

**Project Design Phase-II
Technology Stack**

Date	24 October 2023
Team ID	Team-591539
Project Name	Machine Learning Approach For Predicting The Rainfall
Maximum Marks	4 Marks

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	Data Collection	Gathering meteorological data such as temperature, humidity, wind speed, and atmospheric pressure.	Weather sensors, satellite imagery, IoT devices.
2.	Data preprocessing	Cleaning , transforming and organizing data into suitable form for further analysis.	Pandas, Numpy, Scikit-learn, Matplotlib- Python Libraries
3.	Feature Selection	Identifying the most relevant variables or features that contribute to accurate rainfall prediction.	Feature Selection algorithms , statistical methods
4.	Machine Learning Model	Choosing appropriate ML algorithms	Regression models (linear, random forest,SVM), Deep Learning (RNN,CNN)
5.	Model Evaluation	Assessing the performance and accuracy of ML model to ensure it provides reliable predictions.	Performance metrics (RMSE,MSE,adjusted MSE)
6.	Hyperparameter Tuning	Optimizing model parameters	Grid search , random search

7.	Visualization	Presenting data and model results	Matplotlib,Seaborn , Tableau , Plotly
8.	External API-1	To provide access to real-time and historical weather data, including temperature, humidity, wind speed, pressure, and precipitation.	Weather API
9.	External API-2	To provide access to radar data, which is valuable for tracking rainfall patterns, especially for short-term and localized predictions.	Radar APIs
10.	Trained Machine Learning Model	To predict rainfall and its intensity location wise	Rainfall Prediction Model
11.	Infrastructure (Server / Cloud)	Application Deployment on Local Cloud, Server Configuration for development, testing or small scale production environments and cloud server for scalability	Windows Server, web server, Database, API's, Flask, Git, Cloud, load balancers, auto scaling, monitoring tools.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Using open-source ML frameworks for data processing and model development.They have access to a wide range of libraries , tools and resources .	Python, TensorFLow,Scikit-Learn
2.	Security Implementations	The security is only for the access of dataset, which can be done using private access to dataset	Encryption , access control , authentication mechanisms .
3.	Scalable Architecture	Better visuals for the rainfall pattern	Data visualization models, Gen AI and

		graphs, notifications and email alerts. And making it more automated overtime.	web push notification API .
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S.No	Characteristics	Description	Technology
4.	Availability	services range from simple statistical models to sophisticated machine learning models	Machine learning algorithms, historical weather data,Open Data Platforms,Commercial Weather Services.
5.	Performance	Model providing accurate rainfall predictions with low latency.	ML algorithms Performance testing tools, code optimization techniques, and caching mechanisms.