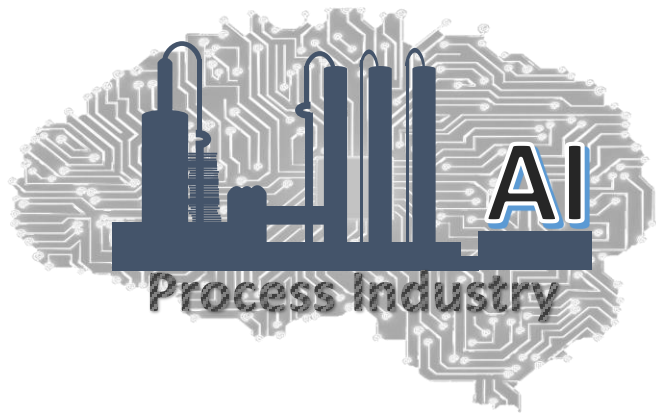# Statistical Techniques for Monitoring Industrial Processes

Lecture : Monitoring Airflow in an Aeration Tank

Module : Univariate SPM

Course TOC

❑ Introduction to Statistical Process Monitoring (SPM)
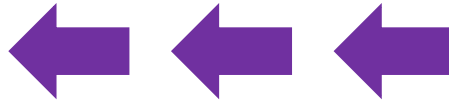
❑ Python Installation and basics (optional)

❑ Univariate SPM & Control Charts

  ➢ Shewhart Charts

  ➢ CUSUM Charts

    • Application: Aeration tank monitoring ⬅ ⬅ ⬅

  ➢ EWMA Charts

❑ Multivariate SPM

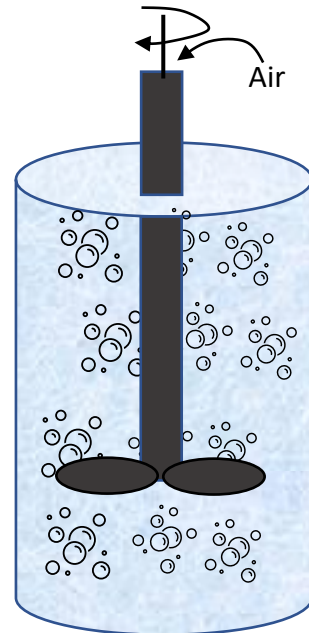 ➢ Fault detection using Principal Component Analysis (PCA)

  ➢ Fault detection using Partial Least Squares (PLS) regression

  ➢ Fault diagnosis using PCA/PLS contribution charts

  ➢ Strategies for handling nonlinear, dynamic, multimode systems

❑ Deployment of SPM Solutions
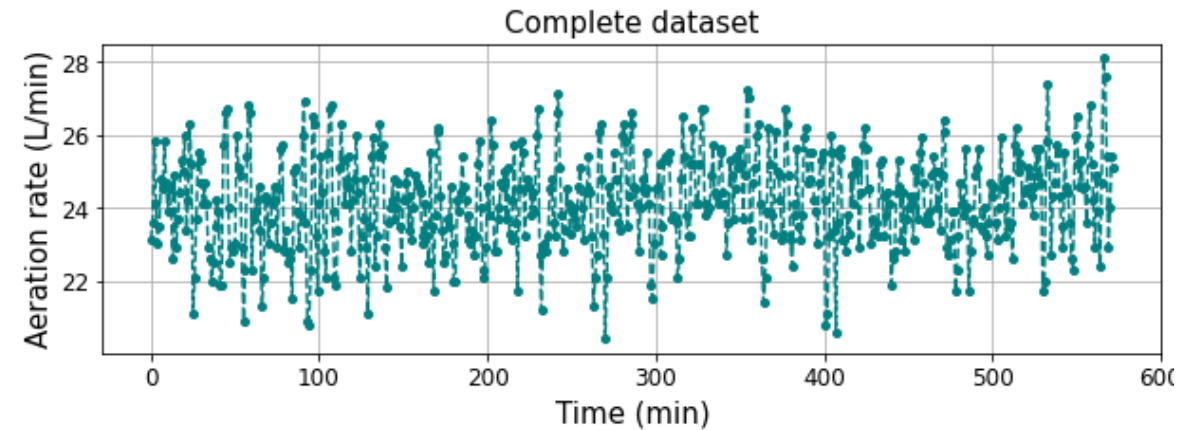
Aeration Tank: System Description

Dataset

❑ available at https://openmv.net/

❑ 573 observations of the air flowrate into tank

Aeration Tank

Aeration Tank Monitoring: Python Implementation

Implementation Plan

- use the first 200 observations to 'train' a CUSUM chart

- use the remaining observations as test data and see if the upward shift can be detected

Statistical Techniques for Monitoring Industrial Processes

Next Lecture : Assessing Control Charts' Performance

Module : Course Introduction