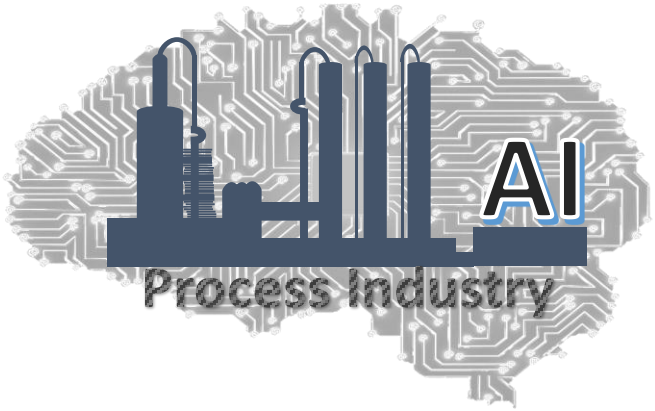
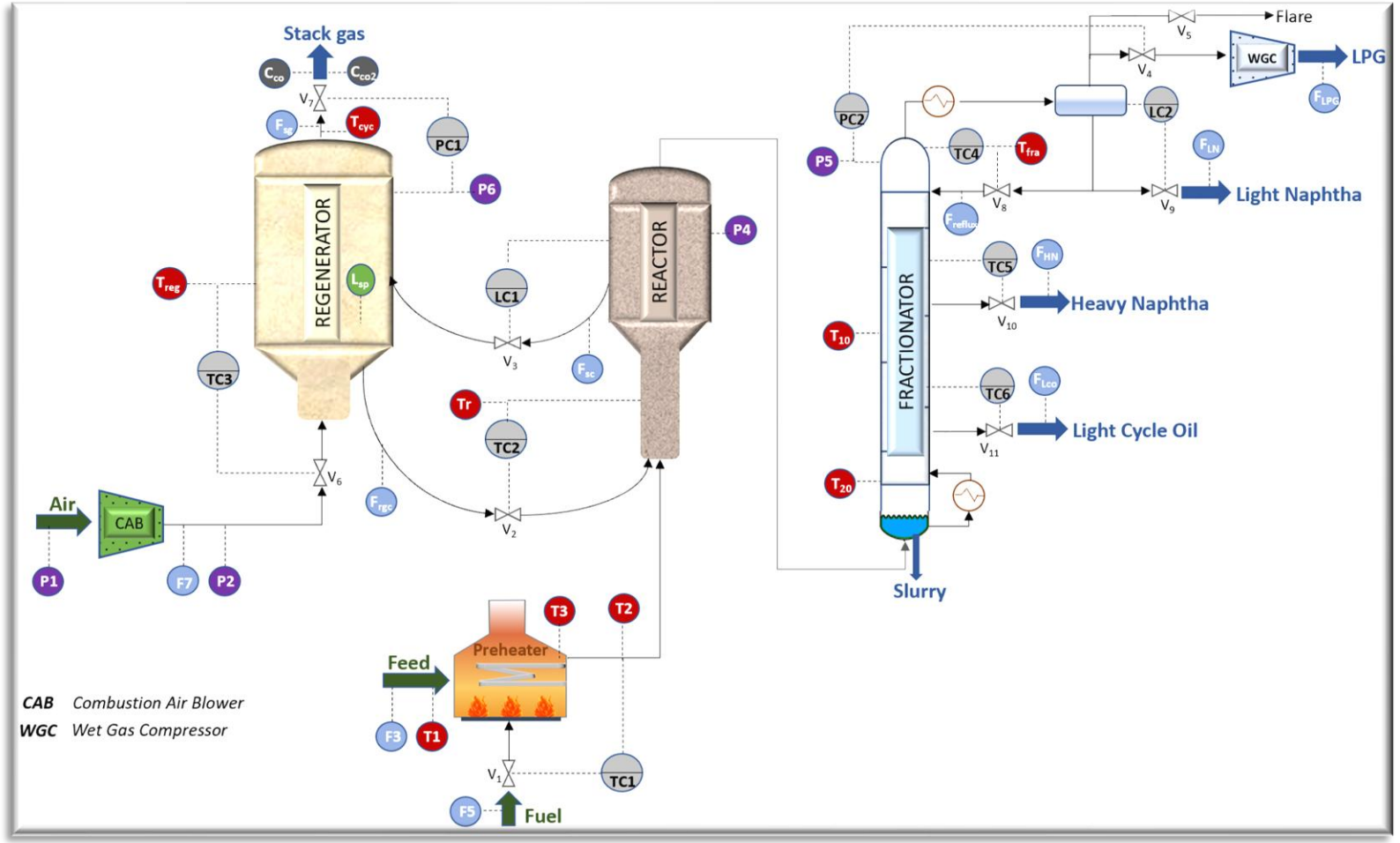
# Statistical Techniques for Monitoring Industrial Processes




***Topic :*** PCA-based Monitoring of Fluid Catalytic Cracking Unit

***Module :*** Coding Exercise

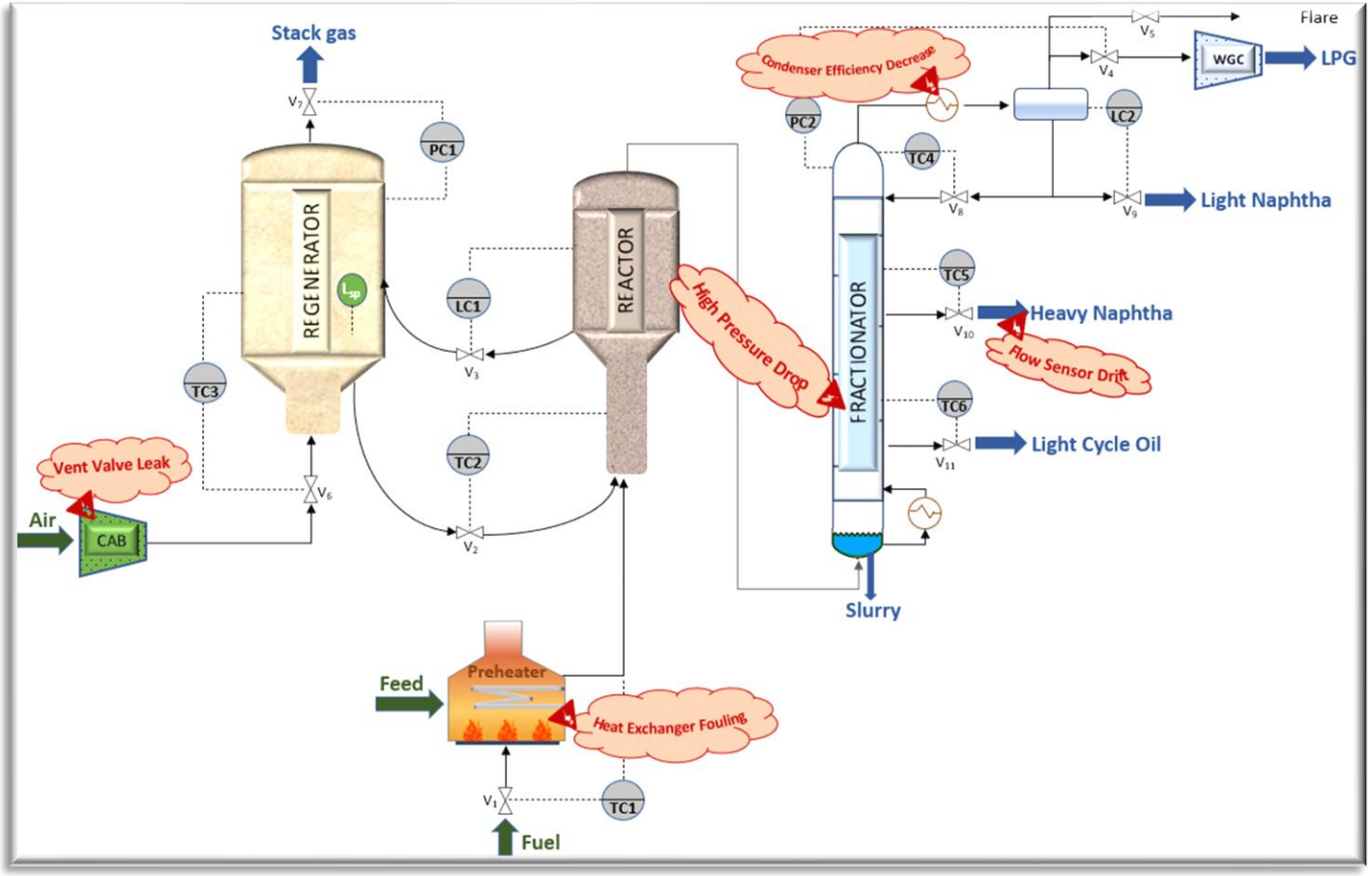
# System: Fluid Catalytic Cracking Unit (FCCU)




- 1 week of fault-free data with varying feed flow and $T_{ambient}$
- Data recorded every minute

*Fluid Catalytic Cracking Unit Overview: https://www.youtube.com/watch?v=7tUclLCRnh4*

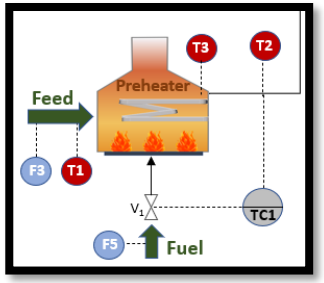
# Faults Simulated

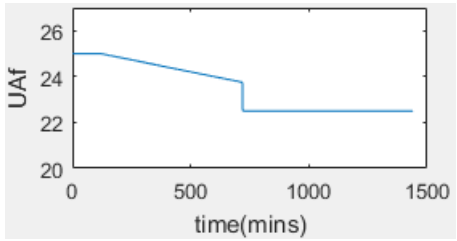



- *Condenser efficiency decrease*
- *Flow sensor drift*
- *Heat exchanger fouling*
- *Higher pressure drop between fractionator and reactor*
- *Combustion air blower vent valve leak*

- 1 day of data for each fault
- Check out https://mlforpse.com/fccu-dataset/ for more details on the faults

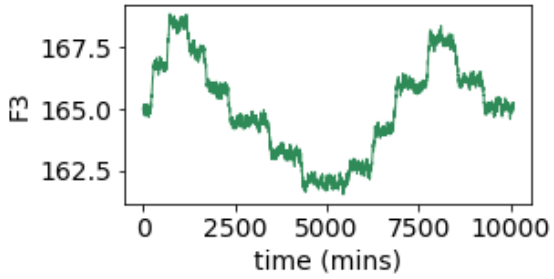
# Fault-free VS Heat Exchanger Fouling Datasets

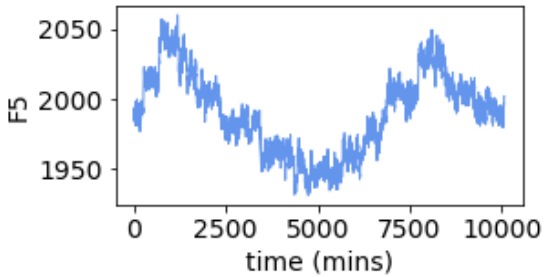


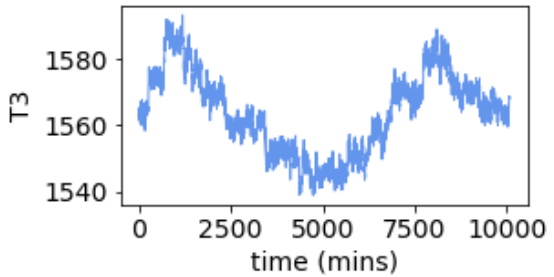




Heat transfer coefficient goes down

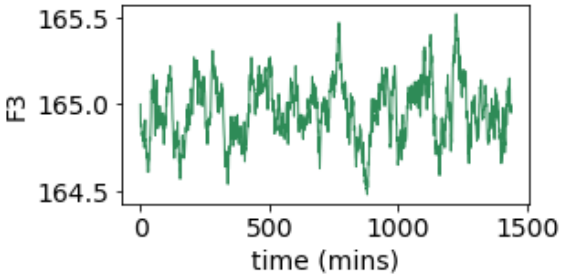
## Fault-free operation: 7 days

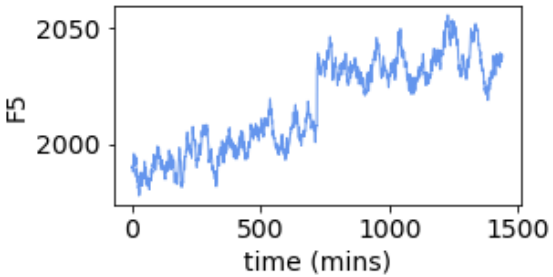


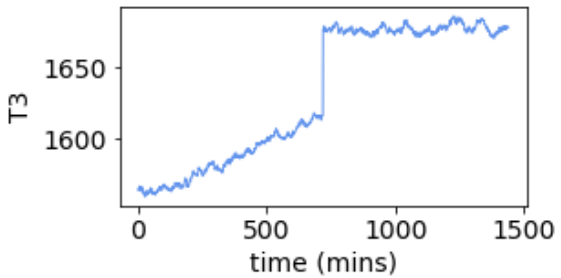



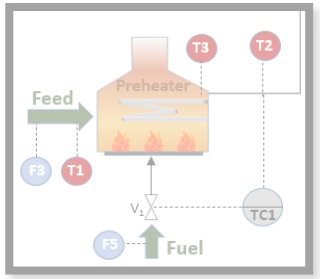

## Faulty operation: 1 day

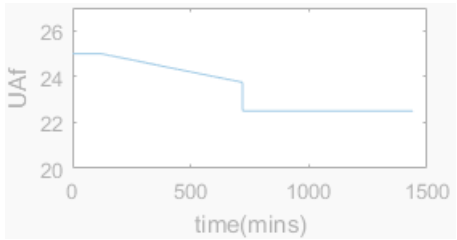


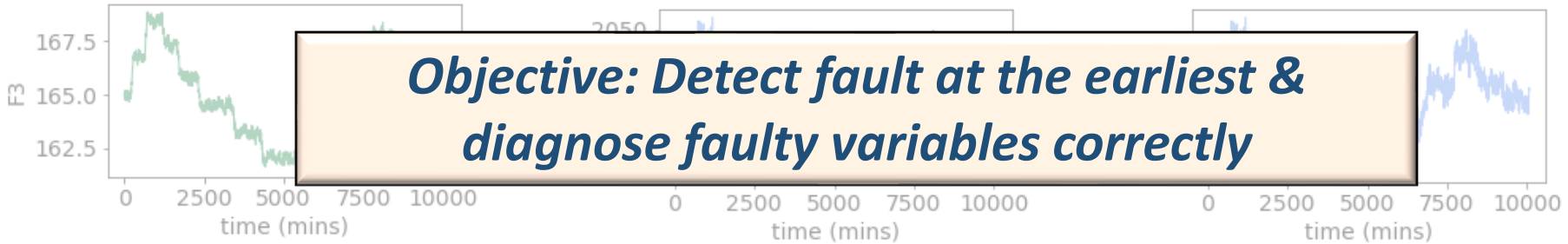
# Exercise Objective



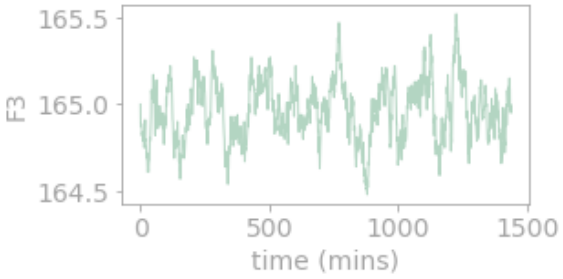

Heat transfer coefficient goes down

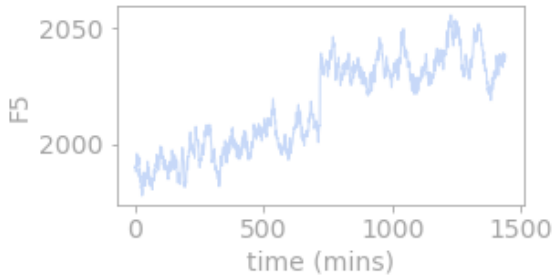
## Fault-free operation: 7 days

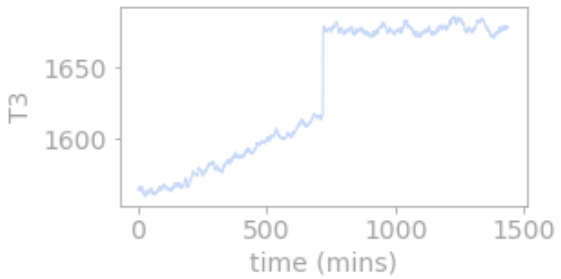



***Objective: Detect fault at the earliest & diagnose faulty variables correctly***

## Faulty operation: 1 day



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