Monitoring Argon Content in the GEM gas mix

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2022-03

Monitoring the Argon percentage of the GEM gas mix

A binary gas analyzer was installed on the output of a mixing system designed to supply gas to the SBS GEMs. The analyzer will monitor the percentage of argon in the gas mixture. The target argon percentage is about 78% argon in a balance of CO_2. The output of the analyzer is an analog voltage (0-5 V). To monitor this voltage, I am using a Texas Instruments ADS1115, 16-bit ADC to convert the voltage signal from the analyzer to an I^2C digital signal which can be read and monitored by the SBS GEM gas flow and pressure monitoring program I have developed.
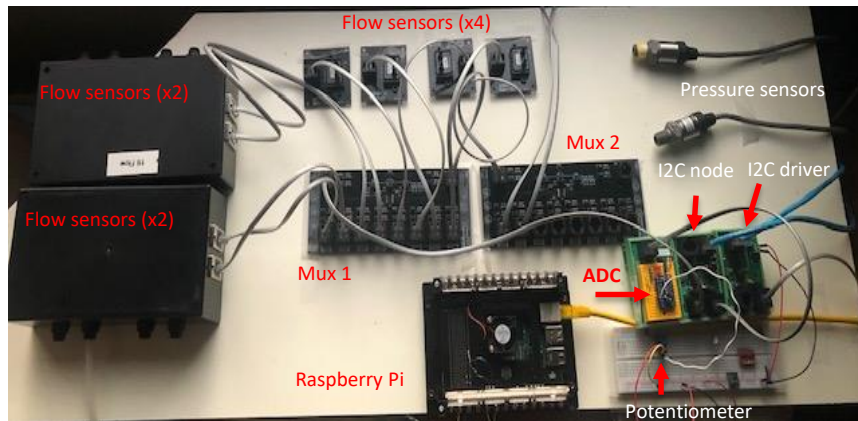

FIG.1. The ADS1115 prototype board (yellow module) was added to the GEM gas system test stand to develop the modifications to readout the argon percentage of the gas

- **Developed program for monitoring and display of argon content of the SBS gas**

- **Converted analog signal from gas analyzer to a digital signal so that it can be read by the Raspberry Pi to display the gas mixture for remote monitoring**

- **Upgraded SBS system installed in EEL building and is currently monitoring the mixing system output**

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To develop the code, I integrated the ADC proto-board into my GEM gas system test stand. FIG. 1. I used a potentiometer to simulate the 0-5 volt signal from the gas analyzer. Next, I modified driver software for the ADC to output the gas mixture signal in percentage by multiplying it by 20. Finaly, I added a process variable for the gas mixture percentage (HAGEM:SBS:gas:mix) to the process variable database file so I could send the signal to my Phoebus GUI.
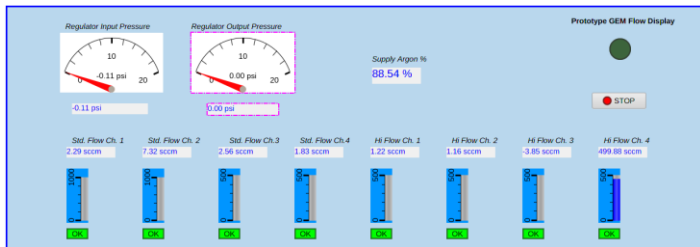

FIG.2. Testing the readout of the potentiometer with Phoebus

After completing modification to the gas flow and pressure readout code on my test stand, I installed the ADC on the SBS GEM gas distribution system in the EEL building. FIG. 4. Additionally, I added an indicator to display the argon percentage on the WEDM webpage which remotely displays the SBS gas flows and pressures. The system is up and running as expected. FIG. 3.
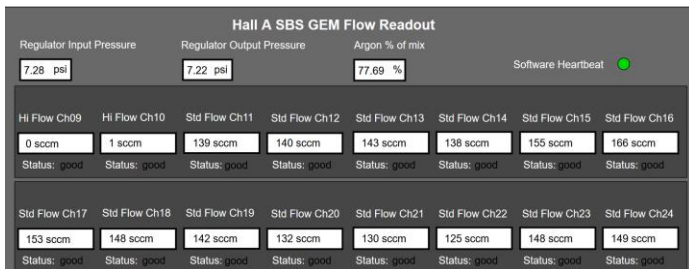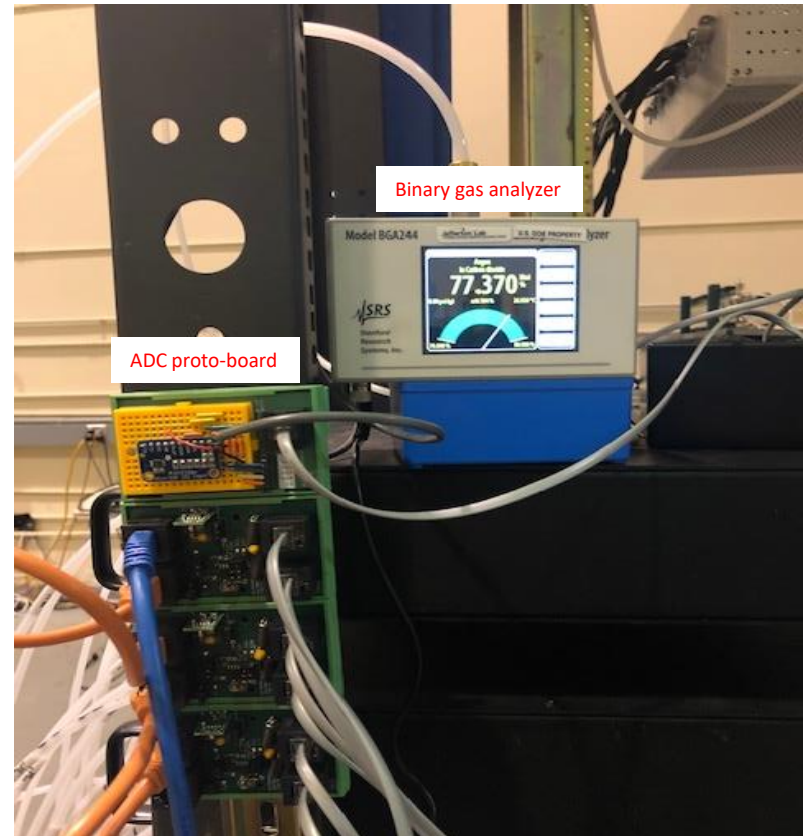

FIG.3. SBS WEDM webpage with Argon percentage of mixture displayed

The ADS1115 ADC proto-board and the BGA244 binary gas analyzer installed on the SBS gas distribution system