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Highway Wind Turbines Monitoring Using IOT

Under Guidance of **Mrs.Jeevitha**

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Abstract -

On Keeping in Mind on the heavy vehicles on highways/expressways, I found out that there is abundant of wind pressure generated on these roads due to wind disturbance/ wind turbulence created by these vehicles. As any vehicle passes on highway, It creates a very huge air pressure on the nearby surrounding areas. This high pressure of wind is till Now of no use. Till now there is no as such technology developed to utilize this high-pressure column of wind so generated. With concern to this, I had tried to develop a windmill which work on the principle of these highway wind energy.

Key Words: Cloud , VAWT , HAWT , Embedded C

1.INTRODUCTION *(Size 11, Times New roman)*

The wind pressure depends upon the:-

a) The intensity of the traffic on highway.

b) The size of the vehicle passing.

c) The speed of the vehicles.

Fig 1: Wind Turbines Placed On The House Gate

These are vertical axis turbines which can be installed highway dividers This turbine rotates on the pressure generated by the nearby moving vehicle. These moving turbines produces mechanical energy in the form of rotation which can further be used to produce electricity. These turbines can be installed just near by the highways as well as railway tracks which can be useful to rotate these turbines. All these turbines can be connected through each other with the help of a drive shaft. This drive shaft can be connected to generator with the help of gear drive system. Through this generator we can connect to a battery which can store that energy for temporary basis and use it for further purposes.

2.Body of Paper

The Recent rise in fossil fuels prices. The demand for wind energy has increased nowadays. Wind Energy can be harnessed using Horizontal Axis Wind Turbines (HAWT) and Vertical Axis Wind Turbines. However Vertical Axis Wind Turbines can produce a Lot of Power and their maintenance is easy task.

SYSTEM REQUIREMENTS :

HARDWARE:

1. Battery
2. Relay Switch
3. Turbine
4. LCD Display
5. Arduino UNO
6. WiFi Module

SOFTWARE:

1. Arduino IDE
2. Cloud Ubidots
3. App
4. Embedded C

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2.DESIGN OF ASSEMBLY: Components of full scale VAWT are base, turbine, shaft, bearings and gear arrangement and battery

Base:

There is a pole base made up of steel can be with stand, in large force of wind. The base & its height are related to cost and transmission system incorporated. So, the height of our base is 1600mm. & width at bottom is 1400mm & at top is 1400mm.

Blade:

Wind turbine blades are made up of steel. While designing the size of blade it is must to know the weight and cost of blades in the project Three blade with vertical shaft are used, it has a height & width of 1000mm & 370mm respectively. The angle between two blades is 60 Degrees.

Shaft:

Shaft must be properly fitted to the blade. The shaft should be less in thickness & light in weight for the blade. Therefore, there will be no problem of slipping & fraction. Length of shaft & diameter are 1300mm & 20mm respectively.

Bearing:

For the smooth operation of Shaft, bearing mechanism is used. To have very less friction loss the two ends of shaft are pivoted into the same dimension bearing. The Bearing has diameter of 20mm. Bearing are generally provided for supporting the shaft and smooth operation of shaft. Grease is used for bearing maintenance and smooth operation.

Battery:

The output of generator is given to the battery for storing generated electricity. The capacity of the battery is up to 12 V. This battery is lead acid type battery and restorable. The supply of generator is given to the battery through a diode.

3..WORKING PRINCIPLE

Fig2: Wind Turbines Rotating on Highway

The Working of Vertical Axis Wind Turbine is Simple. Whenever Wind Flows through turbine by vehicles, this imparts movement of blades in direction of wind flow. The generator is the unit of the wind turbine that transforms mechanical energy into electrical energy. The blades transfer the kinetic energy from the wind into rotational energy. The wind turbine may be connected to an electricity generator. The generated electricity may be stored in batteries from which energy may be used as per the need.

Fig 3: Wind Turbines Placed on Dividers

From Battery, Electricity is Then Sent for Household Supplies and even used for street lighting.

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Fig 4: Working Principle of VAWT Turbines.

4. WIND ENERGY SCENARIO:

Wind power is now the world's fastest growing energy resource utilized. Installed wind generation units capacity has increased from 25,000 MW to more than 200,000 MW in 10 years from 2001 to 2010.

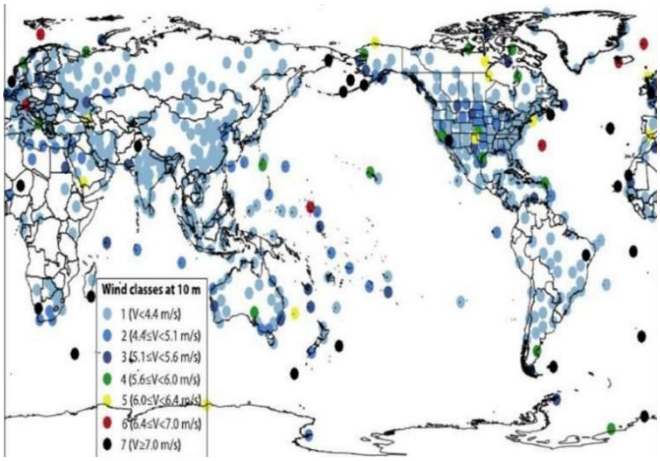

Fig 5: Average wind velocity in regions of the world

Five leading wind power countries are China, USA, Germany, Spain and India and all together represent a share of 75% of the world wind capacity. As per MNRE, wind power accounts for the largest share of renewable power installed capacity i.e.,70 percent (2012), other than the other renewable sources.

The total installed wind power capacity in India reached 29.6 GW in April 2016. A rapid growth in wind power installation has been measured in southern and western states in India. A need for about 350- 360 GW of total energy production capacity was reported by the Central Electricity Authority in its National Electricity Plan (2012), by the year 2022.

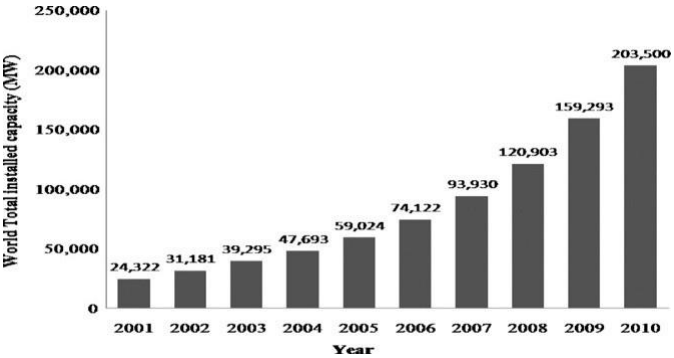

Fig 6: : Installed wind potential of the world

2. PROPOSED WORK

In this project , it is designed to control turbine devices with remote app and IP Address. Remote is connected with central controller and local Wi-Fi sensor is placed to give the output. IP Address is connected with cloud via internet.

Fire and Smoke Sensors are installed in order to alarm the control room during fire accidents and relay switch is installed to stop the functioning of turbines automatically during accidents.

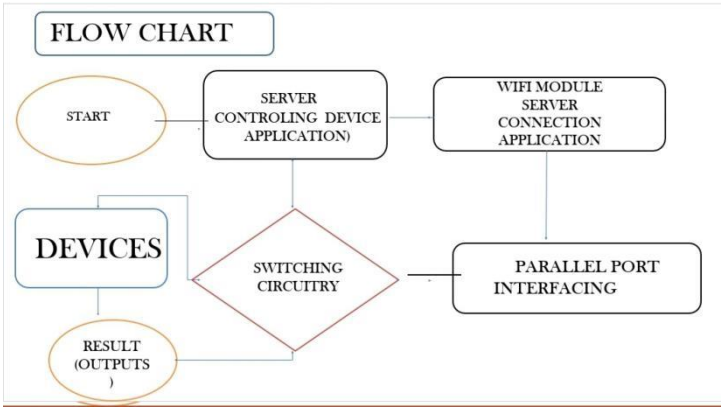

Fig 7: Flow Chart Of The Work Proposed

CLOUD ESP8266:

ESP8266 is a WiFi micro chip with a full TCP/IP stack and micro-controller capacity. It allows micro-controller to connect to a WiFi network . WiFi network will be inter connected with the electronic components to the application or google assistant.

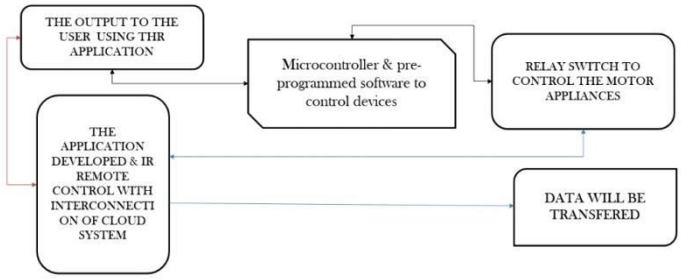

Fig 8: Flow Chart Of Cloud Working Principle

EMBEDDED C:

Embedded C Programming Language, which is widely used in the development of Embedded Systems, is an extension of C Program Language. The Embedded C Programming Language uses the same syntax and semantics of the C Programming Language like main function, declaration of datatypes, defining variables, loops, functions, statements, etc.

CONCLUSION:

Vertical axis wind turbine provides economically sustainable energy solution for remote areas away from the integrated grid systems. Conclusions can be drawn from the present review: In the world, enough wind energy potential is available. To make best use of its effective designs of wind turbines need to be developed., high power generation is achieved with vertical axis wind turbine and can be serving as energy generation unit for remote areas

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