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Power Generation from the Wind Energy Available during Moment of Train

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ABSTRACT: More countries are placing an emphasis on green, renewable energy sources, wind energy has emerged as one of the most promising options for sustainable generation of electricity. Cars are ubiquitous in urban and rural areas because they offer a continuous source of kinetic energy that can be turned into electricity through innovative ideas. Non-conventional sources can also be used in generation of electricity since conventional methods involved natural resource which are depleting day by day. The use of wind power to generate power would be one major step towards achieving this goal. A way is through which the movement of vehicles can create electric energy is applied. This air pressure causes the blades to spin around the shaft causing it to rotate with them. Wind turbine changes wind energy into mechanical energy while generator translates mechanical energy into electrical form. These two devices are joined together where the generated power is used to run electrical components.

KEYWORDS: Wind turbine, charging circuit, rechargeable battery, LM2596, mobile USB, LED

I. INTRODUCTION

With regards to wind power, there is a sense in which the force exerted by moving vehicles can be used for electricity generation in an environmentally friendly manner. In their movement along roads and highways, vehicles create significant wind flow that could be tapped by turbines stationed along such paths specifically for this purpose. These turbines are strategically placed to capture the kinetic energy of vehicle generated wind and convert it into electrical current. Additionally, this decentralized energy form enables localized power production with reduced transmission leads and improved grid robustness supporting its flexibility (DOE). It is important to note that introduction of wind energy generation into transportation infrastructure achieves a milestone towards renewable sources of energy. This method allows electric currents to be produced from clean sources without any effects on land ownership or major changes to existing roadways through utilizing the moving force expelled by the vehicles. Furthermore, this decentralized energy source means there can be localized power supply which thereby cuts line losses besides strengthening grid resilience (DOE).

II. RELATED WORK

[1] Niranjana. S.J suggested how electricity can be generated from a vertical axis wind turbine fixed on the highways. According to this paper, the vertical axis wind turbine produces 1 KW at a speed of 25 m/s. The authors (Abhijit N Roy et al.) attempted to design and fabricate an affordable VAWT. In this experiment, the shaft of the rotor is vertically connected to the wind turbine with the generator attached. There is also a gearbox near the base that can be used for such purposes. Besides reviewing literature, D.A Nicam [3] ET AL reviewed blade development of vertical axis wind turbines. This paper presents characteristics and advantages of both HAWT and VAWT types of turbines as compared to others in existence. The results compiled through experiment in this paper indicate that blade design plays a significant role in influencing turbine performance. Turbine efficiency may be improved by modifying its blades too. Another design was presented by Altaba Hosanna [4] ET AL on development trends in vertical axis wind turbines design. Also, it was designed as ratio 3 times drag devices: blade areas which equals 1:3 with respect to the direction of flow across each section of the rotor's surface towards its centre for full power extraction even at high wind speeds, resulting into high torque values at low speeds. When both ratios were calculated one yields 567W while other gives out 709W power after measuring these two points at different wind speed (20 m/s) and (25 m/s).

III. METHODOLOGY

A. Catching the car-made wind

The vehicles on move could be any kind of light or heavy and they may include as well two, three, four-wheeler or even bigger vehicles. The moving vehicles may be railway train running on railway track.

In this case, it might also refer to airplanes that are taxing in, taking off, or landing; when testing propellers in shops before proceeding to or standing by in the holding area before taking off. It leads to fast winds that blow in all directions of its propagation.

B. The path of the compressed air in the direction of the wind turbine If the wind is properly directed along the wind turbine blades, optimum electricity can be generated. The desired directional wind is provided by a vent, a desired directional wind direction to the wind turbine shaft, and the wind turbine blades having at least one cone truncated or pyramidal housing or two flat sides provide. Aerodynamics is the science and study of the physical laws governing the behavior of particles in the air and the forces exerted by the wind. The shape of the aerodynamic profile is critical to blade performance. Even small changes in profile shape can dramatically alter peak power and noise. So the bow maker doesn't just sit down and teach how it looks when making a new bow. If you go behind the profile, it will move back sideways at point B. Since the back of the wind turbine is curved more than the front, this means that the wind flow through the back has a longer distance from point A to B than the front up so it should this flow of air accelerates after that these two types of air will reconvene at point B. It turns out, this is the low-pressure lift. The highest velocity is reached at the curve of the blade. The low pressure resulting from this high angular velocity almost pulls the blade forward. The resulting small excess pressure at the blade tip also help.

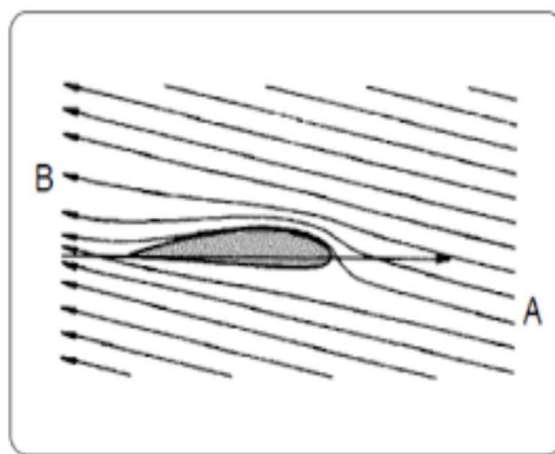


Fig 1: Aero Dynamic of wind

The aerodynamic force on the blade is very large under operating conditions compared to the blade at idle. Most air conditioner owners probably noticed these capabilities when starting up in good weather. The windmill will start spinning very slowly at first, but as it gathers speed it will start to accelerate very quickly. Changing from a slow to a fast speed signals that the blade's aerodynamics come into play, supplemented by the blast of the blade's own power the lifting is much greater. Faster speeds closer to the wind turbine rotational speed in operation place greater demands on the power interruption systems that the wind turbines must acquire and connect without releasing much peak power to the grid. The preferred direction can be transverse or parallel with the rotational plane direction of the blades depending on the type of wind turbine used or wind direction, or if the wind turbines are designed to couple electric turbines to an electric generator. The generated electricity can be used directly or stored in a battery that can be used when needed.

C. The conversion of wind energy into mechanical energy using wind turbines are two basic physical principles by which energy can be extracted from the air these are done by creating another well understood material. lifting or pulling forces (or a combination thereof). The drag forces provide an obvious way to move, these are forces felt by a person (or object) suspended in air. Gravity is trickier than gravity is not so much the most efficient way to move but

more so Lifting is an important factor as pressure decreases as airflow across a soil increases. This law is the opposite of what most people get from physics known as Bernoulli's law. This physical law states that if head wind walking or bicycle speed, where normally felt the pressure increases with the presence of wind It also grows. This is also true when you observe airflow directly across the surface, but not when air is blowing at the surface. It is easy to believe that this is the case after a small trial. Take two small pieces of paper and bend slightly in the middle. Then hold it as shown in the picture and fold between them. The air velocity between these two sheets is higher than outside (where in fact the air velocity is almost zero), so the pressure inside is low and according to Bernoulli's law, the sheets are sucked towards each other One would expect them to collide, but in fact the opposite is true. This is an interesting little experiment that clearly demonstrates a physical phenomenon with very different results than expected.

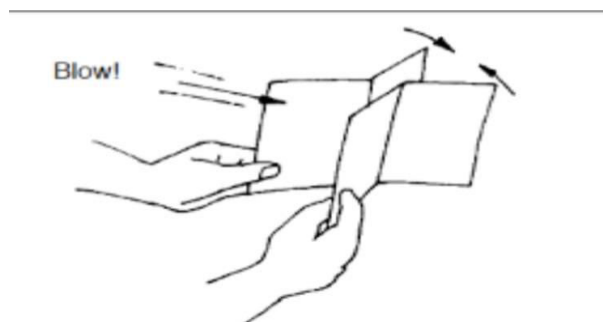


Fig 2: Bernoulli's Law

D. Conversion of its mechanical energy into electricity by a generator A generator is a part of the wind turbine that converts mechanical energy into electricity The blades transfer the absorbed energy from the wind to the circulating energy in the transmission system. The generated electricity can be stored in multiple batteries from which power can be used as needed. These turbines are designed to recharge small units like train sides and batteries, although it must be said it's also quite easy to imagine how such a specially designed wind turbine could sit on or in front of a train to power an engine how you still it about the railroad Cruise on the road. The wind turbine was designed to be used as an alternative to recharge communications equipment as well.

III. EXPERIMENTAL RESULTS:

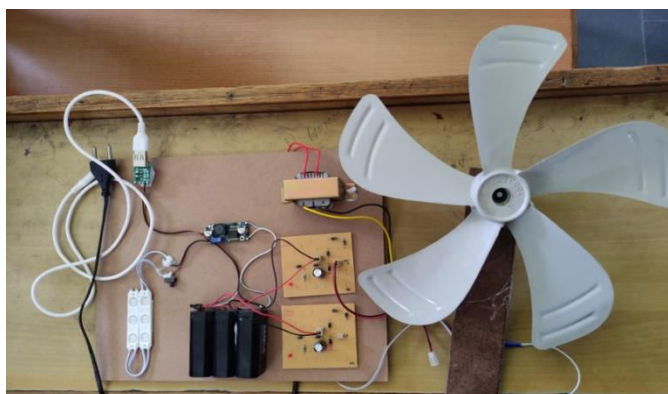


Fig 3. Shows the implementation of power generation from wind turbine during the movement of vehicle.

The figure 3 shows the consumption of electricity generated from the wind turbine while the vehicle is in motion. As vehicles ply highways and roads, generating emissions that can be effectively captured by special turbines or generators installed in their buildings, energy is stored in batteries. Power Supply The device is powered whenever necessary. Thus, electricity is generated from wind, renewable energy.

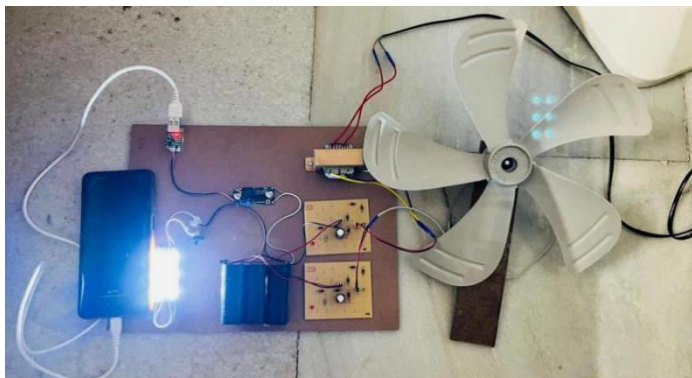


Fig 4. Application of mobile charging using the power generated by the wind turbine during the movement of vehicle.

Figure 4 shows how mobile charging is implemented using the energy generated by the wind turbine while the vehicle is in motion. Here the windmill is connected to a generator. A generator converts mechanical energy into electricity. The bridge modifier is supplied. The rectifier converts AC to DC. DC is stored in the battery. The battery capacity is 12 v. The battery has a buck converter which reduces the voltage to 5v. The buck converter is connected to a USB module. The mobile phone is charged through the USB module. In this way, electricity is transferred to the mobile phone.

IV. CONCLUSION

Wind energy harnessed from the speed of vehicles has great potential as a renewable energy source. As vehicles ply highways and roads, they generate air flows that can be effectively captured by specialized turbines or generators installed in their buildings but to fully realize the benefits of this technology, challenges must be overcome such as operational efficiency, wind energy considerations and resource integration solutions a concept, which can be further extended in the long run.

REFERENCES

- [1] C. Zhao, J. Luo, S. Xie and H. Li, "Experiment Validation of Vertical Axis Wind Turbine Control System based on Wind Energy Utilization Coefficient Characteristics", The 5th Annual IEEE International Conference on Cyber Technology in Automation Control and Intelligent Systems, 2015.
- [2] M. Hyman and M. H. Ali, "Improved Modelling for Wind Turbines on Trains", 2019 IEEE Power Energy Society Innovative Smart Grid Technologies Conference (ISGT), pp. 1-5, 2019, February.
- [3] K. Tan and S. Islam, "Optimum control strategies in energy conversion of PMSG wind turbine system without mechanical sensors", IEEE transactions on energy conversion, vol. 19, no. 2, pp. 392-399, 2004.
- [4] S. Jagdale, K. Deshmukh, A. Patil and H. Sonawane, "Production of Electricity by Fast Moving Vehicles (especially trains)", International Journal of Electrical Electronics and Data Communication, 2016, ISSN 2320-2084.



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