

## **Results - Fault Detection and Diagnosis System**

A] Below are the results:

1. Predictions of the model trained with Isolation Forest unsupervised ML algorithm on the provided dataset yielded an accuracy of 80.8% which is the percentage of readings correctly predicted as faulty or not by running the model through the dataset.
2. Predictions of the model trained with SVC supervised ML algorithm on the provided dataset yielded an accuracy of 97.6% which is the percentage of readings that were correctly classified with the correct fault types (0 - 5) after running the model through the dataset.
3. Cross validation accuracy of the model trained with SVC supervised ML algorithm on the provided dataset yielded an average accuracy of 95.3%.
4. The prediction accuracy of the model using unsupervised ML algorithm was lower than the prediction accuracy of the model using supervised ML algorithm even with 50% test\_size because the model was trained on the "ground truths" and then used for its prediction.
5. The first plot below shows the ideal (healthy) sensor signal and the faulty (real) sensor signal.
6. The second plot below shows the ideal (healthy) sensor signal, true faulty readings in the faulty signal and predicted faulty readings by the model trained with the Isolation Forest algorithm.
7. The overlap between the true and the predicted faulty readings graphically represents the accuracy of the Isolation Forest-trained model with respect to detecting anomalies.
8. The third plot below shows the ideal (healthy) sensor signal, individual true fault types and individual predicted fault types that were predicted by the model trained with the Support Vector Classification (SVC) algorithm.
9. The overlap between the individual true and the individual predicted fault types graphically represents the accuracy of the SVC-trained model with respect to classifying the fault types of the anomalous data points.

