Ammonia sensors have a wide range of uses, and are particularly indispensable for laboratory animal studies. Common metal-oxide based ammonia gas sensors are often expensive and inconvenient to operate. To tackle this problem, Winlab used LSTM neural network that predicts the equilibrium resistance using the sensor’s initial resistance response.

Find the hidden variables that cause drift in the value read by ammonia sensors. Use statistical models to predict the drift. Test the ‘gunk’ hypothesis, which states that sensor accumulates a layer of aqueous ammonia as a function of rest time and ambient ammonia concentration.

Sensor 2336 when placed in Cage 16 shows the gunk hypothesis. Correlation matrix shows that on an average, sensors have a more significant effect than the cages themselves on NH3 levels.

The plot on the left shows that ammonia concentration drift with time interval between readings can be modeled linearly. Predicted values lie on the blue line, while actual values are dots.

We are exploring the drift among sensors using log-linear and log-log models. We will be conducting more controlled experiments with humidity as a variable for drawing conclusions about the nature of drift.

References