

## **1. Introduction -**

### **1.1 Overview -**

In today's world, evolution of technology has taken place in every aspect.

These technologies can be used for increasing efficiency of limited natural resources. Thus employing technologies to harness the non-conventional ones to a greater degree, so as to reduce the burden on exhaustible resources, especially energy resources. This also provides a potential as cleaner and safer energy alternative, namely solar and wind energies.

Our project aims at overcoming the challenges associated with feasibility using wind energy and hence guarantee a better efficiency of the work output for given input.

Wind energy can be generated more efficiently with favourable conditions.

### **1.2 Purpose -**

The purpose of this application is to predict the environmental conditions (date/day, time, temperature, wind speed) at which large amounts of energy can be generated from wind mills. This reduces the run time of lower energy generating windmills and thus save cost of operation, as only the best output generating windmills are used for the production and there is minimal expenditure on the rest.

## **2. Literature Survey -**

### **2.1 Existing Problem -**

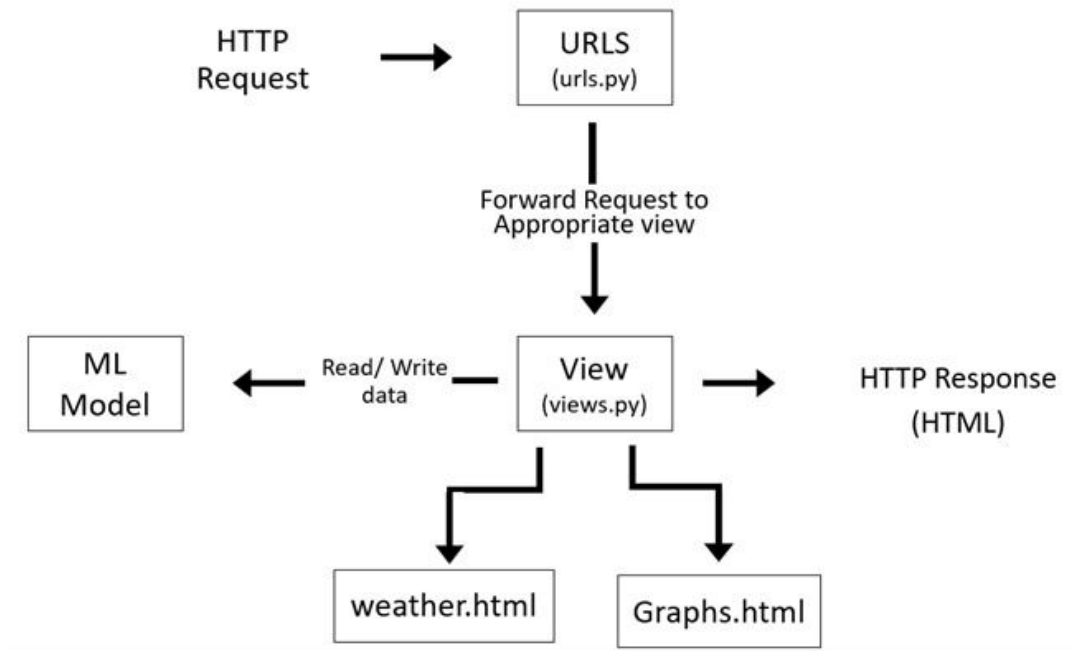
Wind is a fluctuating source of energy. Wind is unpredictable and the availability of wind energy is not constant. Wind energy is not suited for base load energy source. Resources are expended on the upkeep of windmills but the output is not maximized at times.

## 2.2 Proposed Solution

A model that predicts the conditions of a wind - farm ,by estimating the environment variables such as temperature wind direction etc and thus determines and reports the best time to run the windmill at a particular location.

This solution will help to generate optimum amount of energy by running the mills at suitable weather conditions.

## 3. Block Diagram -



## 4.Experimental Investigations -

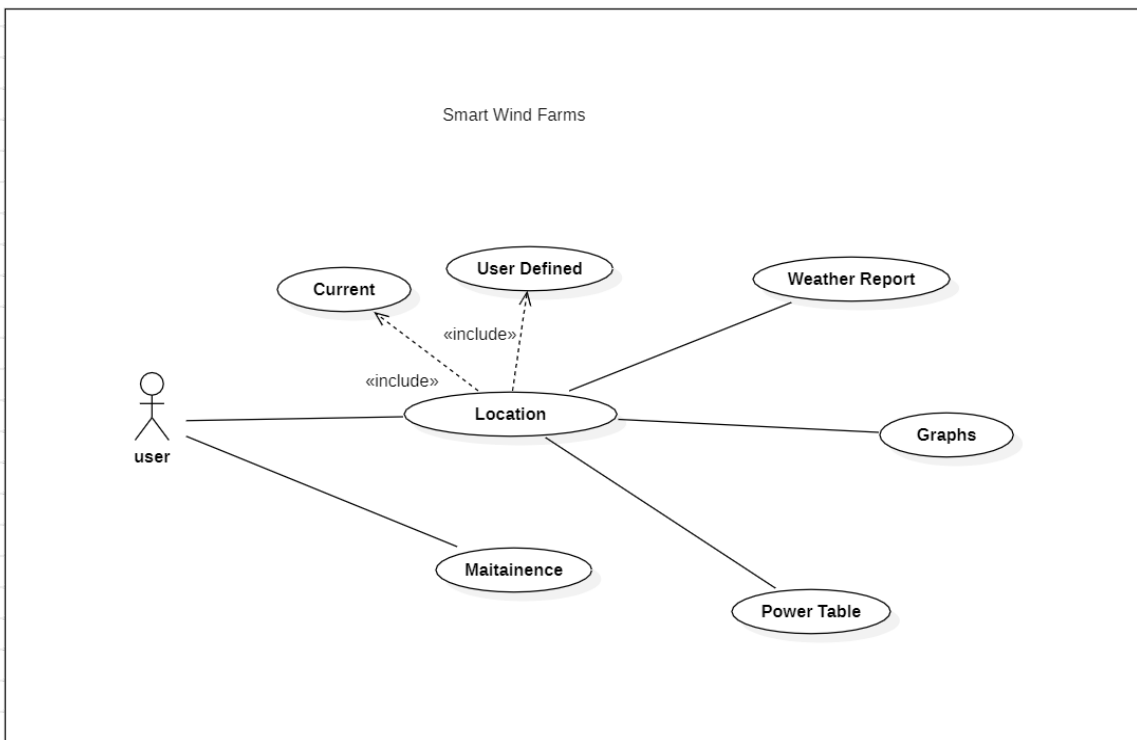
We have tried different algorithms for getting higher accuracy of predicting exact amount of energy that can be extracted from wind mill

## Algorithms used -

Algorithm	RMSE
Linear Regression	164.6
Deep Learning	43.4

so, we have developed our model using deep learning.

## 5. Use Case Diagram -



## 6. Result -

- Interface that reports the weather (& wind) conditions, on a specific day/date with temperature.
- Analyzing the aforementioned data it decides the best running conditions and the best output generating conditions, eliminating extra costs.
- It gives a shortlisted number of selections, that offer maximum power depending on the weather conditions.



## 7. Advantages -

- Cost effective :

All the windmills are not kept up at a time, hence cost cutting in their operation can be done.

- Time Saving:

Knowing the best time for the weather to be in favour, one can decide when to operate the mills beforehand which save a lot of time

- Maximum output power within limited resources :

Ensures optimum power generation with no surplus production that goes to waste.

## Disadvantages -

- Internet connection is a necessary requirement to run this project.

- Weather condition may differ which can change predictions:

As the model is trained on a fixed dataset, the change in realtime weather conditions can be variable and can deviate predictions.

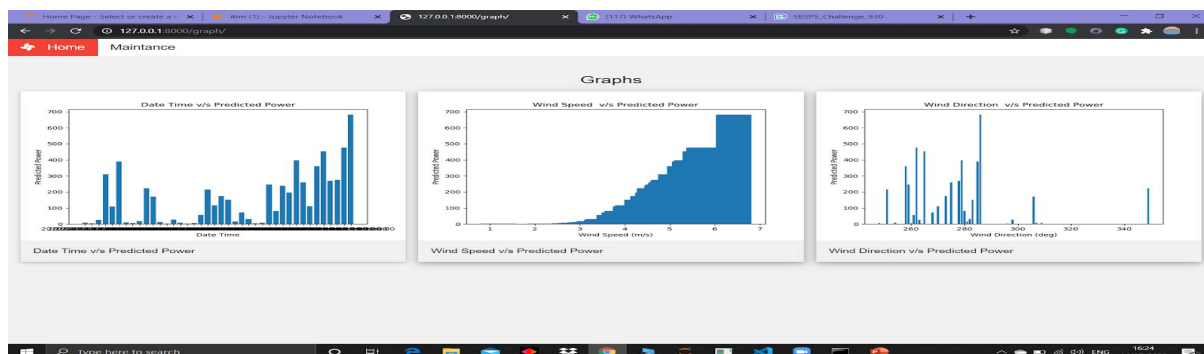
## 8. Applications -

- Can be used for weather forecast.
- Can be used to predict output power at any time in upcoming 5 days
- Can be used to figure an optimised plan of operating the wind mill(s)
- Can be used to check the conditions of wind mill for any need of maintenance

## 9. Conclusions -

- This application will be used for extracting good amount of energy in less time as well as in limited resources .
- Also, measures on how proper maintenance can be taken for wind mills is provided in the maintenance section.

Visualization through graphs for proper understanding of power generation and specific time.



Thus the conclusion of this project is to maximise the use of windmill by generating optimised energy in short time and tracking the proper maintenance of wind mill.

#### 10. Future Scope -

- This application can be used for maintaining record of windmills, power generated in specific time intervals.
- Map visualization of wind farms.

#### 11. Bibliography -

weather api - <https://openweathermap.org/forecast5>

UI - [https://www.w3schools.com/w3css/w3css\\_templates.asp](https://www.w3schools.com/w3css/w3css_templates.asp)

Django on IBM-

<https://www.ibm.com/cloud/blog/getting-started-django-ibm-cloud>

Dataset - <https://www.kaggle.com/berkerisen/wind-turbine-scada-dataset>

#### 12. Appendix -

code -

<https://github.com/SmartPracticeschool/SBSPS-Challenge-930-wind-Power-Generator>