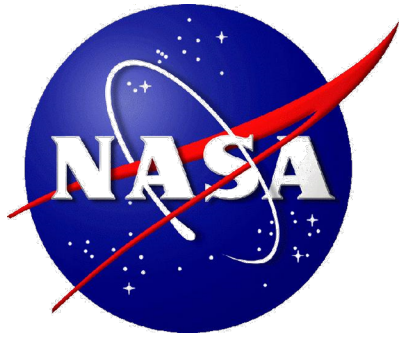


Final Review

MARS - Multi-component Adsorption Recirculation System

April 14, 2015

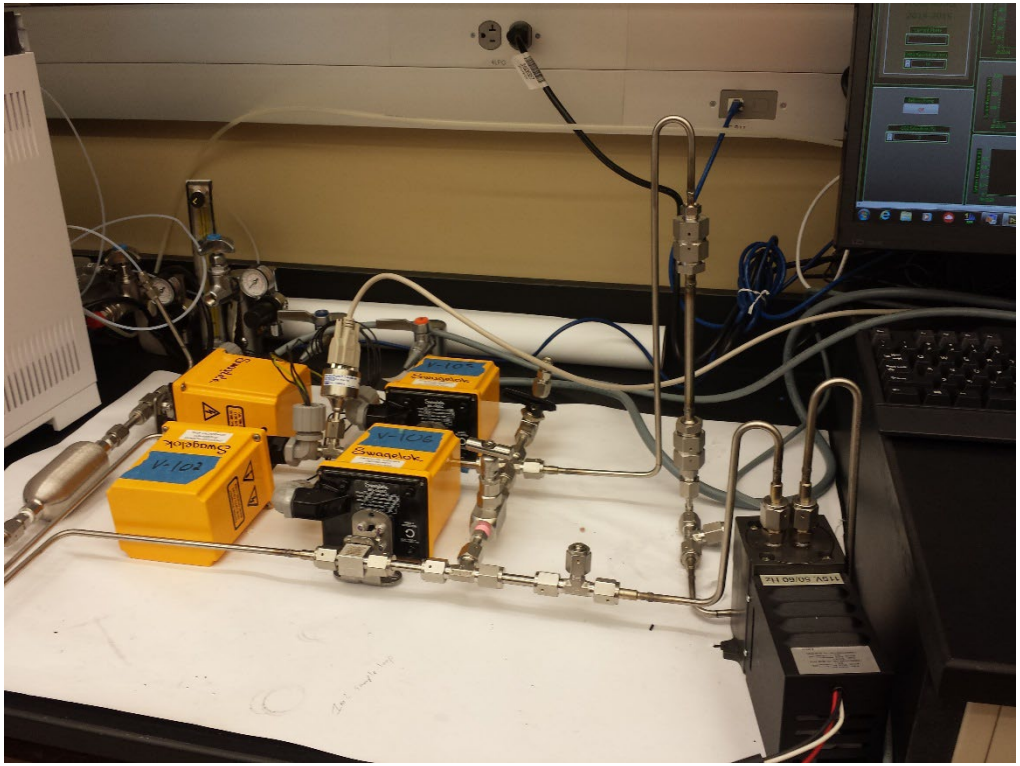
Jack Cunningham, Allison Major, Phillip Bell,

Lafi Alazmi, Aaron Anderson

Introduction

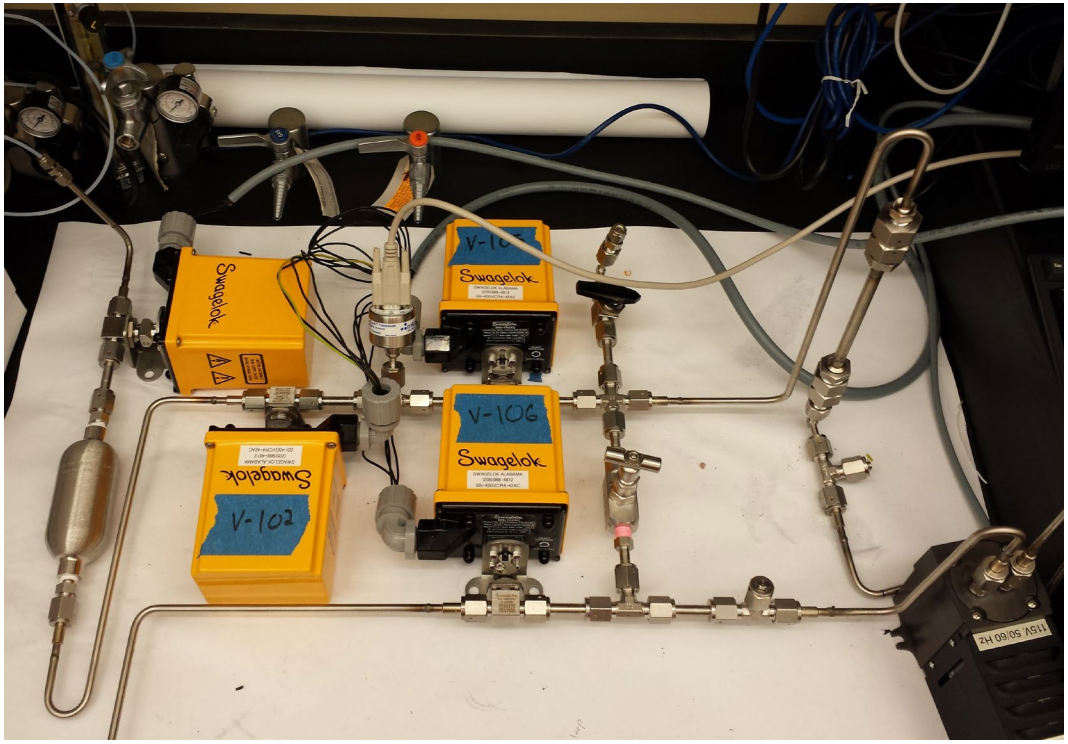
South Alabama Xhab Team

- Goals
  - Measure carbon dioxide adsorption isotherms on 13X zeolite
  - Measured using a volumetric method
  - Injected CO_2 is adsorbed and measured using the pressure loss and the ideal gas law to attribute the pressure loss to moles of adsorbed CO_2.
- Ambitious Goals
  - Measure carbon dioxide-water multicomponent adsorption isotherms on 13X zeolite



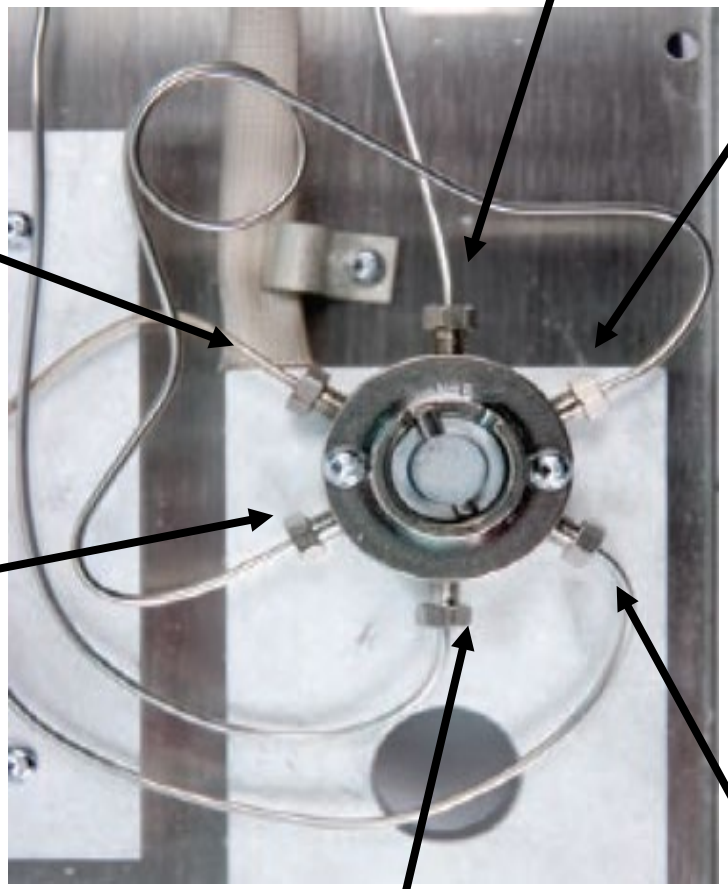
System Update and Progress

- Tasks Completed
  - Valve wiring
  - LabVIEW coding
  - System welding
  - GC sample loop and column replacement
  - Sample volume measurement
  - Gastight syringe ordered and delivered
- Tasks To Complete
  - Leak check entire system
  - Measure system volume
  - Rewire relays and pressure transducer
  - Calibrate Gas Chromatograph
  - Begin adsorption runs

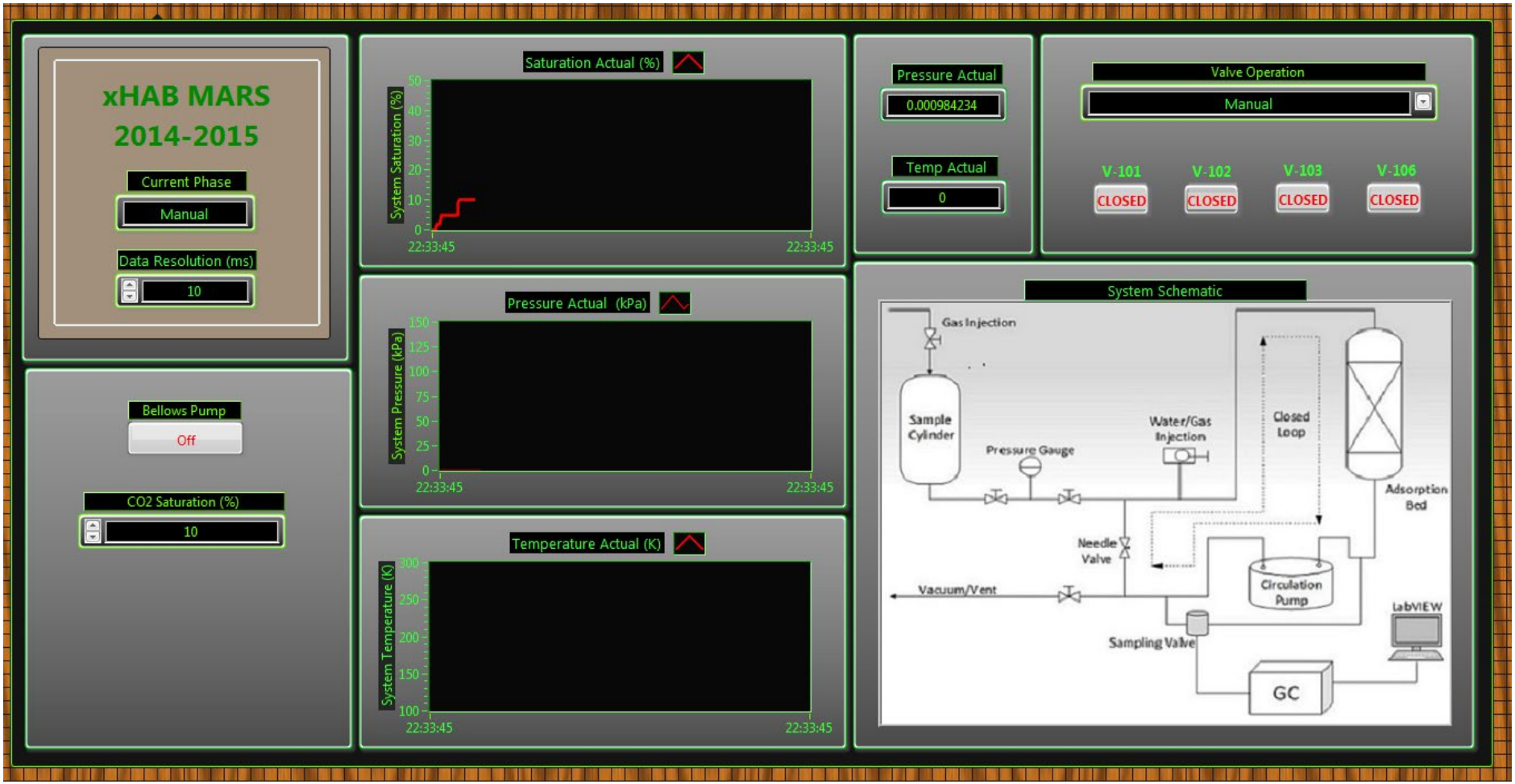


Gas Chromatograph

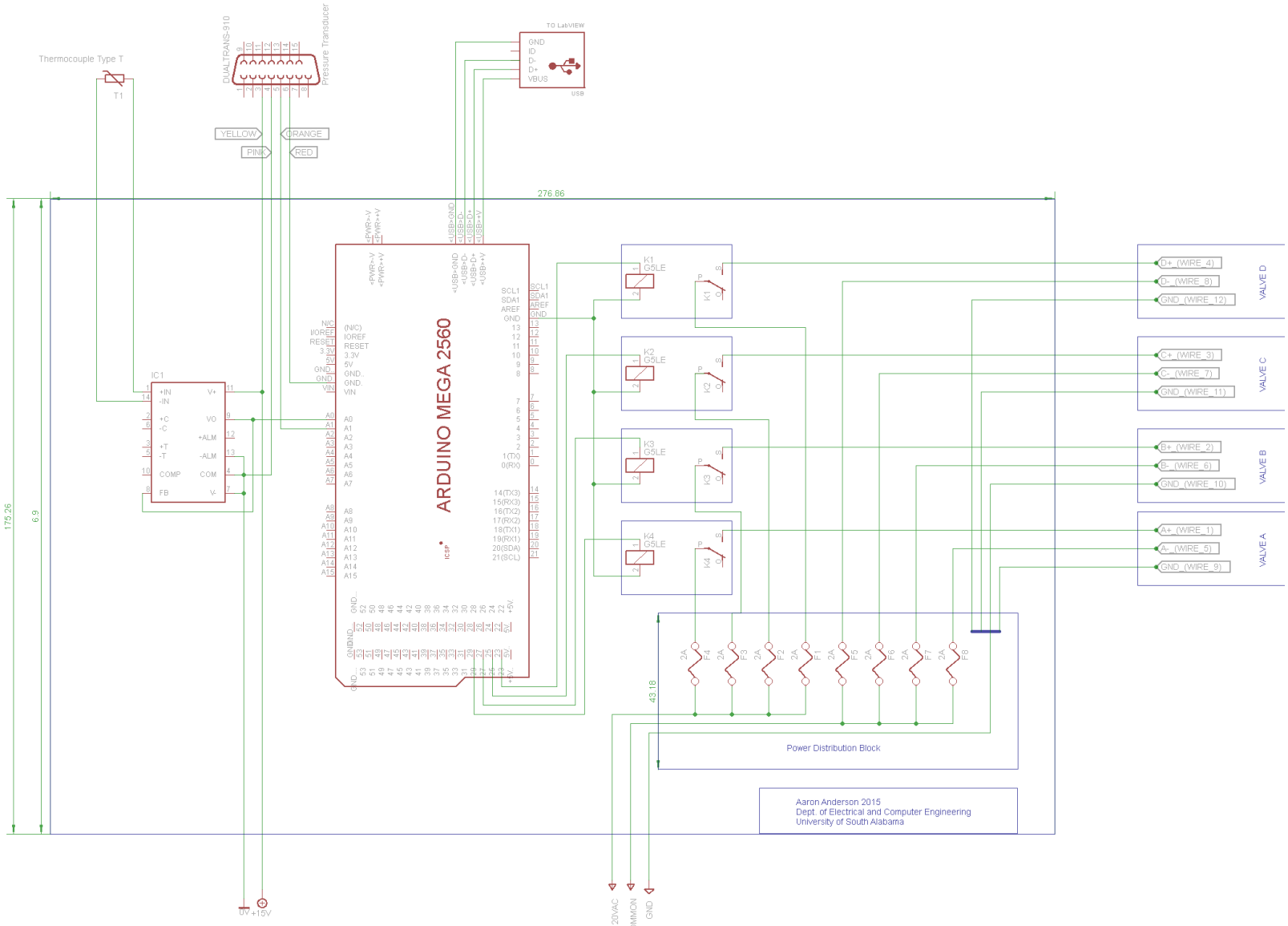
- Replaced sample loop for gas sampling valve
- Replaced DB-5 column with a PLOT-U column
- ChemStation running in XP mode on a Windows 7 machine
- Currently have a contamination peak before a CO2 peak on the Chromatogram



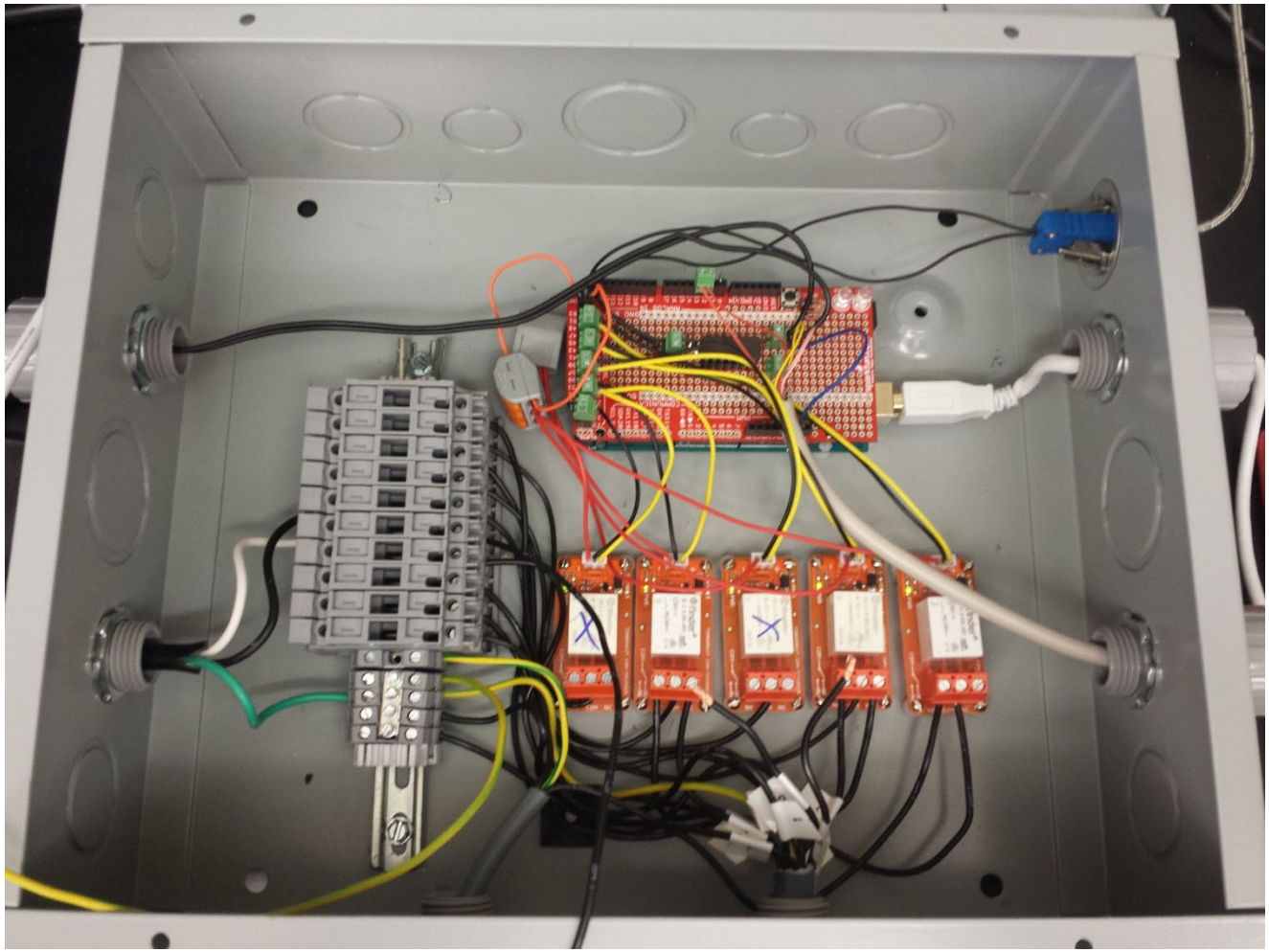
Operator Interface



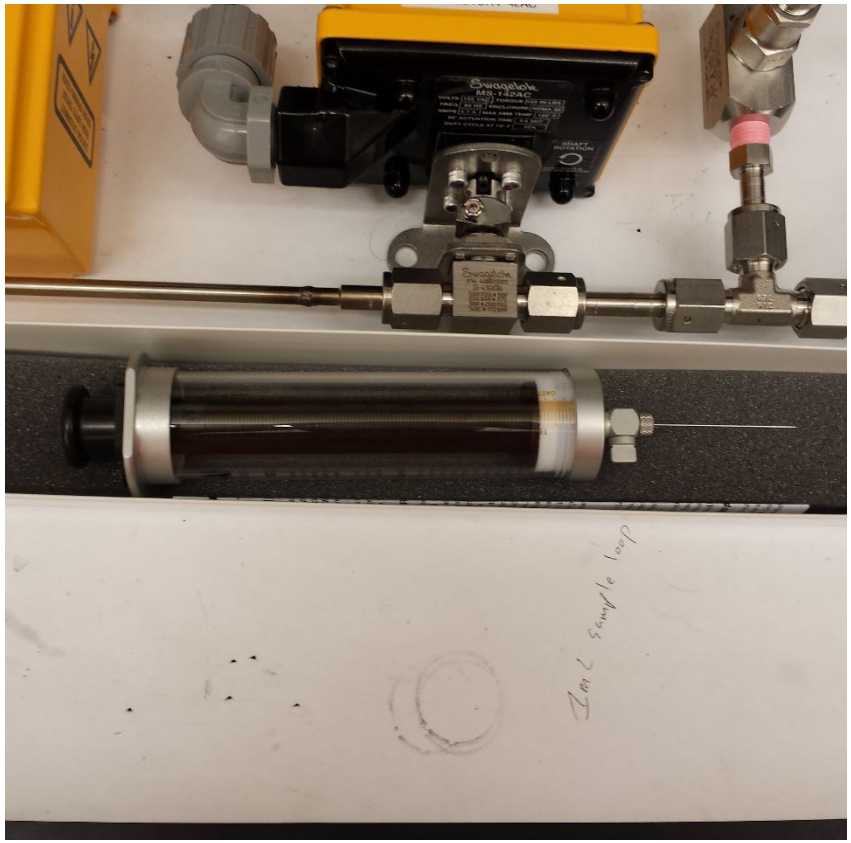
Interface Hardware Design



Interface Hardware



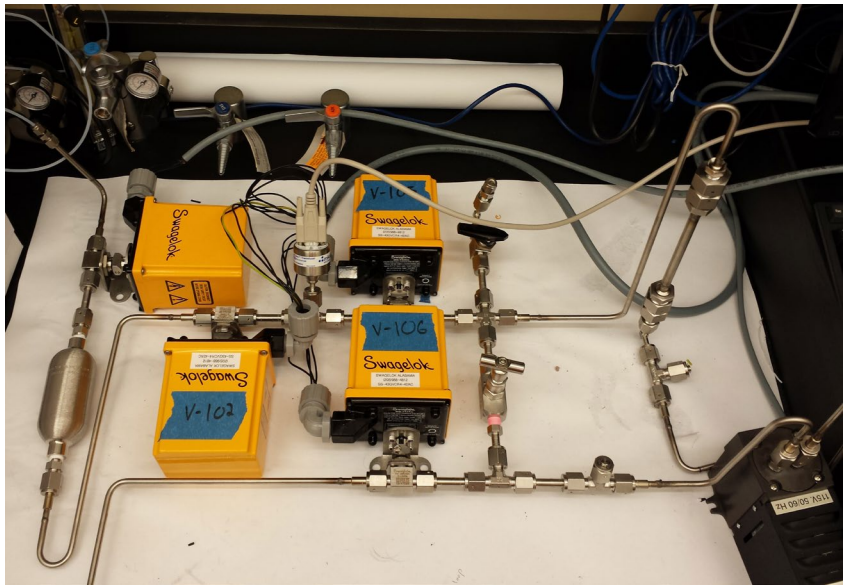
Gastight Syringe

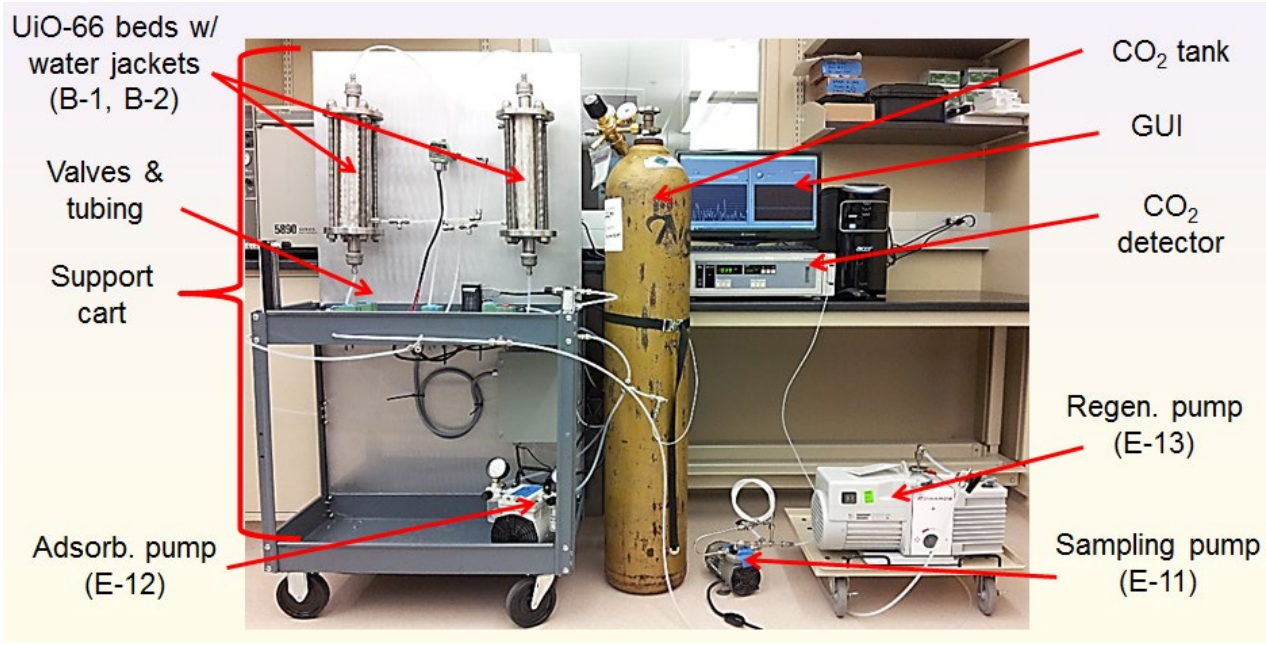


- 100 mL Hamilton Gastight Syringe
  - Sample Lock
  - 22 gauge
  - 2 in.

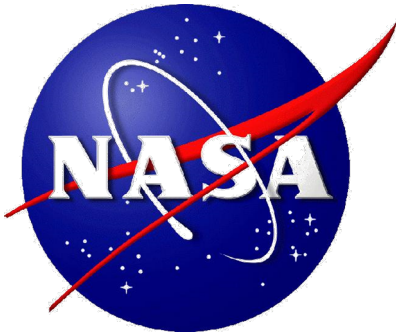
Future Tasks

- Jack will continue starting as a MS CHE student in Summer
- GC peak will be resolved
- CO2 pure data point gathered during the summer
- System will be used in combination with VSA system studying UIO-66 MOF
- Anticipating a manuscript on application of UIO-66 for low concentration CO2 removal
- Only instrument missing is diffusion data measurement tool





Questions/Comments



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