First Results from the Hall B Environmental Monitoring System

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This note presents the first results from the environmental monitoring system that monitors the ambient environment (pressure and temperature) in Hall B

A previous note [1] described the selection process for a System on a Chip (SoC) microcontroller appropriate for deployment in the end stations, with Hall B being the first. Figure 1 shows the microcontroller located on the top of a rack on the forward carriage in Hall B. The white cable is the network cable that provides both power via Power-over-Ethernet and networking.

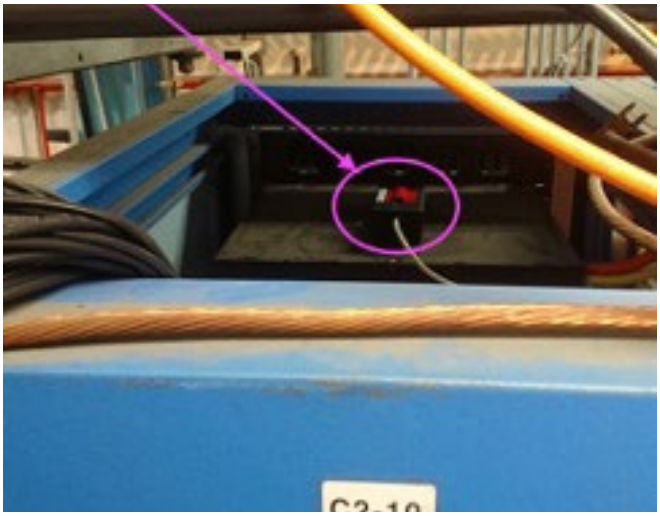

FIG. 1. Deployed microcontroller circled in magneta.

Modifications to the code were needed after the first deployment in Hall B. It was found that there were occasionally delays in fully initializing the network interface, which would cause the setup to the ActiveMQ broker to fail. This was fixed by attempting to connect to the broker multiple times. Currently, the code attempts to connect up to ten times, though in observations over several power cycles it was found to never take more than three attempts to connect. The other modification was to avoid sending the first data sample from the sensor chip to EPICS, as the first reading was always incorrect. This is believed to be due to initializing the over-sampling on the chip, but limited access to the Hall prevented further debugging.

Figure 2 shows comparison of the ambient pressure of the new system compared to an existing pressure sensor. Note that the units are different—hPa for new and inWC for the existing. Figure 3 is a similar comparison for the temperature, again with different units—°C for the new sensor and °F for existing. All of the plots are from myaPlot, which retrieves archived process variable data.

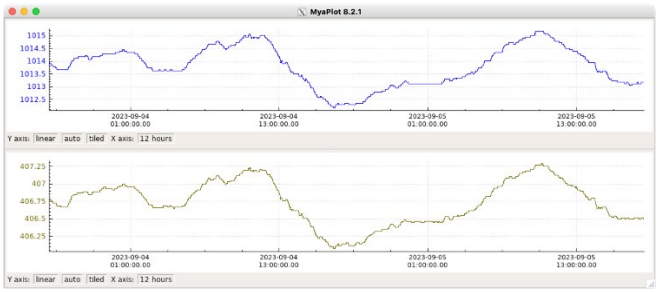

FIG. 2. Ambient pressure comparison. Blue/top shows new sensor; brown/bottom is existing.

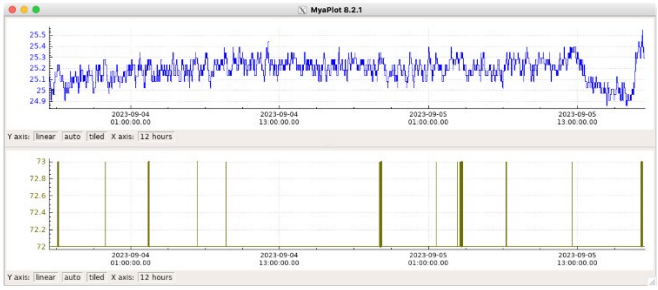

FIG. 3. Ambient temperature comparison. Blue/top shows new sensor; brown/bottom is existing.

As can be seen from the plots, the ambient pressure measurements track the existing sensor data while the ambient temperature has significantly better resolution than that of the existing sensors.

To conclude, the initial results from the SoC measured values archived via EPICS process variables show that the system can be well integrated into the existing software and provide increased accuracy to ambient measurements.

[1] B. Eng, et al., *System on a Chip Microcontroller for End Station Deployments*, DSG Note 2023-31, 2023.