This project aims to replicate the study "[Dynamic predictive maintenance for …”](../Assigned/Dynamic%20predictive%20maintenance%20for%20multiple%20components%20using%20data-driven%20probabilistic%20RUL%20prognostics/main.pdf.pdf) with a key modification of using a Transformer neural network instead of a Convolutional Neural Network for estimating the RUL of turbofan engines.

The main difference between Transformer Neural Networks and Convolutional Neural Networks lies in their architecture and how they process input data. CNNs are designed to capture local patterns and spatial hierarchies in data by applying convolutional filters to learn features, TNNs rely on self-attention mechanisms to capture global dependencies and relationships between elements in a sequence, allowing them to weigh the importance of different input features at each position. This makes TNNs particularly effective for processing sequential data where understanding long-range context is crucial. Most notably, natural language, as they are used in tools such as Chat GPT, Claude, etc. While CNNs excel at tasks requiring local pattern recognition, TNNs are more flexible and efficient in handling variable-length sequences and capturing complex relationships between elements in the input data.

The project will follow the overall methodology presented in the original paper and follow a similar game plan for replicating the results.

A comparative analysis will be conducted to assess the performance of the Transformer-based approach against the CNN-based method used in the original study. The project aims to investigate whether the Transformer model can improve the accuracy and reliability of RUL prognostics, leading to more effective predictive maintenance strategies.