

# IBM HACK CHALLENGE 2020





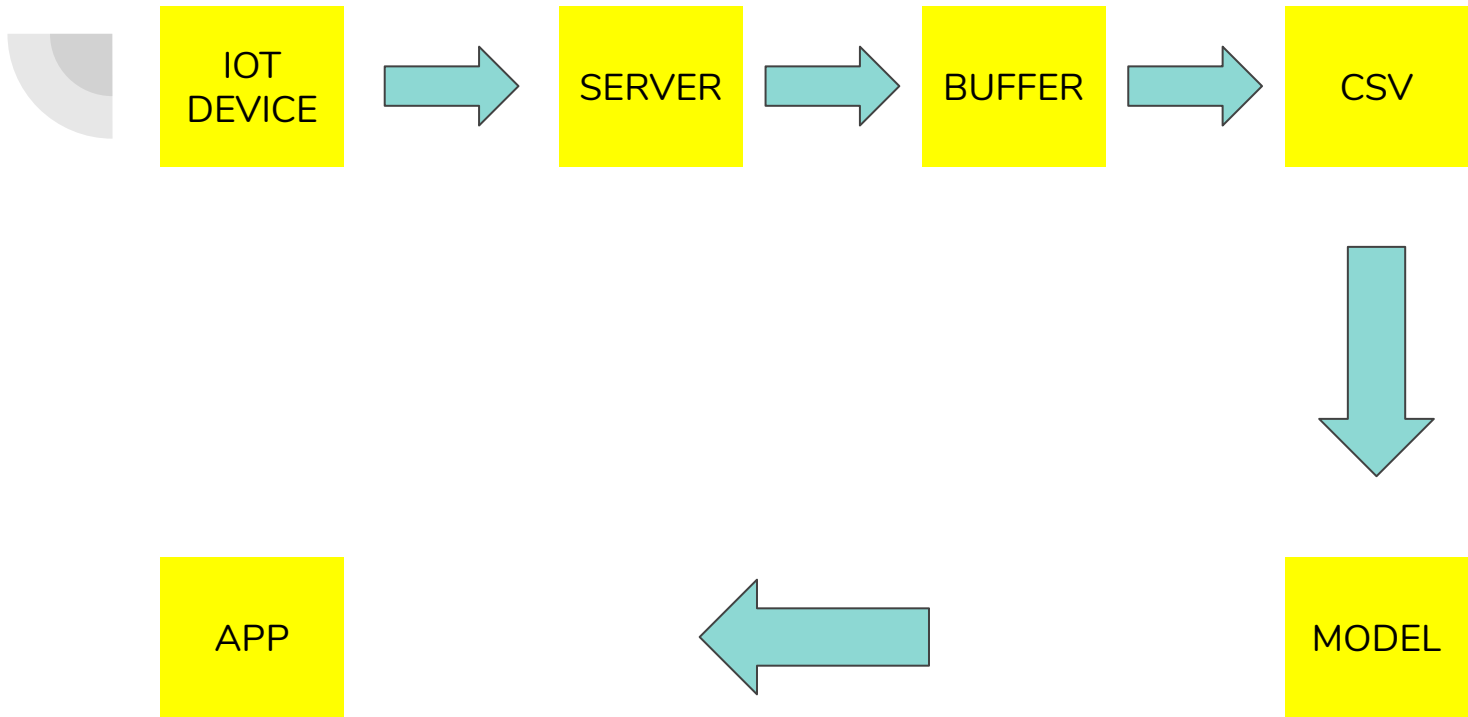
# PROBLEM STATEMENT

Develop a time series model to Predict the power output of wind farm based on the weather condition in the site (1Hr prediction to 72Hrs. prediction). Further build an application to recommend the Power Grid the best time to utilize the energy from wind farm.



## **SOLUTION BY TEAM V.A.P.H.**

We have used LSTM deep learning model to predict energy output 72 ahead of time.





**IOT DEVICE:** It will collect Wind Speed and Wind Direction. We are using random number as we could not afford real

**IOT SERVER:** Responsible for data processing.

**BUFFER:** Stores the data from IOT for to be used as input to model.

**CSV:** It will contain a part of formatted data to be send to model.

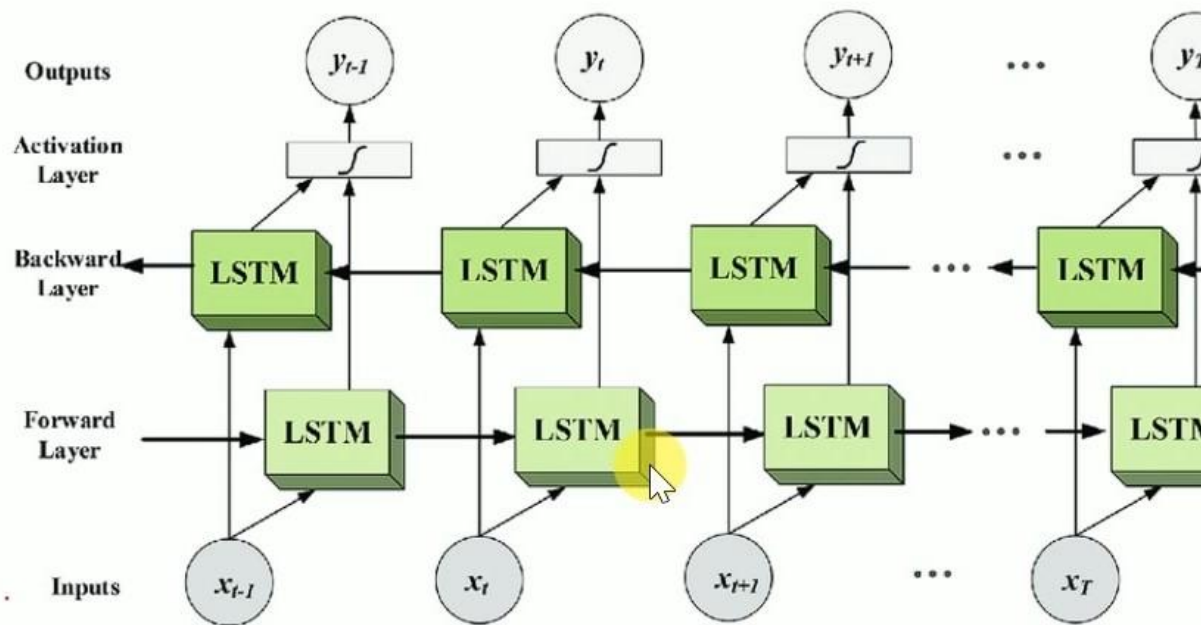
**MODEL:** it is the deployed LSTM model.

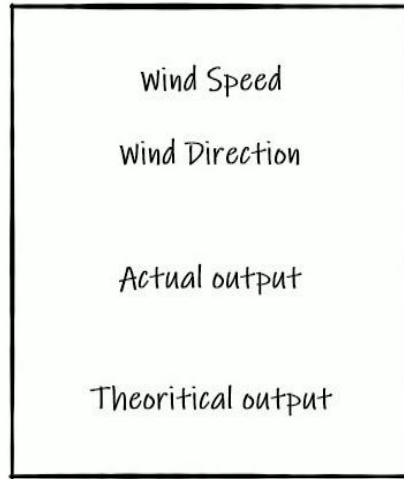
2 3 4 5 X X X X

2 3 4 5 6 X X X X

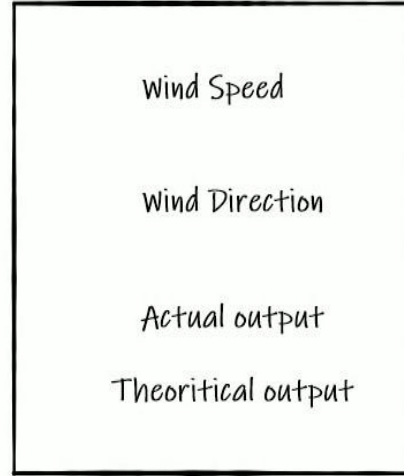
3 4 5 6 7 X X X X

4 5 6 7 8 X X X X

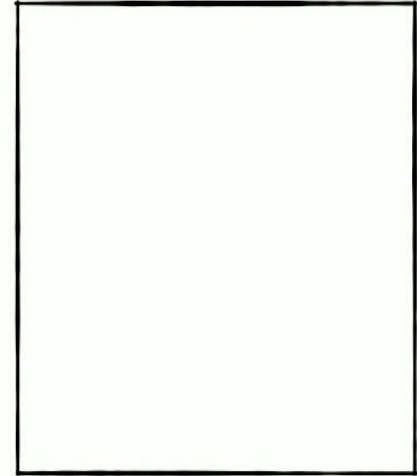




At time  $t-1$



At time  $t$



At time  $t+1$

In actual case it will go till  $t-23$

## Advanced Working Explanation of the LSTM model



- On opening our App. It will automatically detect the time and send it to the node red server The server will fetch last 24 hours data  $r(t-24)$  to  $r(t)$  to the deployed model. The deployed model return predicted energy output of the next hour.
- In the next phase our app will get the wind direction and speed from database for the next hour. Then it will combine predicted energy along above data to generate a temporary row  $p(t+1)$ .
- Then we will again send it  $r(t-23)$  to  $r(t)$  along with  $p(t+1)$  to predict energy output of  $p(t+2)$ . It will continue until we get all  $p(t+72)$  rows. We will calculate best hour to use the energy.
- Finally Node-Red Server will return all the data required to plot a graph of energy prediction of the next 72 hours. It will also display best hour to use the energy.



## WindBot

DataTrends

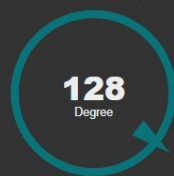
Favourable Time

2947kWh

Wind Speed



Wind Direction



Best Time  
26 hours ahead

PREDICT

## WindBot

DataTrends

Favourable Time

### Prediction Graph

