Vehicular Movement Wind Turbine Generation

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***Abstract*- This project mainly focuses on generating a electrical energy from Wind Energy. The idea proposed here is a new technique to generate electrical energy from Wind energy produced due to the vehicle motion in highways and also solar energy will be used to charge the solar panel. Turbine mechanism adapted which is easy to implement. Cost effective without disturbing the current road design can be simply installed on the dividers or can be installed in gardens where there is tremendous wind energy and a ray of light to charge the solar cell. Wind power is extracted from air flow using wind turbines to produce electrical power. Wind energy as an alternative to fossil fuels, is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation and uses little land. The effects on the environment are generally less problematic than those from other power sources. Recently, in order to obey the policies of energy conservation and use of renewable sources of energy the power is generated by wind energy more.**

***Index terms*- wind turbine, wind power generation, electricity generation using wind, vehicular movement, wind turbines, generators, wind power generation, rotors**

I.INTRODUCTION

In this paper only power generation through wind turbine[4],[5] is discussed, as there many accidents taking place on the highways due to lack of lighting lamps or improper working of the street lamps or due to lack of electric supply. Even there are gardens or parks where there are no lighting lamps. Also, the wind and solar energy is a renewable energy resource and can be used for generation of electricity, which then will be used to light the lamps and for other purpose if required. And this electrical energy can be used for many applications besides lighting the street lamps. Also, this energy can be stored in a battery and can be used whenever there is lack of wind energy or solar energy due to less vehicles.

Energy is an important factor in the process of economics, social and industrial development. Energy sources that do not get exhausted are non-conventional renewable energy sources which include solar, wind, water. The power available in the wind increases rapidly with the speed hence wind energy conversion machines should be located preferably in areas where winds are strong and persistent. High speed wind energy generators fabricated now-a-days have only two blades and can deliver power from few hundred KW to a few MW. Also, the solar energy can be used to charge a solar panel and be used as a backup process if the wind is less due to any reasons. Derived energy can be converted to other forms of energy or can be stored through use of compressed fluids, batteries, hot water, water saver system etc. Wind powered pumps can be used to save fuel and electricity.

Electricity generation is the process of generating electric power from sources of primary energy. A characteristic of electricity is that it is not freely available in nature in large amounts, so it must be "produced" that is, transforming other forms of energy to electricity. Production is carried out in power stations (also called "power plants"). Electricity is most often generated at a power plant by electromechanical generators, primarily driven by heat engines fueled by combustion or nuclear fission but also by other means such as the kinetic energy of flowing water and wind. Other energy sources include solar photovoltaic and geothermal power.

A.WIND TURBINE TYPES

A wind turbine, or alternatively referred to as a wind energy converter[2], is a device that converts the wind's kinetic energy into electrical energy. Wind

turbines work on a simple principle; the wind turns the propeller like blades of a turbine around a rotor, which spins a generator, which creates electricity. The size of wind turbines varies widely. The length of the blades is the biggest factor in determining the amount of electricity a wind turbine can generate. Small wind turbines that can power a single home may have an electricity generating capacity of 10 kilowatts (kW). The smallest turbines are used for applications such as battery charging for auxiliary power for boats or to power traffic warning signs. The largest wind turbines in operation have electricity generating capacities of up to 10,000 kW, and larger turbines are in development. Large turbines are often grouped together to create wind power plants, or wind farms, that provide power to electricity grids.

A Horizontal-axiswind turbine

Fig 1: Horizontal-axis wind turbine

Horizontal-axis turbines are similar to propeller airplane engines. Horizontal-axis turbines have blades like airplane propellers, and they commonly have three blades. The largest horizontal-axis turbines are as tall as 20-story buildings and have blades more than 100 feet long. Taller turbines with longer blades generate more electricity. Nearly all of the wind turbines currently in use are horizontal-axis turbines.

B. Vertical-axis wind turbine

Vertical-axis turbines look like egg beaters. Vertical-axis turbines have blades that are attached to the top and the bottom of a vertical rotor. The most common type of vertical-axis turbine—the Darrieus wind turbine, named after the French engineer Georges Darrieus who patented the design in 1931—looks like a giant, two-bladed egg beater. Some versions of the vertical-axis turbine are 100 feet tall and 50 feet wide. Very few vertical-axis wind turbines are in use today because they do not perform as well as horizontal-axis turbines.

Fig 2 : Vertical-axis wind turbine

Wind power plants, or wind farms, are clusters of wind turbines that produce large amounts of electricity. A wind farm usually has many turbines scattered over a large area. One of the world's largest wind farms, the Horse Hollow Wind Energy Center in Texas, has about 430 wind turbines spread over about 47,000 acres. The project has combined electricity generating capacity of about 735 megawatts (or 735,000 kW).

II. LITERATURE SURVEY

Energy is an important factor in the process of economics, social and industrial development. Energy sources that do not get exhausted are non-conventional renewable energy sources which include solar, wind, water. The power available in the wind increases rapidly with the speed hence wind energy conversion machines should be located preferably in areas where winds are strong and persistent. High speed wind energy generators fabricated now-a-days have only two blades and can deliver power from few hundred KW to a few MW. Also the solar energy can be used to charge a solar panel and be used as a backup process if the wind is less due to any reasons. Derived energy can be converted to other forms of energy or can be stored through use of compressed fluids, batteries, hot

water, water saver system etc. Wind powered pumps can be used to save fuel and electricity.

Also, wind energy is most advantageous from following points of view –

- No CO2 emission
- Wind is a safe energy source existing everywhere, and there is no need to worry about depletion like fossil fuel
- Simple equipment and easy operation
- Few affection to nature environment
- It is cost free to use

Companies seek ways to draw greater efficiency from their designs. A predominant way has been to increase blade length and thus rotor diameter. Retrofitting existing turbines with larger blades reduces the work and risks of redesigning the system. The current longest blade is 88.4 m (from LM Wind Power), but by 2021 offshore turbines are expected to be 10-MW with 100 m blades. Longer blades need to be stiffer to avoid deflection, which requires materials with higher stiffness-to-weight ratio. Because the blades need to function over a 100 million load cycles over a period of 20–25 years, the fatigue of the blade materials is also critical.

A.Vehicle Speed Relation to Wind Speed

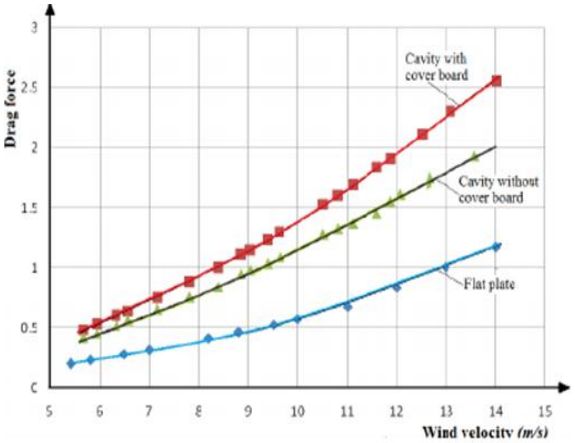

Fig 3 : Vehicle speed Vs Wind speed

Speed of wind turbine directly related to wind speed[3], the speed of locomotive moves from first gear to next on smooth road then the speed directly changed to the next, by changing gear the speed increases up and there by sufficient amount of wind energy can be directly supplied to wind turbine.

B. Vehicle Speed Relation to Torque

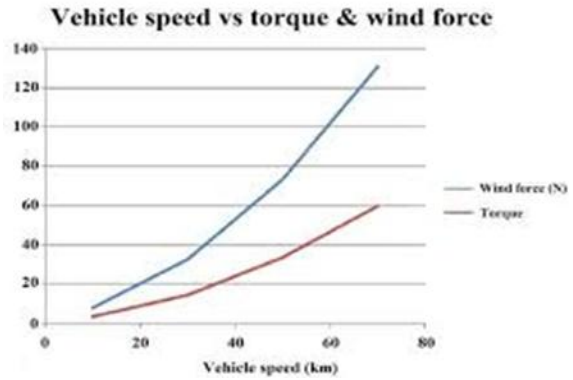

Fig 4 : Vehicle speed VS Torque

Vehicle speed and torque[3] are directly proportional all. The speed rises from the minimum to the allowable limit the wind speed also rises up linearly to the torque.

WORKING:-

The project aims basically to use photovoltaic cell i.e. solar cell and DC generator (windmill). The solar cell will convert solar energy into DC supply and DC generator will convert the wind energy into DC supply. The output of the wind energy and solar energy is given to the battery for charging, then this DC power will further be converted into AC by inverter and further the voltage will be increased by a step up transformer which is used to turn on the light source. In our project we are using a 230V lamp as output light source. In addition, we will be designing one system which will check the Day & Night condition[1]. For that LDR sensor is used.

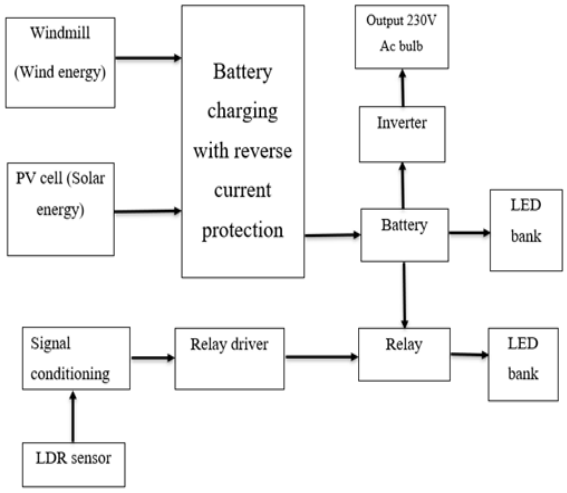

Fig 5 : Block diagram

In our project we using these components like - Solar cell, Relay, Inverter, Capacitors, Diodes, Battery,

Light Emitting Diodes (LEDs), Presets, IC 555, LDR, IC CD4047, MOSFET IRF540

III. RESULT

Wind energy is highly eco-friendly since it is clean and there is no pollution. By using renewable energy resource good environment can be created. Also, there is no end product left just like thermal power stations. Solar panels just need to be installed in adequate place where there is maximum sunlight. Wind energy is cheap means of energy production only it needs good site and wind velocity ranging from 8-15 kmph which is easily available in most part of the country. The wind mills with high efficiencies and lower costs are readily available which can operate at these wind velocities. For India it is possible to generate huge amount of energy from wind mills and sunlight as it is renewable energy resource.

IV.CONCLUSION

1. Designing wind turbines which are different from wind fans.
2. Due to the fast motion of vehicle in highways blades connected to the rotor starts rotating in turn the rotor the turbine rotates i.e kinetic energy is converted into mechanical energy. This turbine motion causes the generator (Dynamo) Mechanism to generate Electrical Current (i.e. converting mechanical energy to electrical).
3. Monitoring Density of vehicles. If the density is more intensity of lights will be high. If the density is less intensity will be switched to low level.

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