# Renew Power Hiring Hackathon MachineHack

**Name**: Mahesh Chandra Duddu

**Email-Id**: duddumaheshchandra@gmail.com

**PhNo**: +91-9440642368

Thank you, **Renew Power** and **MachineHack,** for providing me with this opportunity.

# Problem Statement: Unplanned downtime of wind turbines can result in a significant loss of revenue and energy and can easily scale to millions of dollars a year. It is therefore pivotal that flagging of the failure of components is made to prevent further loss and perform maintenance. It, however, involves replacement of components and higher costs. Condition-based monitoring systems rely on supervisory control and data acquisition systems to predict faults and get valuable insights into the turbine’s performance.

In this hackathon, ReNew Power shared minute-wise normalised data of wind speed, power and temperature data for multiple components of a wind turbine. The company is looking to create a model to get an ideally functioning turbine’s expected rotor bearing temperature. It will then use the model to check the deviation of the actual rotor bearing temperature of the faulty turbine from the expected temperature.

\*\* It is to be noted that the hackathon is not a time series-based prediction, as data is divided randomly. NOTE: “*Timestamp is the unique identifier of the data; it shouldn’t be used as an input in the model”*

# Proposed Approach(Moderately Scalable & Highly Generalizable)

The proposed approach uses modeling based on each turbine id using fully engineered features along with square root data transformation, 5-Fold Cross-validation, and later getting the median of all the predictions made by models on test data.

**Data Cleaning**: No null values or duplicate rows.

**Handling Outliers**: Square Root Transformation is used on data to handle the skewness of data.

**Feature Engineering**: All pairs of features are selected without repetition, to get new features by Dividing, summing, multiplying, and the difference between those pair features.

**Feature Selection**: This didn't improve the model results.

**Feature Scaling**: Standardization followed by Normalization is performed.

**Model Building**: Different algorithms are tried for this modeling, but ExtraTreesRegressor performed well relatively and is selected as the model in our proposed approach.

**Hyperparameter Tuning**: It didn't improve the model results.