



The Data Incubator

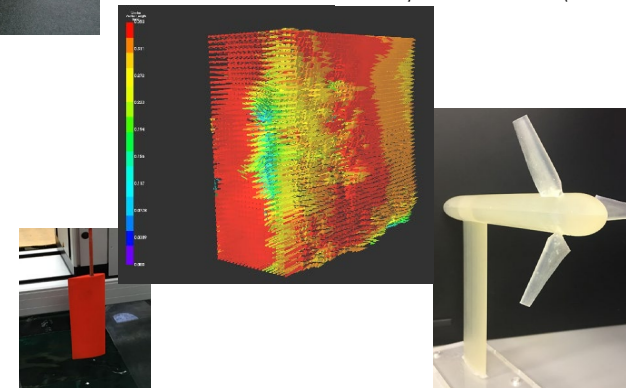
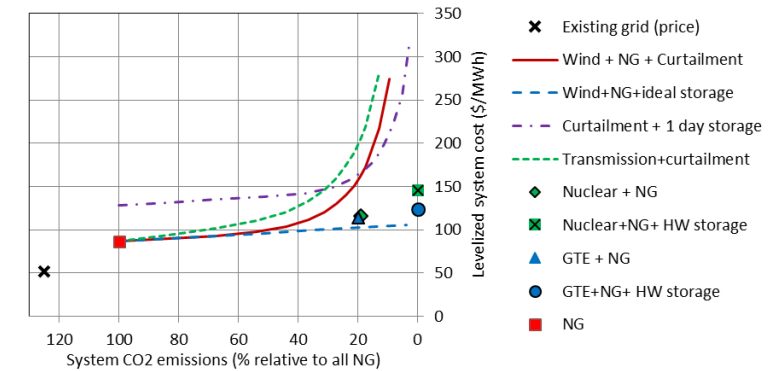
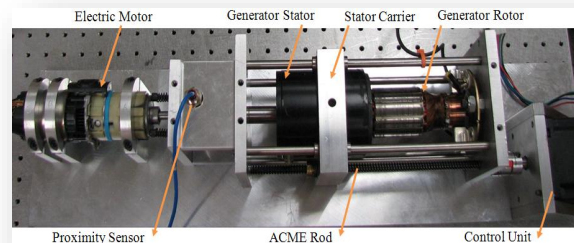
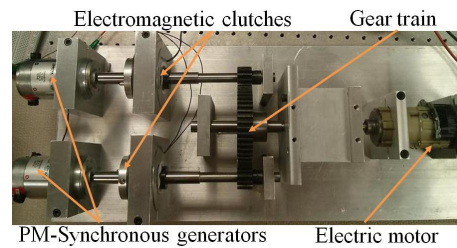
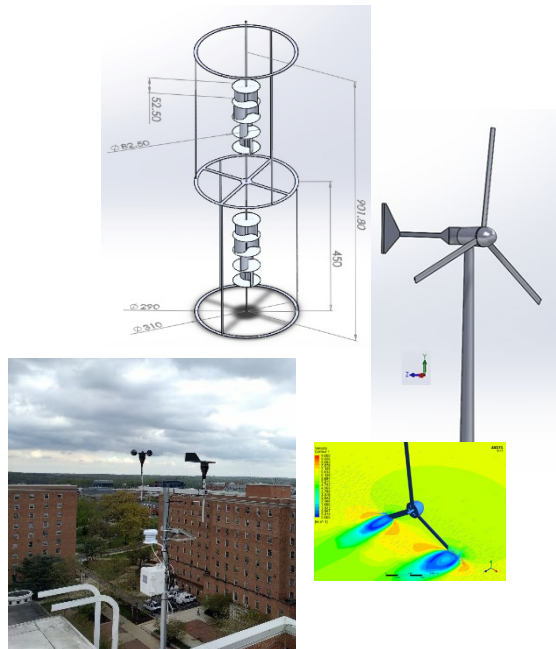
Time-Series Forecasting in Energy Applications

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Introduction

- Background in studying renewable energy technologies from resource assessment and technology development to operational performance and cost analyses.
- Significant interest to data analytics and applying machine learning models to achieve more accurate and efficient solutions.



The Challenge Project

Dataset: A Publicly available 10 year maximum temperature data of Melbourne

1. Data Cleaning & Preprocessing

- **Pandas, Scikit-learn**
- Remove Null Values
- Indexing & Sorting
- Normalization by Scaling

2. Generate Timeseries Training Dataset

- Look Back Window
- Split Train/Test

3. Train & Test

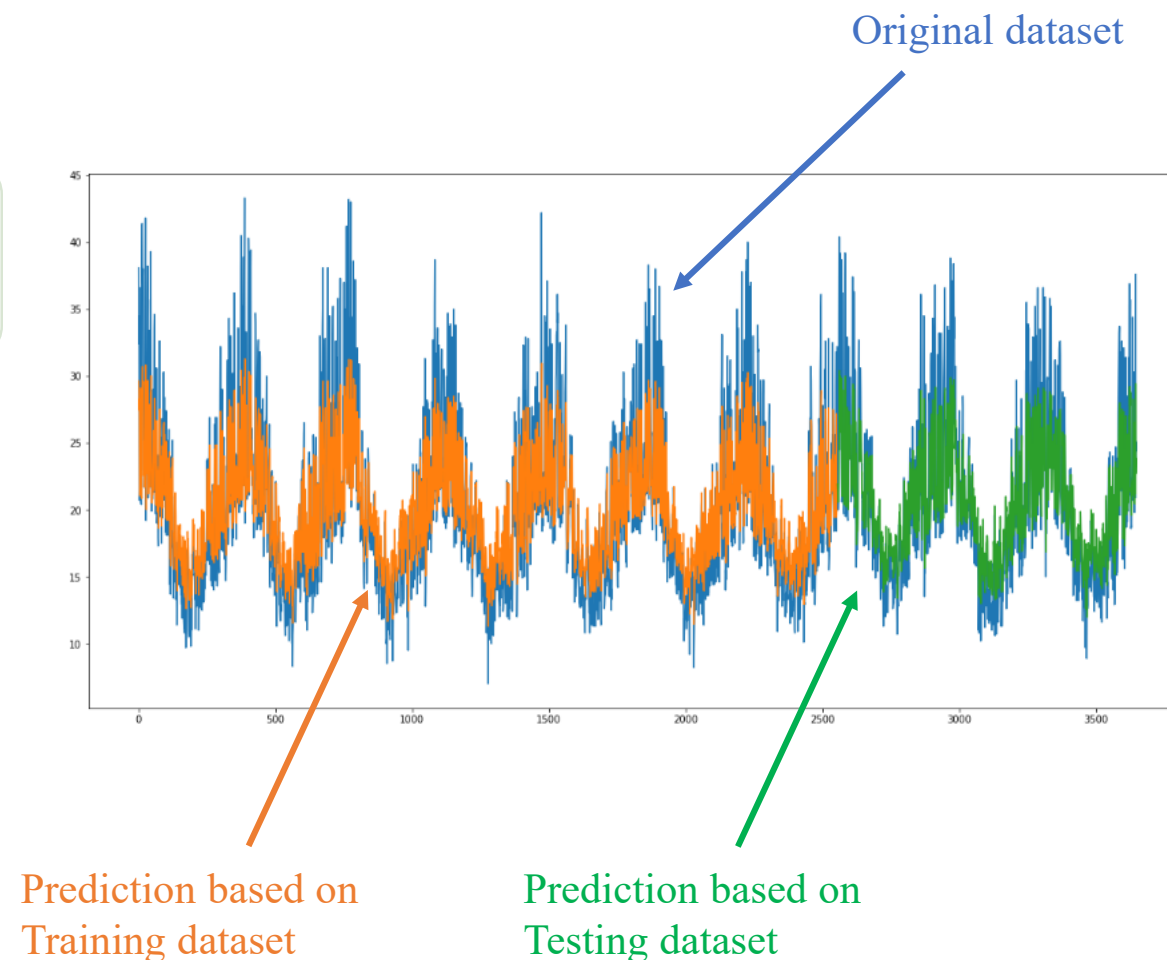
- **Tensorflow/Keras**
- LSTM, Bidirectional LSTM, Regression

4. Prediction

- Inverse Scaling
- Predict Train & Test

5. Visualization

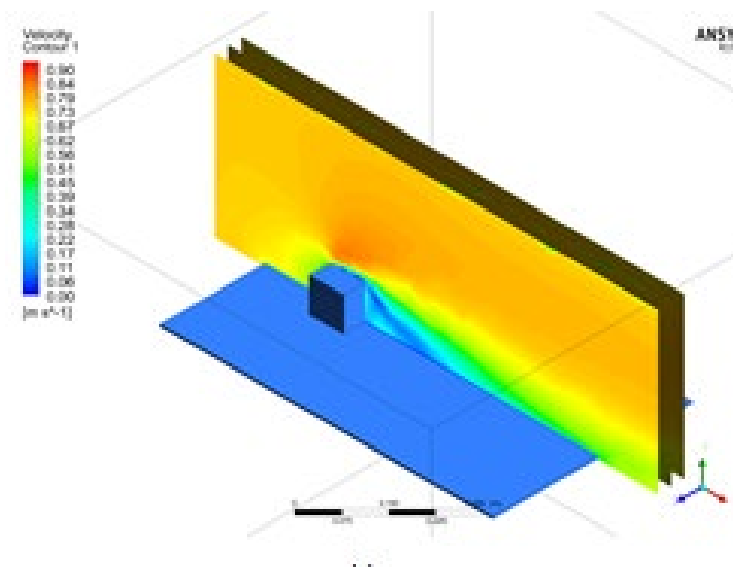
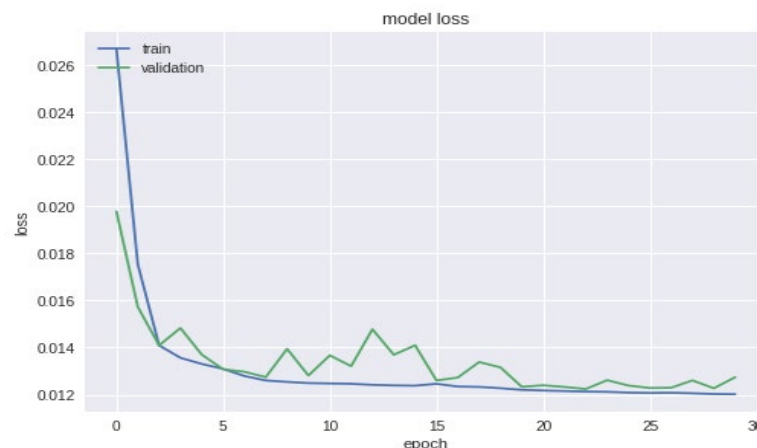
- **Matplotlib**
- Plot the Predictions



I am studying ANN and LSTM algorithms for obtaining an accurate approximation of the entire flow field for a given inflow condition.

- An in-house computational fluid dynamics model was used to simulate velocity vector fields around a cube at different input speeds.
- For each speed, a dataset $\sim 455,000$ velocity values was divided into training (70%), testing (15%), and validation (15%) subsets.
- A MLP ANN with 6 layers was used.

	MEA	RMSE	MAEP
u	0.0195	0.0787	1.5900
v	0.0079	0.0157	1.1479
w	0.0104	0.0240	0.9938
total	0.0126	0.0483	0.9389



Challenges:

- Data pre-processing
- Deep learning models
- Machine learning/deep learning libraries

Thank you!