



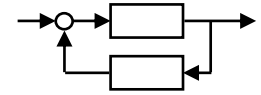
Process Monitoring of Industrial Processes

Introduction: Process Monitoring

- What is process monitoring?

Observation of a particular process variables to ensure that it stays within set control limits

Process
Control



- Why carry out process monitoring?

To ensure safe production

To maintain product quality

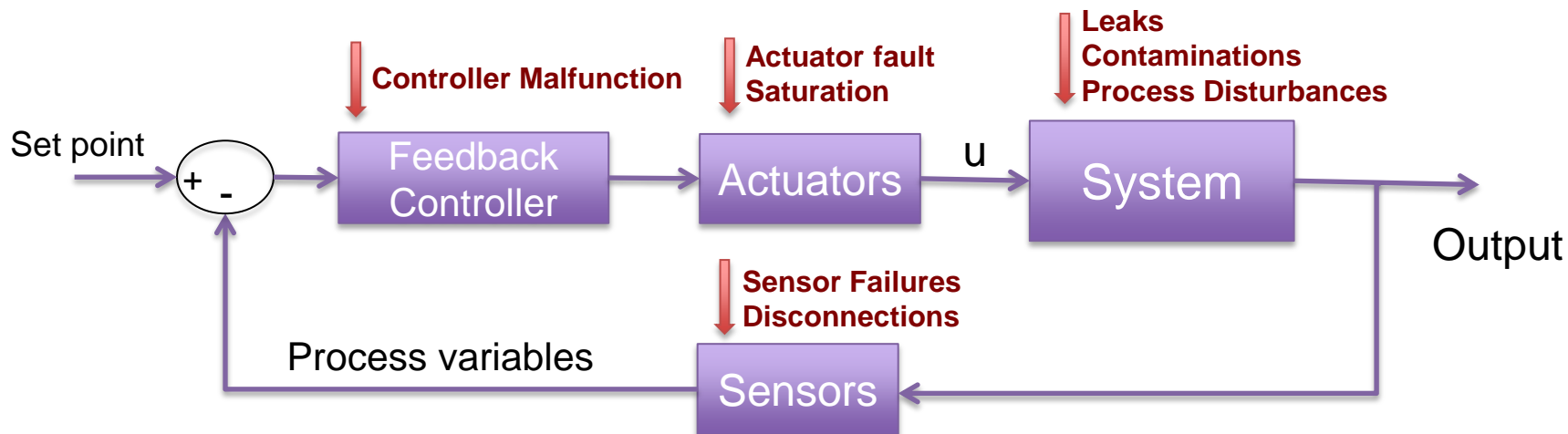
Process
Monitoring

Detection
Isolation
Identification

- Minor accidents caused due to poor abnormal event management (AEM) are very common in chemical plant and has resulted in occupational injuries, illness, and monetary losses.
- Poor AEM has caused petroleum industry in US approximately 20 billion dollars in annual losses, and up to 27 billion dollars annual losses in British economy from poor AEM in petrochemical, pharmaceutical, etc.

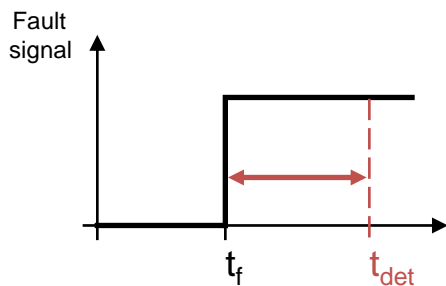
Introduction - Faults in Processes

Abnormal changes in several variables caused by deviation in process

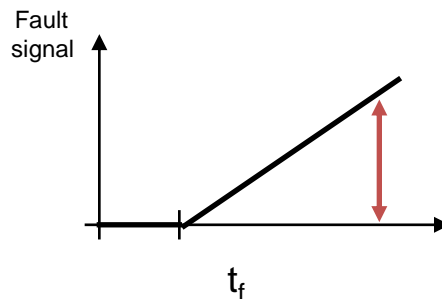


Types of Fault

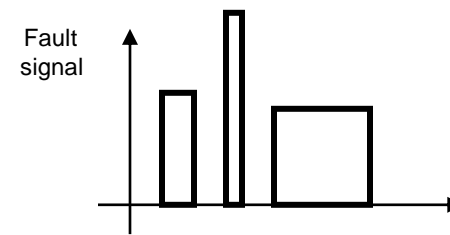
Abrupt



Evolutionary



Additive



Objective I – Optimized Fault Detection Method

Fault detection techniques can be categorized in three parts

Quantitative
model- based

Qualitative model-
based

Data- based

- **Challenges with industrial process data**

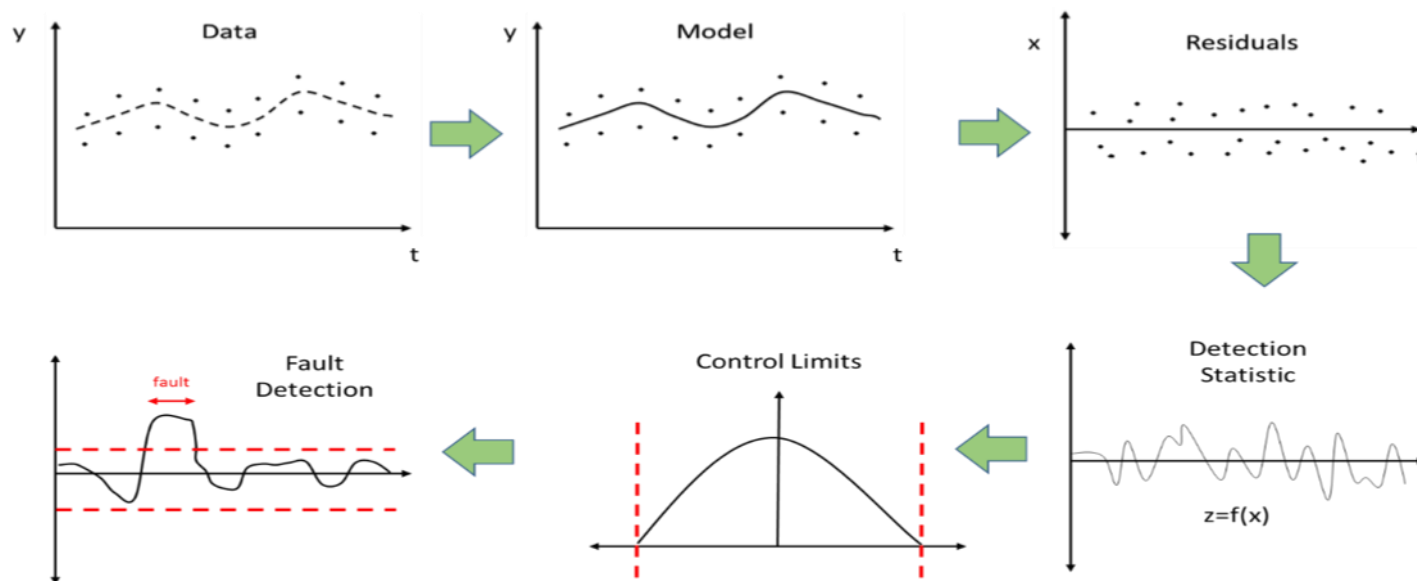
- ✓ Complex nonlinearity in data set
- ✓ Noise in data set
- ✓ Correlated variables in data set



Negatively affects fault detection
performance

Objective I : Develop a method for improving fault detection performance of complex nonlinear industrial processes

Introduction - Multivariate Statistical Methods



Multivariate statistical techniques are powerful tools capable of reducing dimensionality of data, to retain essential information and easier to analyze original huge dataset