



# Anomaly Detection in Time Series Data using Transformer

Student: Chan Si Min, Rachel

Supervisor: Assoc. Prof Yeo Chai Kiat

## Project Objectives:

Due to the vast quantity of high dimensional data produced, anomaly detection is becoming more crucial. The correlation between sequences also adds complexity to multivariate anomalies, emphasizing the importance of robust and adaptable models. The problem of anomaly detection in large-scale databases is also becoming more and more difficult as a result of the rise in data modalities. Hence, this project aims to build a Transformer model for detecting anomalies in multivariate time series data. The project also looks into ways to improve the model performance.

## Proposed Models:

**Base Model (TST):** Modify original Transformer's Encoder and does not utilize Decoder

### Proposed Improvement 1: Convolutional Transformer (ConvT)

Add ConvLayer to deal with extremely low dimensional time series

### Proposed Improvement 2: Two Tower Transformer (TTT)

Capture both channel and step information to get hidden link between different channels

### Proposed Improvement 3: Tightly Coupled Convolutional Transformer (TCCT)

Change Multi-Head Attention to CSPAttention to address memory bottle neck issues

Add Passthrough Mechanism to obtain fine-grained information using feature maps

## Results:

