Jupiter Publications Consortium

Vol. 2 Iss.3, pp. 49-53, 28th Jan, 2017
ISSN Print : 2454-1435 © 2016 IJRMMAE
ISSN Online : 2454-1443 © 2016 IJRMMAE
http://www.ijrmmae.in

International Journal of Research in Mechanical, Mechatronics and Automobile Engineering (IJRMMAE)

POWER GENERATION FROM SPEED OF VEHICLE MOVEMENT

Dr.Jayachandran, S.Inbasakaran

Department of Electrical and Electronics Engineering New horizon college of Engineering, Bangalore

Received 5, January 2017 | Accepted 24, January 2017

Abstract

The objective of the paper is to design a wind turbine to recapture wind energy from vehicles on the highway. Wind energy is considered the fastest growing clean energy source. It is limited by variable natural wind. Highways can provide a required considerable amount of wind to drive a turbine due to high vehicle traffic. This energy is unused. Extensive research on wind patterns is required to determine the average velocity of the wind created by oncoming vehicles. The wind turbines will be placed on the medians therefore fluid flow from both sides of the highway will be considered in the design. Using all of the collected data, existing streetlight on the medians can be fitted with these wind turbines.

Keywords: Power, Energy, velocity, vehicles,

I. Introduction

This article mainly concentrates on generating 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. Using a turbine mechanism which is much easier to implement, and is cost effective. This happens without disturbing the current road design or even disturbing the traffic. Wind powers extracted from air flow using wind turbines or sails to produce mechanical or electrical power [2]. Windmills are used for their mechanical power, wind pumps for water pumping, and sails to propel ships.

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 [4]. The effects on the environment are generally less problematic than those from other power sources. This turbine motion causes the generator (dynamo) mechanism to generate electrical current (i.e., converting mechanical energy to electrical).

Wind energy is the fastest growing source of clean energy worldwide. This is partly due to the increase in price of fossil fuels and government incentives [5]. The employment of wind energy is expected to increase dramatically over the next few years according to data from the Global Wind Energy Council.

II. Design and Implementation of Proposed Design: A. Block Diagram and Methodology:

Jupiter Publications Consortium

Vol. 2 Iss.3, pp. 49-53, 28th Jan, 2017
ISSN Print : 2454-1435 © 2016 IJRMMAE
ISSN Online : 2454-1443 © 2016 IJRMMAE
http://www.ijrmmae.in

International Journal of Research in Mechanical, Mechatronics and Automobile Engineering (IJRMMAE)

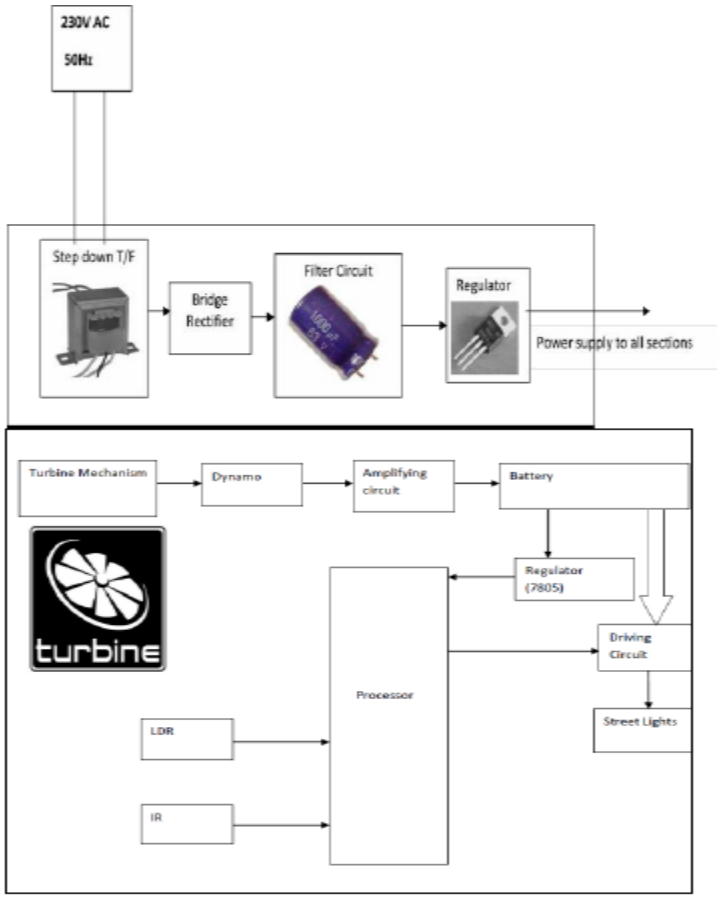

Fig1: Block diagram of Proposed System

Due to the vehicle motion the turbines placed beside the road starts rotating. The mechanical energy produced in turn causes the dynamo mechanism to produce electrical energy. The electrical voltage produced will be amplified using the amplifiers and this is connected to 12V battery. So that battery will charge from this wind turbine. In this project IR sensors will be placed beside the roads. First IR will be placed at the beginning of the road, when the first IR sensor is sensed which indicates that vehicle has enter the street & its output is given to the controller depending upon which street lights in that road will be switched ON. Second IR will be placed at the end of the road, when is detected which indicates that vehicle is passed out of the street & its output is given to the controller depending upon which street lights will be switched OFF. So that battery will charge from this wind turbine. In this project IR sensors will be placed beside the roads. First IR will be placed at the beginning of the road, when the first IR sensor is sensed which indicates that vehicle has enter the street & its output is given to the controller depending upon which street lights in that road will be switched ON.

As well as from IR output the density of vehicles will be monitored. If the density is more, intensity of lights will be high. If the density is less, intensity will be switched to low level. To control intensity level we use PWM Technique, LDR will be keep checking the sunlight. First IR will be placed at the beginning of the road, When the first IR sensor is sensed which indicates that vehicle has enter the street & its output is given to the controller depending upon which street lights in that road will be switched ON.

Second IR will be placed at the end of the road, when is detected which indicates that vehicle is passed out of the street & its output is given to the controller depending upon which street lights will be switched OFF [7-10].

Vol. 2 Iss.3, pp. 49-53, 28th Jan, 2017
ISSN Print : 2454-1435 © 2016 IJRMMAE
ISSN Online : 2454-1443 © 2016 IJRMMAE
http://www.ijrmmae.in

International Journal of Research in Mechanical, Mechatronics and Automobile Engineering (IJRMMAE)

Whenever sunlight is less, LDR gives maximum output and street lights will be turned ON. When it gives minimum output, lights will be turned OFF.8051 architecture based P89V51RD2 microcontroller from NxP is used to implement this project. Microcontroller acts as the heart of the project, which controls the whole system. It contains 1k RAM, 64k Flash, 3 Timers, 2 external interrupts, 1 UART, 32 GPIO's, ISP programming support etc. KEIL IDE is used to program the microcontroller and the coding will be done using Embedded

C. III. RESULTS AND DISCUSSION

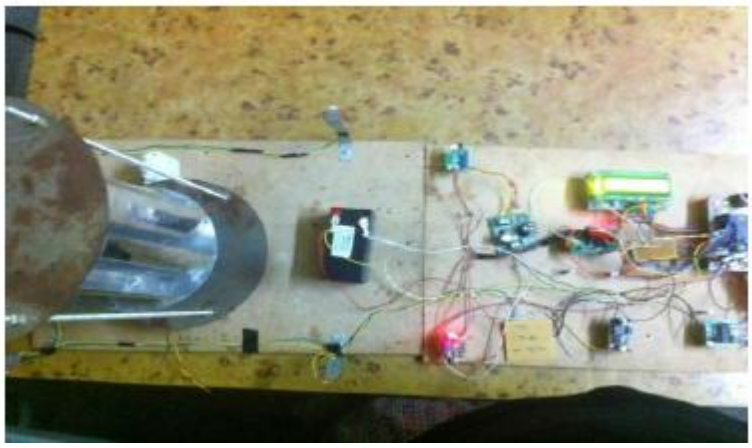

Fig2: Hardware Model of Proposed Design

Thus the proposed design model has been developed. The idea of tapping wind energy from the movement of vehicles on the highway is achieved. Due to the vehicle motion the turbines placed beside the road starts rotating, which forms the initiation for the energy to be tapped. The mechanical energy thus, produced in turn causes the dynamo mechanism to produce electrical energy which is required. The electrical voltage produced was amplified using the amplifiers and this is connected to 12V battery supply. So that battery keeps charging from this wind turbine. The input port has the wind turbine and battery and the output port has connection to the microcontroller circuitry. Buck boost amplifier is utilized in the design. This circuitry is employed, since the power generated is 12V, but the desired voltage to charge the battery is 13.5-13.8V. This increases the voltage value and helps in charging the battery. Vertical axis wind turbine is implemented here, which rotates at 500rpm, to generate the required power. In this project, IR sensors were placed beside the roads. First IR was placed at the beginning of the road, When the first IR sensor is sensed which indicates that vehicle has enter the street & its output is given to the controller depending upon which street lights in that road will be switched ON.

Second IR was placed at the end of the road, when it was detected, indicates that vehicle is passed out of the street & its output is given to the controller depending upon which street lights will be switched OFF.

As well as from IR output, the density of vehicles was to be monitored. If the density is more intensity of lights will be high. If the density is less intensity will be switched to low level. To control intensity level we use PWM Technique, LDR will be kept checking the sunlight. Whenever sunlight is less, LDR gives maximum output and street lights will be turned ON. When it gives minimum output, lights will be turned OFF.8051 architecture based P89V51RD2 microcontroller from NxP was used to implement this project. Microcontroller acts as the heart of the project, which controls the whole system. Due to the vehicle motion the turbines placed

Vol. 2 Iss.3, pp. 49-53, 28th Jan, 2017
ISSN Print : 2454-1435 © 2016 IJRMMAE
ISSN Online : 2454-1443 © 2016 IJRMMAE
http://www.ijrmmae.in

International Journal of Research in Mechanical, Mechatronics and Automobile Engineering (IJRMMAE)

beside the road starts rotating, which forms the initiation for the energy to be tapped. The mechanical energy thus, produced in turn causes the dynamo mechanism to produce electrical energy which is required. The electrical voltage produced was amplified using the amplifiers and this is connected to 12V battery supply. So that battery keeps charging from this wind turbine. The input port has the wind turbine and battery and the output port has connection to the microcontroller circuitry. Buck boost amplifier is utilized in the design. This circuitry is employed, since the power generated is 12V, but the desired voltage to charge the battery is 13.513.8V. This increases the voltage value and helps in charging the battery. Vertical axis wind turbine is implemented here, which rotates at 500rpm, to generate the required power.

IV. Merits, Demerits, And Applications

Merits

- Easy to Implement
- Cost Effective When compared with Hydro turbines
- Independent of Weather Conditions
- It won't disturb the traffic.

Demerits

- Maintenance Required
- Energy Generation Depends On the Vehicle Motion And Turbine Design

Applications

- In Road Highways
- In Tolls
- In Agriculture Fields

V. CONCLUSION

India is currently suffering from major shortage for electricity. India should become one of the leading power producers in the world, but the current technologies are not sufficient to achieve our goal. India has vast supply of renewable energy resources. The total demand for electricity is expected to cross 2550,000 MW by 2030. The electrical sector has an installed capacity of 185.5 GW as of November 2011.

To overcome the above problem, we need to implement the new technologies in production of energy. Smart Wind power is the conversion of wind energy into useful form of energy such as electric energy by using wind turbines in the middle or either sides of the highways to generate electricity. The technology is expected to contribute to the cause of the environment as it helps to reduce carbon emissions and also assists the government in saving on fuel too. If we implement this method surely we can shift our country into a new dimension that is we need not depend upon any other country for electricity.

Energy independence is the ability of a country or region to meet all its own energy needs. There are huge potential for producing electricity from renewable sources. The achievement so far is about 10406.69 MW, as against global installed capacity of approximately 200000 MW of renewable electricity generation.

With this method, the whole unit can be supplied with electricity for lighting, fans etc. An energy dependent country is a country that has to import energy to meet its energy needs energy needs. Whereas a country which has achieved energy independence can produce, transform and transport the energy that it consumes by itself.

Vol. 2 Iss.3, pp. 49-53, 28th Jan, 2017
ISSN Print : 2454-1435 © 2016 IJRMMAE
ISSN Online : 2454-1443 © 2016 IJRMMAE
http://www.ijrmmae.in

International Journal of Research in Mechanical, Mechatronics and Automobile Engineering (IJRMMAE)

VI. REFERENCES

[1] K.SanthaSheela and S.Padmadevi, "Survey on Street Lighting System Based On Vehicle Movements", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 3, Issue 2, February 2014, pp. 9220-9225.

[2] Rita Devi and Jaspal Singh, "Design and Development of Prototype HighwayLighting with Road Side Wind Energy Harvester", International Journal of Science and Research (IJSR), Vol. 3 Issue 9, September 2014, pp. 1681-1683.

[3] G. Prasanth and T. Sudheshnan, "A renewable energy approach by fast moving vehicles", Proceedings of the National Seminar & Exhibitionon Non

[4] Destructive EvaluationNDE 2011, December 8-10, 2011, pp. 233-236.

[5] Wail Adaileh, Khaled Al-Qdah, MayyasMahasneh, "Potential of Power Generation Utilizing Waste Kinetic Energy from Vehicles",Smart Grid and Renewable Energy, May 2012, pp. 104112.

[6] RohaidaHusin, Syed Abdul Mutalib Al Junid,ZulkifliAbdMajid, "Automatic Street Lighting System for Energy Efficiency based on Low Cost Microcontroller",International Journal of Computer Applications, Vol. 72, June 2013,pp. 32-38.

[7] Omar Badran, EmadAbdulhadi, "Evaluation of factors affecting wind power generation in Jordan",The seventh Asia-Pacific Conference on wind Engineering, 2009, Taipei, Taiwan, pp.112-117.

[8] Jan Vargauwe, Andre Martinez, Alberto Ribas, "Optimization of a wind turbine using permanentmagnet synchronous generator", International conference on renewable Energies and Power Quality, Bilbao, March 2012, pp. 324-329.

[9] Sathyanarayanan R, Muthamizh S, Giriramprasath C, Gopinath K T, Communication Software and Network (ICCSN),2011 IEEE 3rd International Conference on Digital ObjectIdentifier,

[10] 2011, pp.778-785.

[11] Batista N. C., Melicio R, Matias J. C. O., CatalaoJ. P. S., "New blade profile for Darrieus wind turbines capable to self-startRenewable Power Generation", IET Conference onDigital Object Identifier, SabanciUniversity, pp. 456-462.

[12] Zarkesh, A.; Heidari, M.," Developing a NewApplication for Wind Generators in Highways", Computational Intelligence, Communication Systemsand Networks (CICSyN), 2013 Fifth InternationalConference, Vol. 3, pp. 279-282.

[13] Mukesh Kumar Sharma, "AssesmentOf WindEnergy Potential From Highways", InternationalJournal of Engineering Research & Technology(IJERT),Vol. 1 Issue 8, October – 2012, pp. 667-672.

[14] S. V. Saravanan, M. Varatharaj, L. Ayyadurai, S.Palani& D. Prem "Design and Fabrication of VerticalAxis Highway Windmill" International Journal ofAdvanced Electrical and Electronics Engineering(IJAEEE), Vol. 2, Issue2,2013, pp. 789-795.