Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	03 October 2022
Team ID	PNT2022TMID35748
Project Name	Predicting The Energy Output Of Wind Turbine Based On Weather Condition
Maximum Marks	4 Marks

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

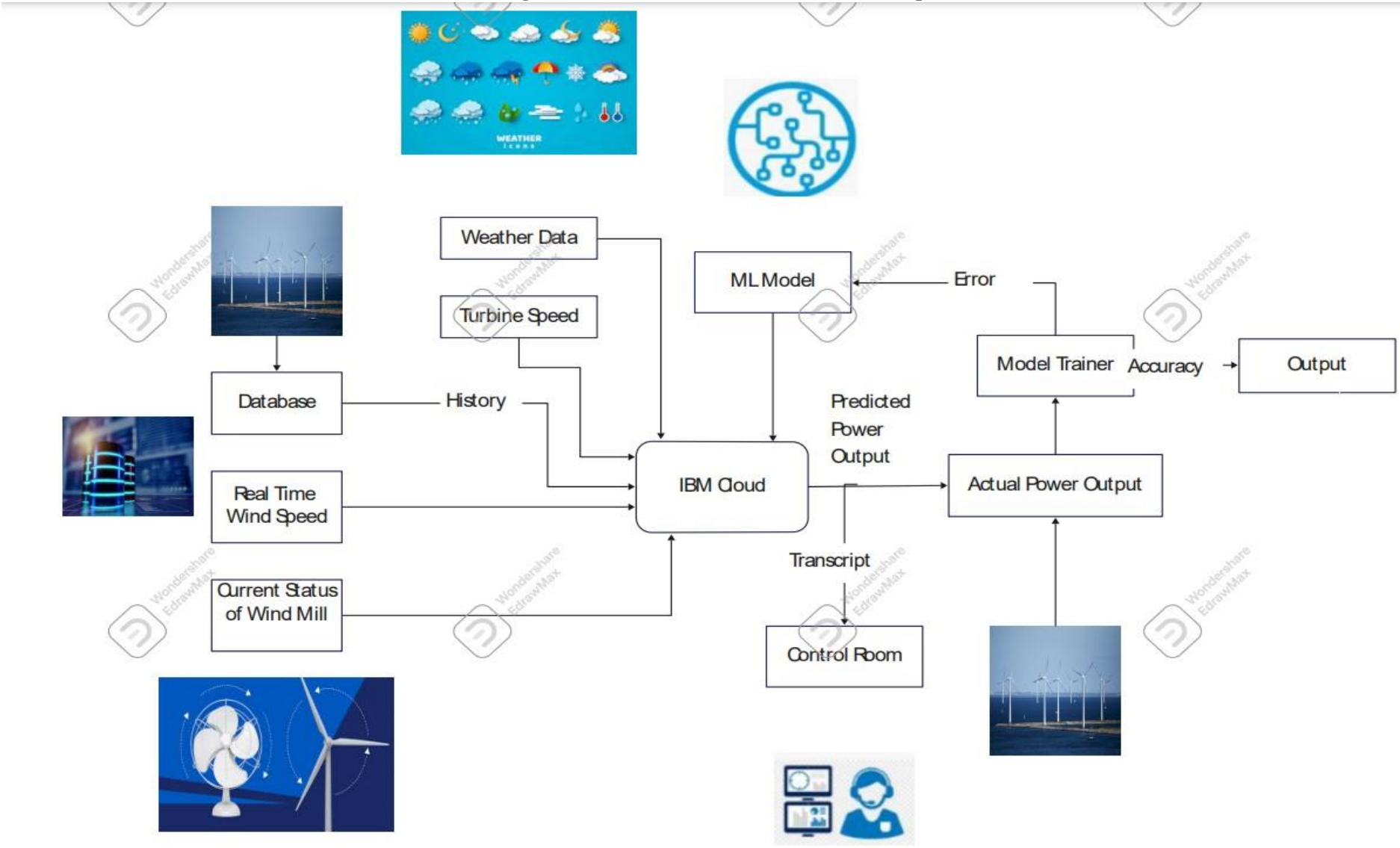

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	The user will receive the processed information via message or mail after using a mobile app or web application.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	A technique for developing predictive systems combines statistical and physical modelling. The auto regressive model predicts the wind farm's inlet state.	Python (Machine Learning)
3.	Application Logic-2	Here, we can construct software processes for user interfaces like building web or mobile applications.	IBM Watson STT service
4.	Application Logic-3	To boost power production and efficiency, the anticipated data is compared to actual output in this instance.	IBM Watson Assistant
5.	Database	To allow users to obtain data whenever needed, we can store all the data in SQL or any other database.	MySQL, NoSQL, etc.
6.	Cloud Database	The specified data, such as power output from an external API, can be merged with the database we constructed and kept here securely and reliably for use in the future.	IBM DB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API-1	Only with the aid of other APIs can we determine the weather and compare it to our actual output.	IBM Weather API, etc.
9.	Machine Learning Model	A machine learning model's intended use	Wind output power forecasting, etc.
10.	Infrastructure (Server / Cloud)	Local Server Configuration / Application Deployment on Local System / Cloud: Using our concepts Configuring a cloud server with IBM: Through IBM	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	MIT App Inventor, Python, Weather App API.	Technology of Opensource framework
2.	Security Implementations	Here, we are using the IBM Cloud, which is a very safe location from where we can store data and access it as needed.	IBM Cloud, MIT App Invertor , IBM Watson Assistant
3.	Scalable Architecture	A more and more common and desired option is machine learning. The architecture presented in this work was specifically created to anticipate the output power of wind turbines and is based on IBM Cloud services. IBM executed a stress test to demonstrate the viability of the designed architecture for data processing.	IBM Cloud
4.	Availability	Instead of using the repaired windmill, we can quickly identify the problem in the windmill by comparing actual output with anticipated output using machine learning in Python. We can then increase efficiency by adding components and optimise the condition of windmills and batteries with this method.	Python for data analysis , IBM Watson , IBM Cloud , Weather API'S , Analytics
5.	Performance	**Excelled Efficiency**: We want to connect weather information to energy production. We want to demonstrate that accurate energy output predictions can be made using even publicly available data from weather stations around wind farms. We also look at how various weather conditions affect the amount of energy produced by wind farms. In order to forecast the energy output of wind turbines, we are developing an IBM Watson AutoAI Machine Learning approach. The model is set up on the IBM cloud to produce a scoring end point that can be	Python for data analysis , IBM Watson , IBM Cloud , Weather API'S , Analytics

		utilised as an API for creating mobile or online applications. We are working on a web application that uses the node red service. We use the scoring end point to provide the deployed model with user input values. The user interface then displays the model prediction to forecast the wind turbine's energy production.	

References:

- **https://www.energy.gov/eere/wind/wind-energy-basics**
- **https://www.energy.gov/eere/wind/maps/wind-vision**
- **https://justenergy.com/blog/wind-energy-pros-and-cons/**