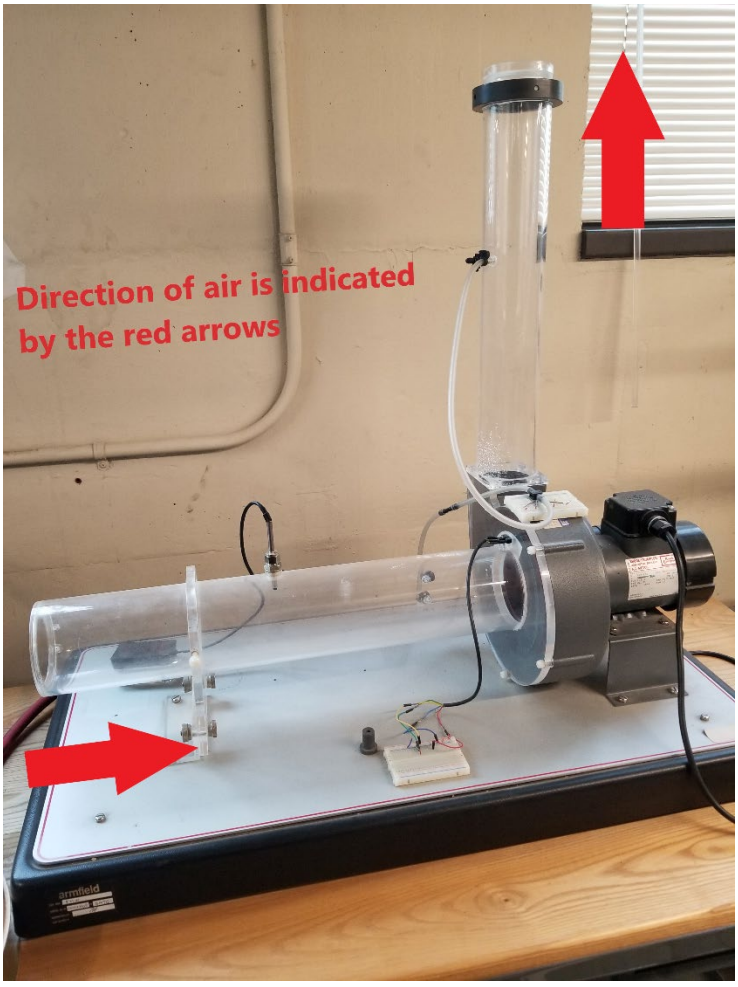
h (in)	Vout (mV)
0	7.59
2	8.72
3	9.24
4	9.68
5	10.17
6	10.67
7	11.12
8	11.6
9	12.17
10	12.64
11	13.16
12	13.65

PART B

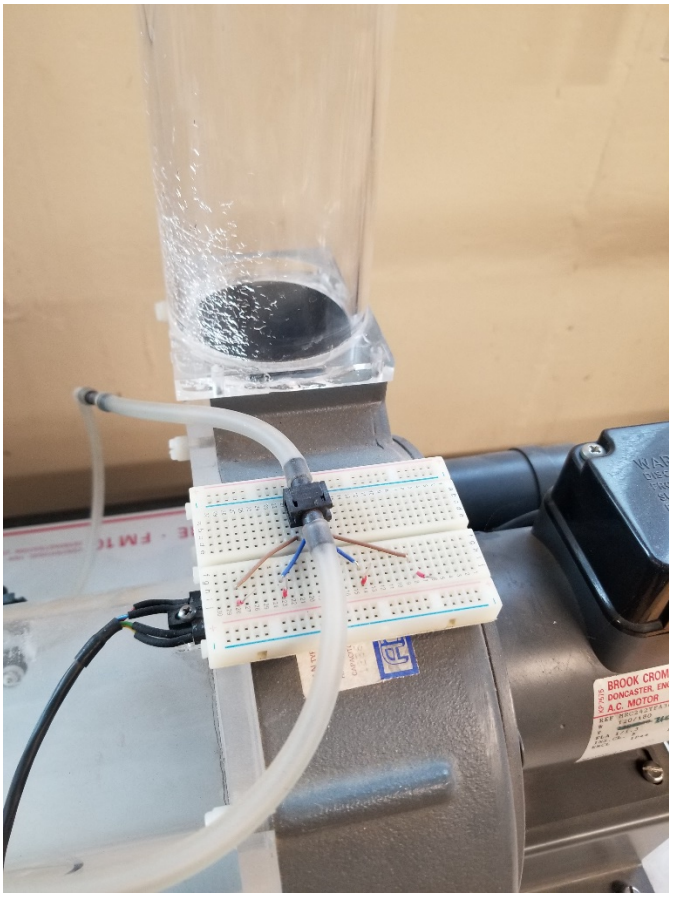
The same differential pressure sensor is now connected across a centrifugal fan. That is, one of the sensor's inlets is connected upstream from the fan while the other inlet is connected downstream from the fan. The sensor will thus give us a measurement of how much pressure the fan is producing.

The speed of the fan is measured using a counter and optical sensor that is triggered by a reflective strip. The optical sensor is triggered once per rotation so when coupled with a timer, a rotational speed can be calculated.

The speed of the fan was varied and pressure readings were measured for these different speeds. The "f (Hz)", given in the dataset below, is a measure of how fast the fan is rotating (i.e. how many rotations per second or RPS). Again, Vout is output voltage of the sensor.



f (Hz)	Vout (mV)
0	7.59
10	7.85
14	7.93
20	8.11
26	8.27
34	8.51
38	8.64
42	8.81
45	8.92
49	9.08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