# DSG-RICH R&D Meeting Minutes

Date: March 26, 2021
Time: 11:00AM – 12:00PM

Attendees: Peter Bonneau, Aaron Brown, Pablo Campero, Brian Eng, George Jacobs,
Tyler Lemon, Marc McMullen, and Amrit Yegneswaran

1. **Zaber motorized stages for automated reflectivity test station**
   Tyler Lemon
   - Posted information on reflectivity test station upgrade on DSG website
   - Provided travel distance and weight considerations for test station to Zaber
   - Will use Zaber LC40 series for *X* and *Y* axis stages, with ~3 ft of travel each
   - Recommended Zaber X-LSQ300A-E01 for *Z*-axis stage
     – ~1 ft of travel
     – 90 um position accuracy
   - Recommended two Zaber RSW60A-E03 rotary stages for θ and φ rotation
     – Continuous rotation, but will be limited to ±90° because of cabling to probe
     – 0.08° position accuracy
     – Mounted onto *Z* axis stage with specific Zaber mounting plate
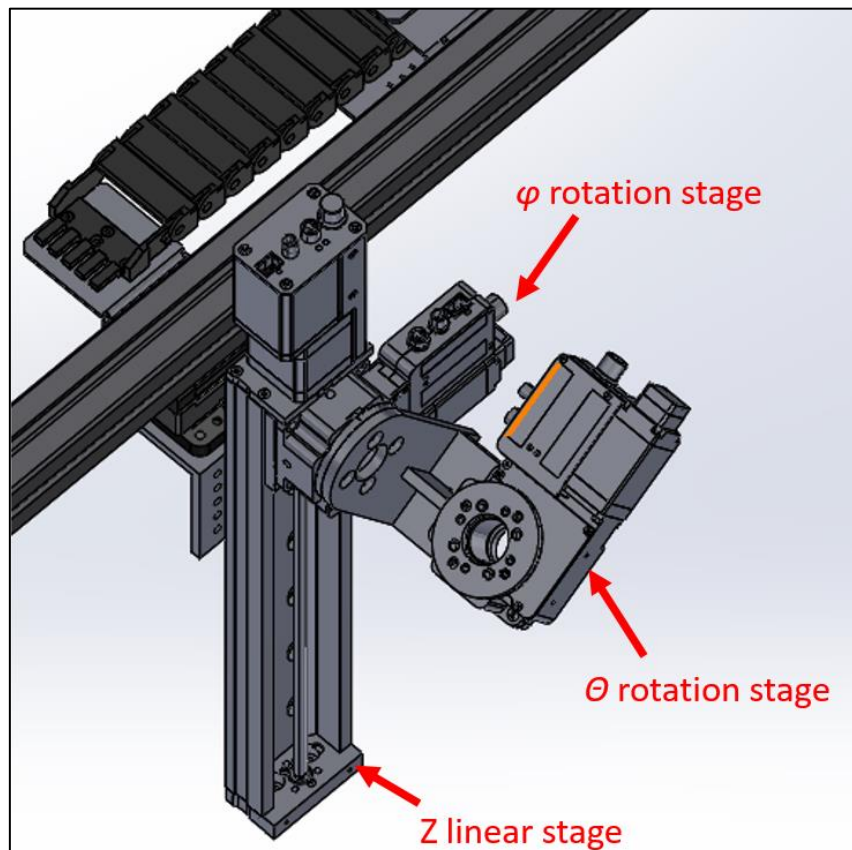

Zaber CAD model of *Z* axis stage and rotary stages

## 2. ANSYS analysis of SHT35 sensor PCB in progress
Tyler Lemon

- Created model of multilayer PCB in NX, based on Altium specifications
  - Altium exports PCB as a simplified solid
  - NX version has separate layers for power plane, ground plane, center FR-4 layer, internal prepreg layers, and solder pads; also includes vias
  - Next version will have traces and solder mask
- Performed ANSYS analysis on new model
  - Set ambient temperature to 20° C
  - Applied convection to stagnant air on all faces in model
  - Applied internal heat generation of ~22 mW to both buffer drivers
    - "Worst case" scenario where buffer driver constantly holds output low
    - In normal operation and behavior, signal only held low for ~1 ms per data acquisition
  - Analysis treats board as in free space, not fixed to any object that can act as a heat sink
    - Previous model held bottom of PCB at ambient temperature to mimic PCB being mounted on RICH detector shell
  - After PCB heat load reaches steady state, temperature at SHT35 sensors is 20.086° C
    - Temperature increase will not affect sensors' measurements
- Will update model to reflect latest design of PCB as changes are made
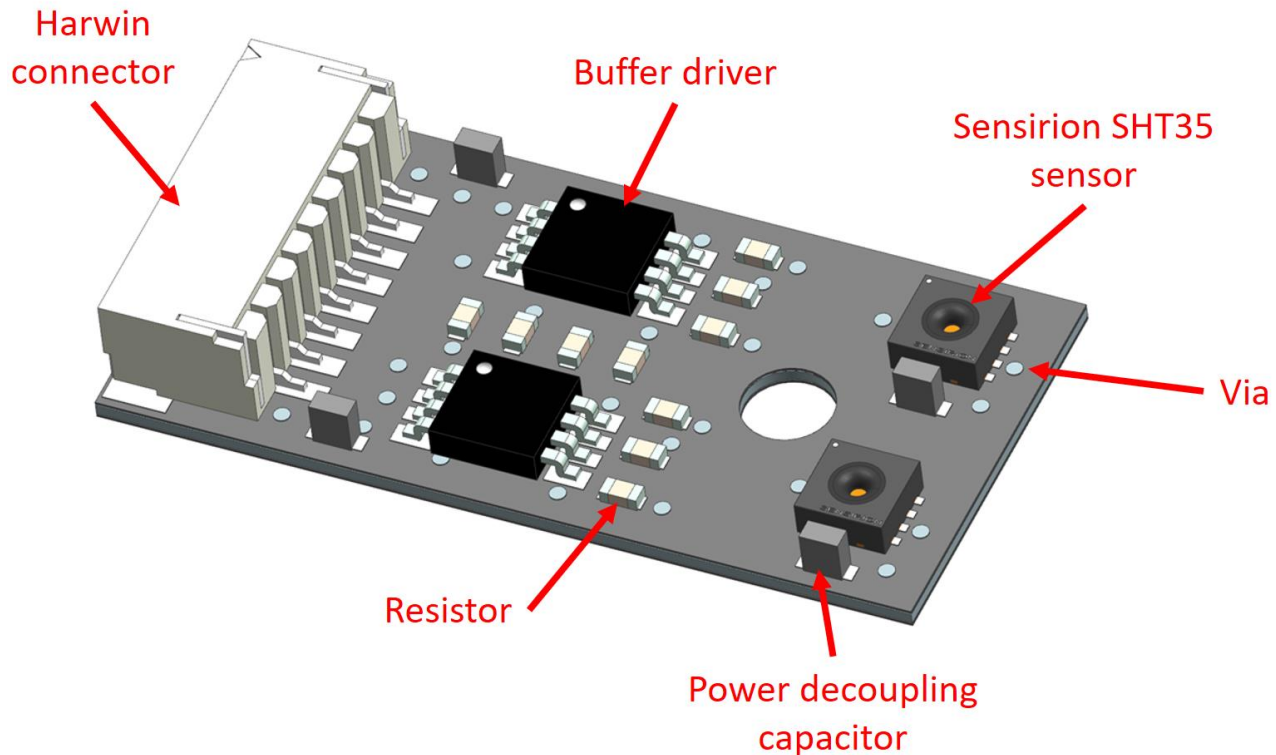
NX model of multilayer Sensirion SHT35 sensor PCB
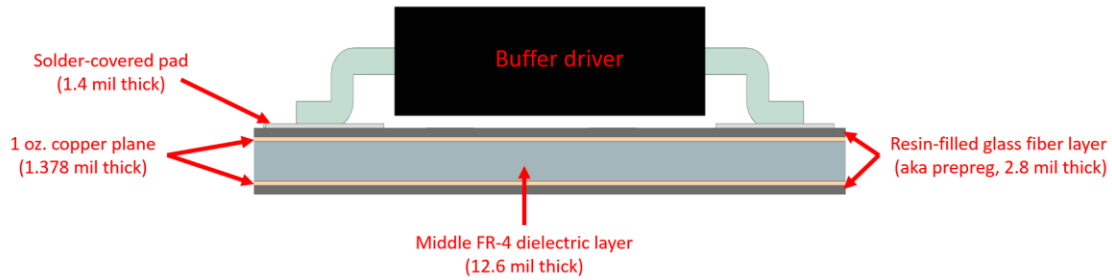
Cross-section view of NX model PCB at buffer driver showing model's different layers.
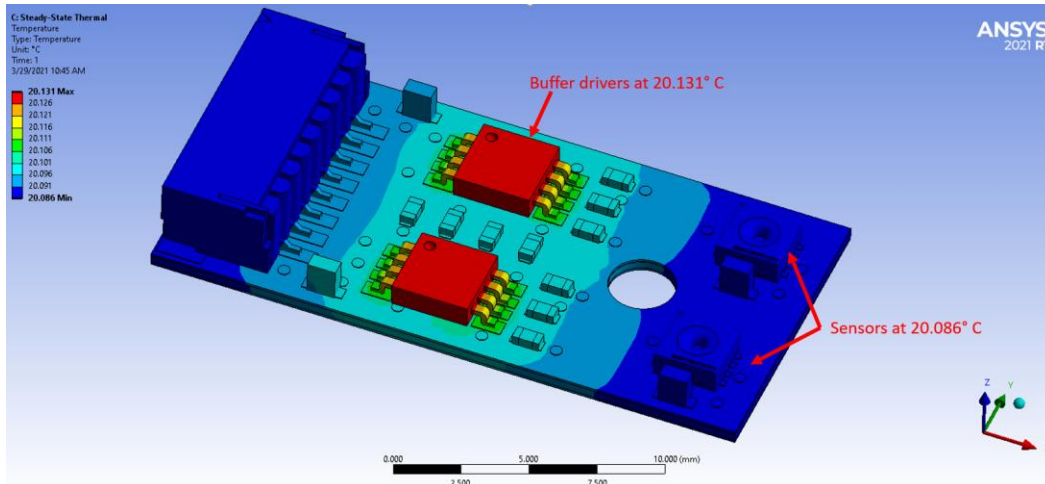

Output of ANSYS for multilayer PCB

3. Sensirion SHT35 sensor PCB
Peter Bonneau, Brian Eng, Tyler Lemon, and Marc McMullen

- Completed prototype design; fabrication will follow review
- Will research crimping tool for Harwin connectors
  - Harwin does not have a recommended crimper
  - Submitted PRs for Harwin and Molex connectors and Molex crimper
  - Will test crimper with both Harwin and Molex connectors before deciding on connector to use on PCB
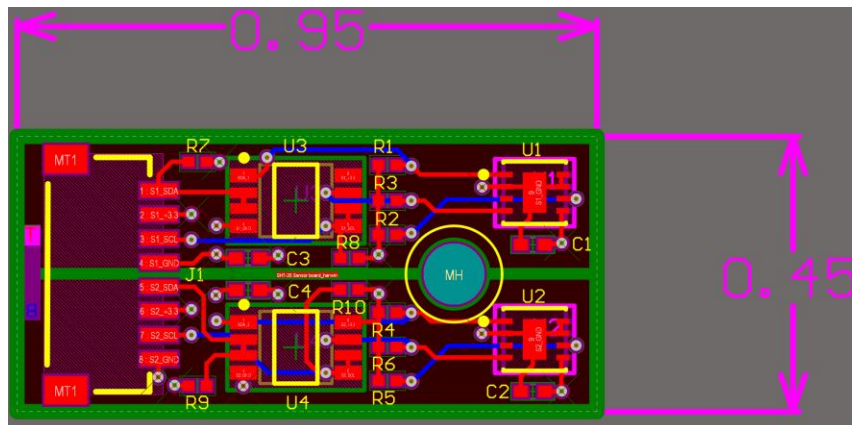
Altium PCB layout. Traces on top layer are red and traces on bottom layer are blue. Yellow lines indicate silk screen overlay. Dimensions shown are in inches.