

## Monitoring Software for RICH Sensirion SHT85 Sensors

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LabVIEW code was developed for a user interface with three tabs—the Main tab displaying relevant run and alarm parameters as well as the moving averages of temperature and humidity data acquired at a rate of 0.1 Hz, the Plot tab displaying charts, and the Expert tab used to set values and alarm limits. The program also saves the data to a text file.

To monitor the temperature and humidity of the new RICH detector at the level of 0.1° C and 1.5% relative humidity, Sensirion SHT85 sensors will be installed [1–4]. LabVIEW code was written to display data received from 48 sensors and indicate any values out of bounds of the alarm levels set by the user. The first version of the software generated random numbers as placeholders for actual sensor data.

The Expert tab, Fig. 1, is used to enter parameters needed to run the software. For this version, random numbers is chosen as the Run type. For the calculation of the moving average the number of data points to average (100) is entered; the program replaces the oldest data point with the newest. The upper and lower bounds for the random numbers are entered. The upper and lower alarm limits for both temperature and relative humidity must be entered for each sensor.

After entering the required information on the Expert tab, the program is started. The Main tab, Fig. 2, shows for each sensor the current temperature, average temperature, standard deviation, current relative humidity, average relative humidity, and standard deviation. If the average goes below the set limit, an indicator lights green; a different indicator lights green if the average is over the set limit. There are running totals for each sensor of the number of times the average goes under or over the limit. The average of all sensors is also indicated for both temperature and relative humidity.

The Plots tab shows two charts, one for temperature averages and one for humidity averages, Fig. 3. In the columns to the left and right of the charts, the sensors to be displayed in a chart can be chosen by checking the box to the left of the sensor name in the column corresponding to the chart.

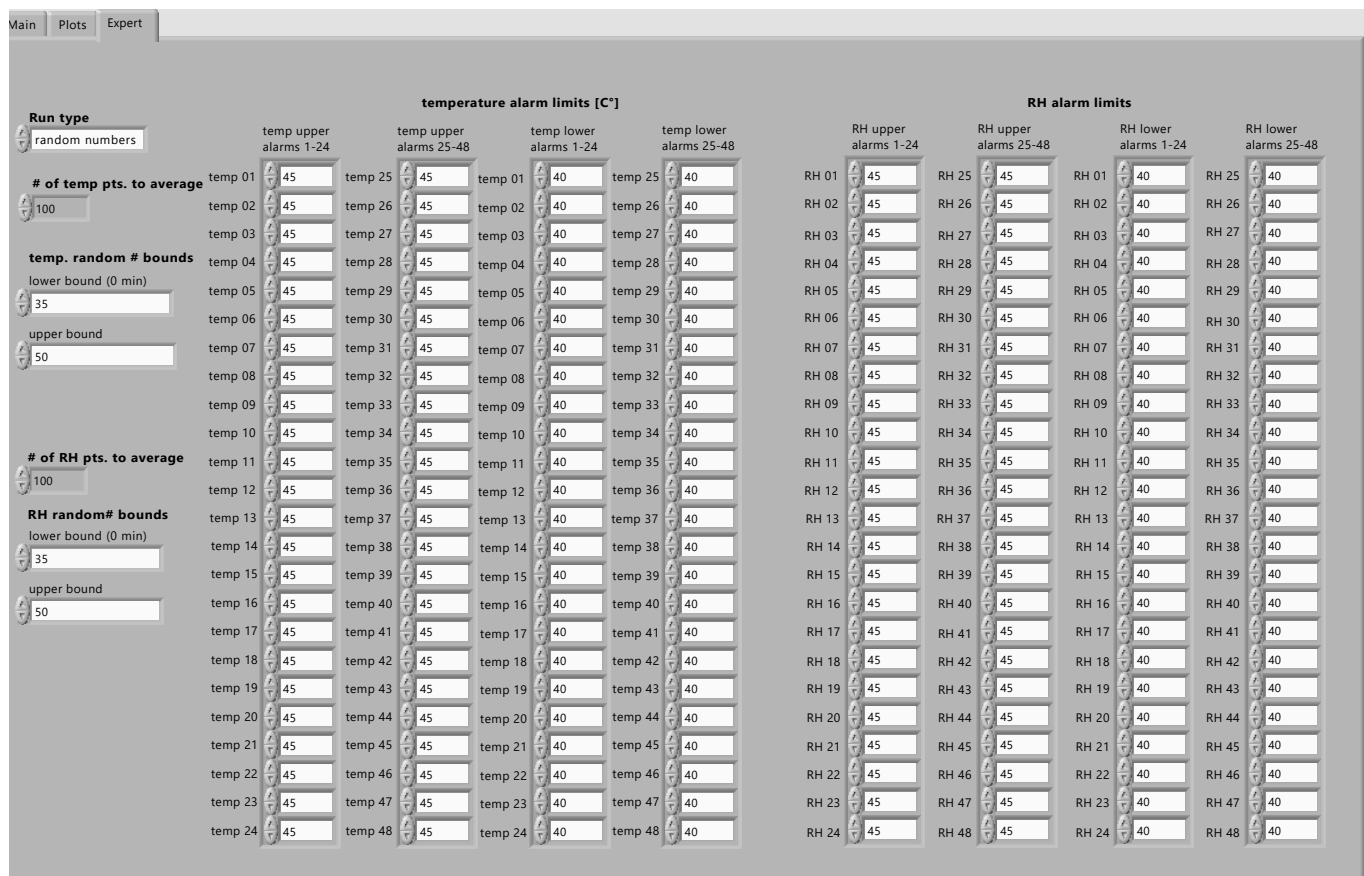


FIG. 1. Screenshot of Expert screen to enter initial values needed to run program.

Data read from the sensors are saved to a text file, one file for temperature and one for humidity. A new file is created at 12:00 AM each day.

In summary, LabVIEW code was written to display data from the SHT85 temperature and humidity sensors, which will be used for the RICH detector in the future. The current code uses randomly generated numbers, the next version will use RICH data.

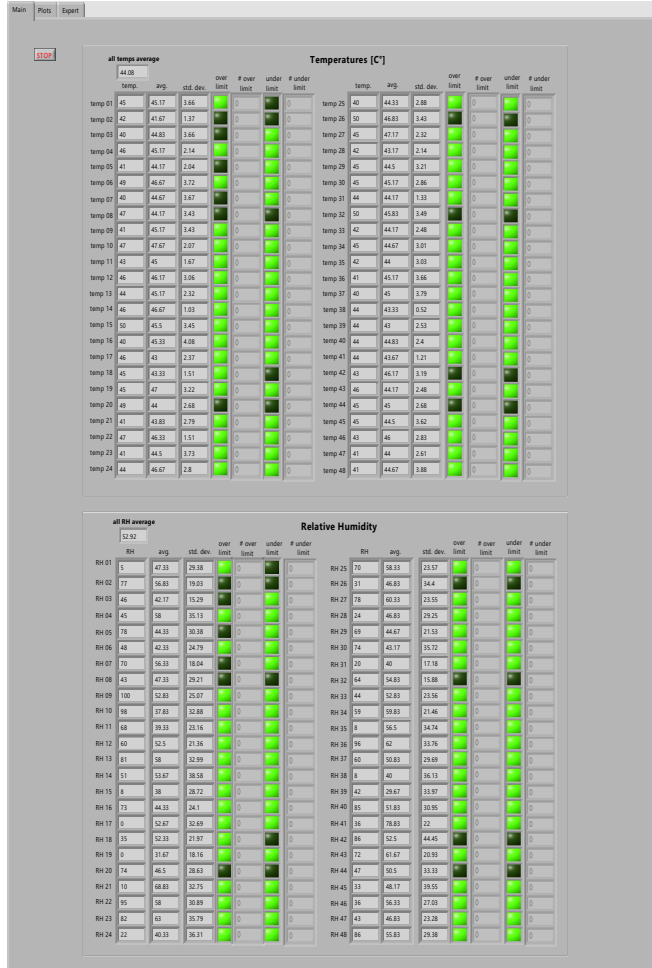


FIG. 2. Screenshot of temperature and humidity sections of Main tab.

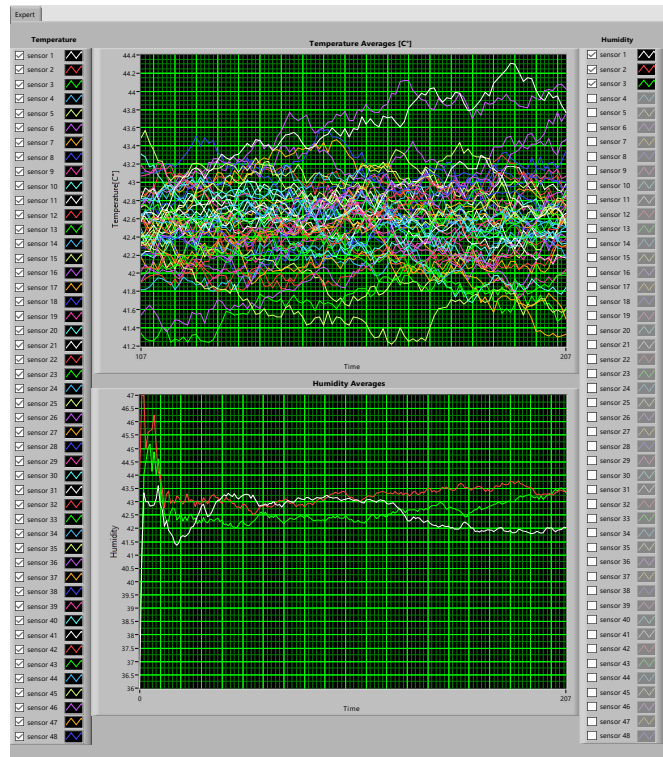


FIG. 3. Screenshot of charts for temperature averages and humidity averages. The temperature chart, top, shows all sensors. The humidity chart, bottom, shows sensors 1, 2, and 3.

- [1] P. Bonneau, et al. *Proposed Integrated Temperature and Humidity Digital Sensor for the RICH Detector*, DSG Note 2019-12, 2019.
- [2] P. Bonneau, et al. *Proposed Controller for the Readout of the Temperature and Humidity Digital Sensors Sensirion SHT85 Envisioned for the RICH Detector*, DSG Note 2019-27, 2019.
- [3] P. Bonneau, et al. *Developing a Readout System for the Sensirion SHT85 Sensors*, DSG Note 2019-28, 2019.
- [4] P. Bonneau, et al. *Development of Data Acquisition to Read out Sensirion SHT85 Temperature and Humidity Sensors for the RICH Detector*, DSG Note 2019-31, 2019.