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

Date	8 February 2026
Team ID	LTVIP2026TMIDS89922
Project Name	Weather-Based Prediction of Wind Turbine Energy Output
Maximum Marks	4 Marks

Technical Architecture:
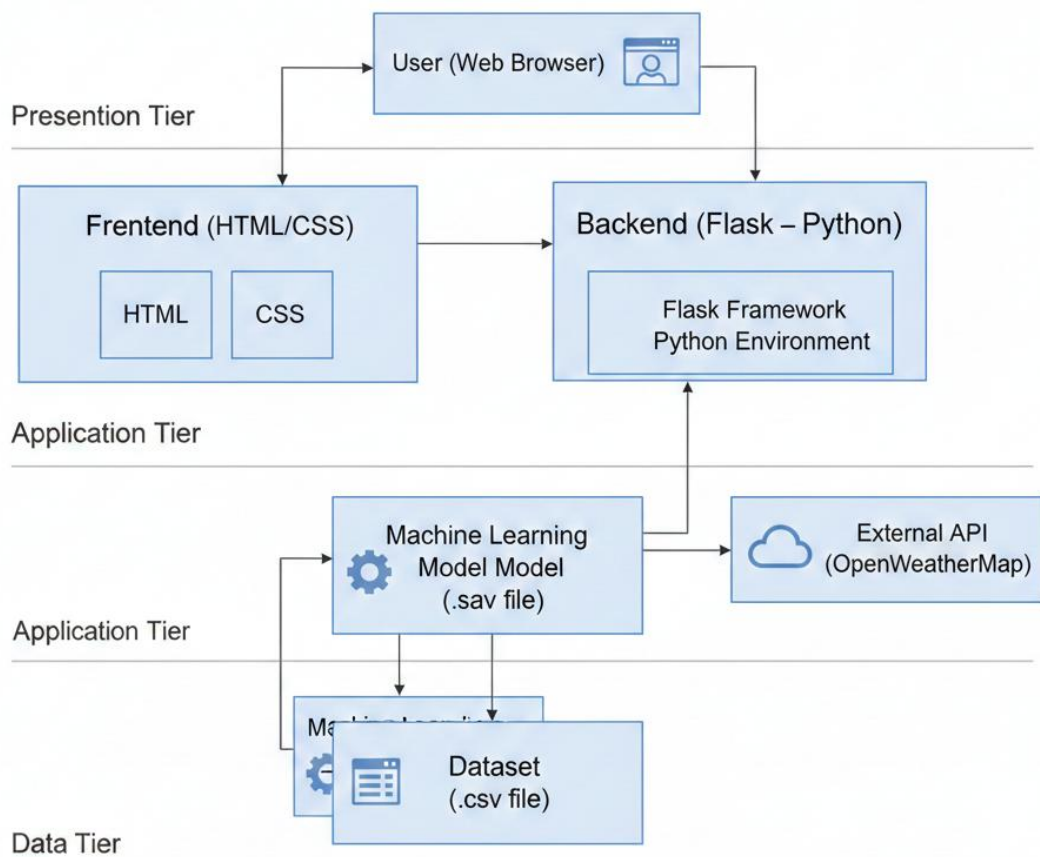

Wind Turbine Energy Prediction Web Application Architecture

Table-1: Components & Technologies

S.No	Component	Description	Technology
1	User Interface	Web-based interface for user input and prediction results	HTML, CSS
2	Application Logic-1	Backend server handling requests and routing	Python (Flask Framework)
3	Application Logic-2	Weather data fetching and processing logic	Python (Requests Library)
4	Application Logic-3	Machine Learning prediction logic	Scikit-learn (Random Forest)
5	Database	Historical dataset used for training	CSV File (Local Storage)
6	Cloud Database	Not Applicable (Project runs locally)	—
7	File Storage	Storage of trained model and dataset	Local File System
8	External API-1	Fetch real-time weather data	OpenWeatherMap API
9	External API-2	Not Applicable	—
10	Machine Learning Model	Predict wind turbine energy output	Random Forest Regressor
11	Infrastructure	Application deployed on local system	Local Server (Flask Development Server)

Table-2: Application Characteristics

S.No	Characteristic	Description	Technology
1	Open-Source Frameworks	Web framework and ML libraries used	Flask, Scikit-learn, Pandas, NumPy
2	Security Implementations	API key stored locally, server-side model execution	Flask Backend, API Key Handling
3	Scalable Architecture	Modular design allows integration of more features and APIs	3-Tier Architecture (Frontend, Backend, Model)
4	Availability	Available whenever Flask server is running locally	Local Deployment
5	Performance	Prediction response generated within seconds	Random Forest Model, Optimized Feature Selection