

## Arundo DS challenge - Skyler Saucedo 11/4/22

*A 1-2 paragraph description of your solution detailing the approach taken and at what time before the failure your method would indicate the system is no longer operating as expected.*

Sporadic power interruptions have deleteriously contributed to the pumping efficiency and flow of lubricant to the gears, adding strain to the system's capacity to dissipate heat and maintain pressure. A slow decrease in gearbox pressure suggests a potential mechanical failure may be imminent. During the onset of failure, there is less pressure at the gearbox than what is expected, and with this, less lubricant circulating through the system. Additionally, there is a gradual increase in the variance of the temperature during this time, hinting at the system's increased difficulty to lubricate the gears and maintain nominal behavior and a stable temperature.

My custom sensor utilizes Arundo's API detection toolkit and, using a combination of detector types, can sense anomalous behavior at 11/7 20h. An *AutoregressionAD* detector (with `n_step` sizes comparable to a full on-off cycle of power and flow) is used to initially observe how the cyclical time series data behaves during the onset of failure. After exploring the other detectors, *AutoregressionAD* was also used on the pressure data (emergent property of the power and flow data) and appeared to confirm the onset of failure. The variance in temperature data during the onset of failure is best observed using a *quantileAD* detector, where the anomalies during the onset of failure rank above a 98.1 percentile threshold.