GEM: Gas Flow Monitoring Software

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GEM Gas Flow Monitoring Software: Final stage

I am working to improve the reliability of the Hall A GEM gas monitoring system. I am modifying the code to read all flows and both pressures using a single channel, Fig. 1. The rendering of the gas panel is shown in fig.2.

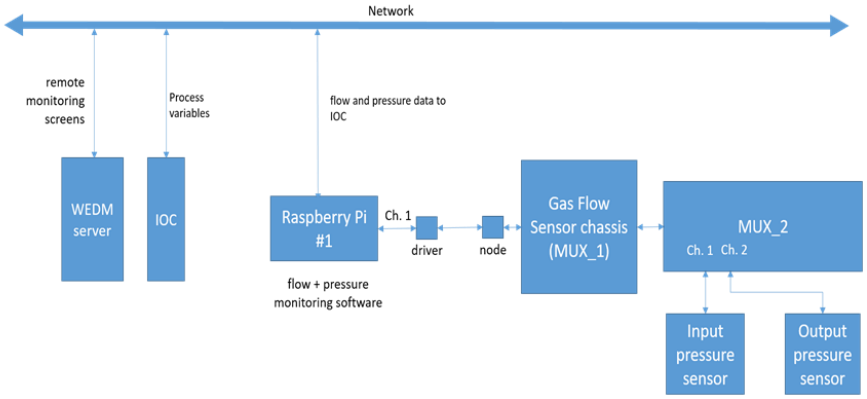

FIG. 1 The GEM BigBite data diagram will use a single Raspberry Pi channel to read all flow and pressure sensors

To do this I am using a second DSG-developed multiplexer to alternate between the input and output pressure transducer before reading the pressure data on the channel. I am trying different methods to sequence the change in multiplexer channels to accomplish switching. On the initial try, the software reads all the channels of the flow multiplexer (MUX_1), then closes that multiplexer. The flow multiplexer is installed in the Gas Flow Sensor chassis and has eight gas flow sensors connected to it.

- **Modifying hardware and software to improve robustness of gas flow and pressure readout system**
- **Tested different software modifications to use a second multiplexer to read pressure sensors**
- **Plan to implement code on Raspberry Pi using LabVIEW**

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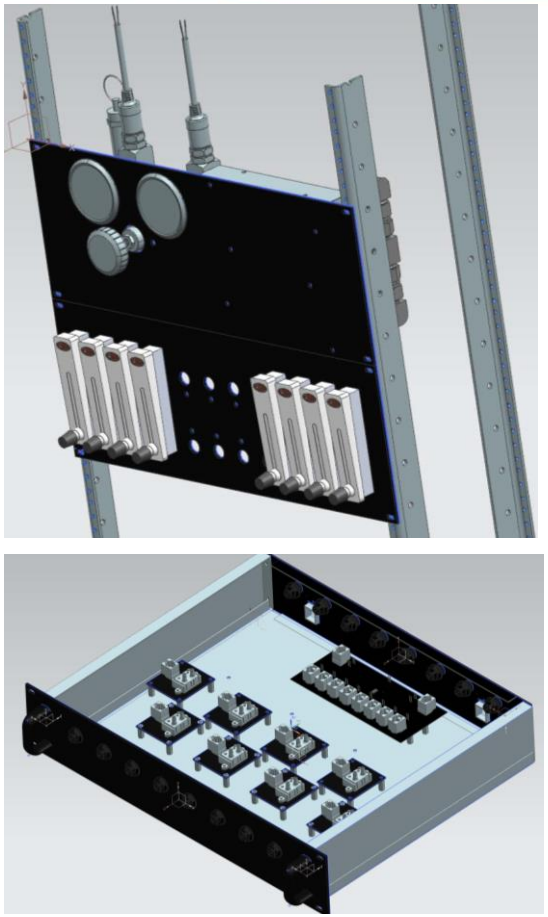
The code then calls the pressure reading program, which uses a three iteration for-loop to change the channels of a second multiplexer (MUX_2), read, and record the data from the two pressure transducers. Table 1.

Pressure program for-loop	
Iteration 1	Read input pressure sensor and write the data to PV
Iteration 2	Read output pressure sensor and write the data to PV
Iteration 3	Close MUX_2 and re-enter the main loop to read all the flow sensors

Table 1. Pressure program for-loop iteration steps

The issue with this method is that the program works for a while until it stops reading the pressure sensor. When the program stops, the program must be restarted. To mitigate the issue, I will change how the program reads the pressure. For instance, instead of using a for-loop to switch the pressure channels, I will only use the pressure program to read one of the pressure sensors at a time and write the data to a process variable. I will alternate the pressure channel on each loop of the main program. This will update each pressure reading every other loop of the main program, which is approximately six seconds for the BigBite.

Next month I plan to download the LabView module for Raspberry Pi and write a LabView version of the GEM flow and pressure readout software.



Rendering of the GEM gas panel and gas flow sensor chassis in NX12.
Top: gas panel.
Bottom: gas flow sensor chassis