RICH-II: Hardware Interlock System

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Shared Variables for the Hardware Interlock System

I am working on the LabVIEW program for the RICH-II hardware interlock system. I am adding network shared variables and EPICS communication to the program, which allows remote monitoring of all relevant variables using an expert LabVIEW user interface, a CSS user screen, or a CSS expert screen.

To make it easier to add network shared variables to the LabVIEW program and link EPICS PVs to the network shared variables, I developed a separate Python program to create a configuration file for the LabVIEW network shared variable library and a database file for the EPICS PVs. The Python program reads and parses an Excel file, which contains the name of the network shared variable, the data type of that variable, and the EPICS PV to assign to that network shared variable. The Python program then creates a CSV that can be imported into LabVIEW to add all network shared variables to the LabVIEW program's shared variable library and a .db file that can be imported into the sbRIO's EPICS server or client to create the EPICS PVs that are linked to the network shared variables.

Without this Python program, the only way to create and assign properties to network shared variables and EPICS PVs in LabVIEW is to manually add the items to the project file. Because RICH-II's program will have over 300 shared variables, this process would be tedious, time-consuming, and prone to typos.

A problem that was encountered was there is very little documentation on the syntax and format of the file that LabVIEW can use to import variables into the network shared variable library. To overcome this, I had to manually create a template variable in the LabVIEW project, export that variable to a CSV (a built-in capability of LabVIEW projects), and then use that CSV as a template for the overall format of the output of the Python program.

- **Adding EPICS communication capability to LabVIEW program**

- **Developed Python program to create a configuration file for the LabVIEW network shared variable library and a database file for the EPICS PVs.**

- **Plan to test interlock system on Hall B development subnet in EEL building and review acquired data with a separate analysis program - being developed**

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Another problem encountered was the sbRIO did not have the correct EPICS software installed on it. This was resolved by reconfiguring the sbRIO with the correct software.

As of February 15, 2022, the software for this task has been completed,fig1, but not used and tested. The sbRIO and hardware interlock system has only recently been moved to EEL and set up on the JLab Hall B development subnet (previously, the system was at home to allow work-from-home on the project).

In the next month, the network shared variables will be tested on the Hall B development subnet. Additionally, the sbRIO will be configured as an EPICS server to allow the shared variables to be published to EPICS. After data are able to be read in EPICS, all sensor data (with no dead band) will be archived using the existing MYA infrastructure. At this point, while data is recorded, a separate analysis program (most likely in Python) will be developed to determine the stability and behavior of the sensors over long periods of time.
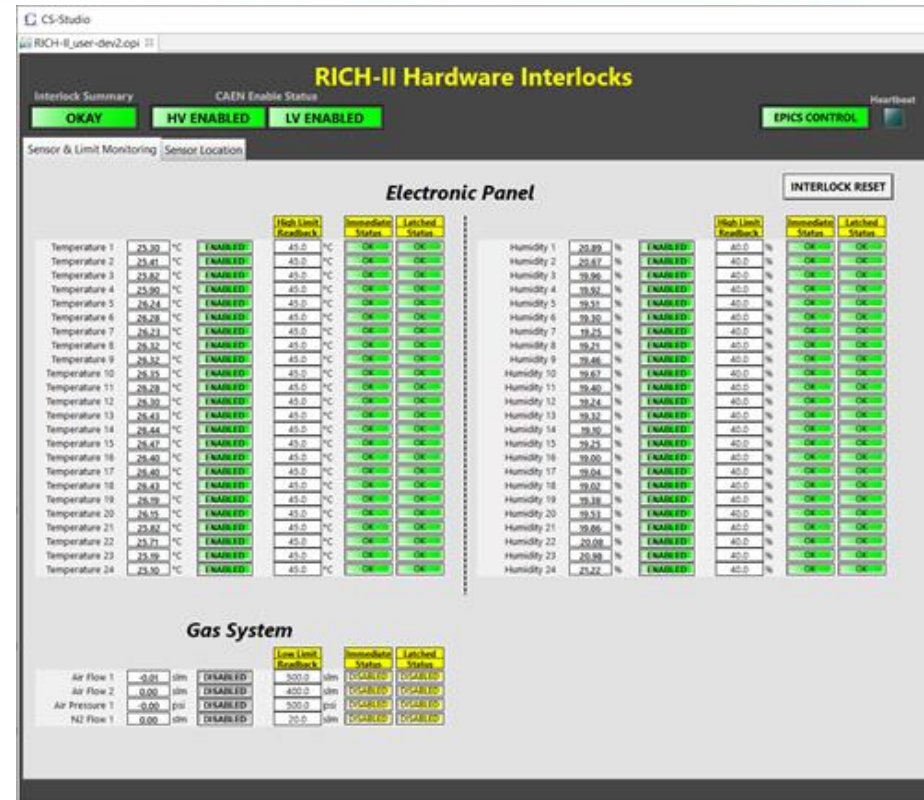
Portion of CSS-BOY screen developed to monitor and control RICH-II hardware interlock system using EPICS.