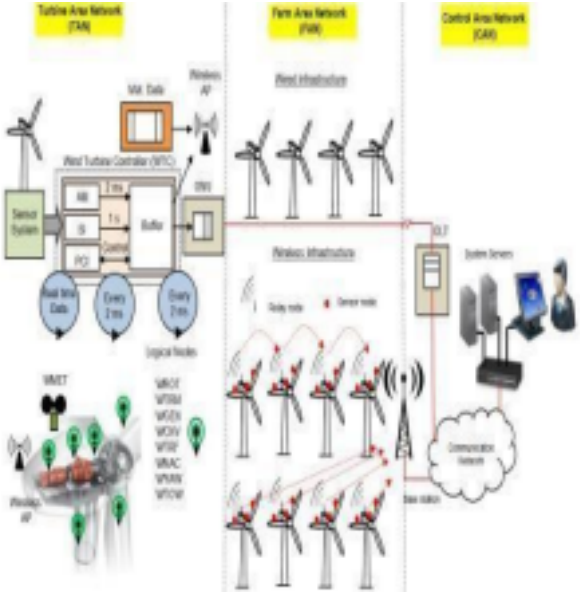
Project Design Phase-II Technology Stack
(Technology Architecture & Stack)

Date	15 October 2022
Team ID	PNT2022TMID03363
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 **Example:** **Predicting the energy output of wind farm based on weather conditions.**



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Guidelines:

The proposed communication network architecture for the Smart-WPF consists of three networks: the turbine area network (TAN), the farm area network (FAN), and the control area network (CAN). It consists of hierarchical architectures where Level 1 is a sensor network in a single wind turbine, Level 2 is the wind turbine-to-wind turbine interaction in the WPF, Level 3 is the local control center to wind turbine interaction, and Level 4 is the farm-to-farm interaction to optimize grid operation. In order to implement hierarchical network architectures, a hybrid communication solution is considered. EPON-based architecture represents a wired solution, while ZigBee-Pro is considered for the wireless solution. In this work, Levels 1 and 2 are explained in more detail, while Levels 3 and 4 are out the scope of this work.

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	This is used by the user for interacting with the system to know about the services provided by system.	HTML, CSS, Angular Js.
2.	Weather Data collector	This weather data collector is used to collect the real time weather data in the environment.	Sensors, wired and wireless network.
3.	Symbolic Regression (Machine Learning Model)	To deal with interaction of the different parameters.	Genetic Programming Data Modeler.
4.	Database	Used to store the collected and examine weather condition and energy output.	MySQL, NoSQL, etc.
5.	File Storage	To store the data files in the databases for future references.	Local or Global File System or IBM Storage.
6.	External API	This application programming interfaces is used to know about the energy output based on every weather condition.	Weather conditions obtained and their energy output.

7.	Infrastructure (Server / Cloud)	The whole system is applied and stored in server for easy access and retrieved.	Data Storage Server or IBM Cloud Servers

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	The open source framework used in this system is flexible and it includes R, python etc..	IBM Open source Tools and databases.
2.	Security Implementations	The data stored in the database when shared with industries are encrypted and shared as encrypted data to avoid the access of data by third party people.	SHA-256, Encryptions, IAM Controls, OWASP etc.
3.	Scalable Architecture	The architecture used here is a 3tier architecture where a middleware is present to carry out the communication between client and server.	3tier architecture.
4.	Availability	The system is designed in a way that It can handle traffic in a better way and thus helps the system available for users at any time.	Network traffic analysis tools.
5.	Performance	The system can efficiently handle a higher number of request and can also uses catch buffer to store and retrieve the data in a easier way.	Methods like Confusion Matrix F1 score, Precision – Recall curve etc.

References:

https://c4model.com/

https://www.mdpi.com/1996-1073/7/6/3900

https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d