WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

"Dual Power Generation and Monitoring on Highways using IOT"

Rakshitha R[a], Sharanya S[b], Ramya S H[c], R Himaswetha[d], Dr. C. Rangaswamy[e]

Department of ECE,Sambhram institute of Technology,Bangalore-560097,India
Department of ECE,Sambhram institute of Technology,Bangalore-560097,India

A B S T R A C T

In today's world electricity is one of the foremost thing for our day to day life. As we all are obvious of the fact that non-renewable sources of energy are depleting at a lightning fast rate. So it's time for us to shift the focus from conventional to non-conventional sources of energy to produce electricity. Dual Power Generation system is basically an integration of solar plant and a wind energy plant. It will help in providing the uninterrupted power supply. Wind pressure from moving vehicles rotate blades of windmill to generate electricity. Wind turbulence at the highways directly depend upon size and speed of the automobile along with the traffic frequency. In other hand we generate power from another free energy source i.e., solar power generation. In our approach we place solar panels on dividers so that, it will generate power from sun light during day time and from vehicle headlights during night time. We monitor the energy produced by both the energy sources using sensor network and upload the data into cloud using IoT.

Keywords: Dual Power, Wind Energy, Solar Energy, IoT

1. Introduction

The conventional energy resources are depleting day by day. Soon it will vanish from the earth, so we have to find another way to generate electricity. The new source should be reliable, pollution free and economical. The non-conventional energy resources should be good alternative energy resources for the conventional energy resources.On highways, vehicle moves faster than the usual. Moving vehicles on the highway create wind turbulence. When a vehicle moves on highway, it disturbs the wind present over that highway. Vehicle creates low wind pressure field and big vertex behind it while moving. The wind disturbed by the vehicle intend to cover that space created by the moving vehicle and creates huge wind turbulence at highways. The direction of the wind turbulence is always moving along the vehicle to the centre of low pressure field. Turbulence presents at the highways along with normal breeze creates a strong wind effect near the highways. This wind effect can be easily felt by any one on the highway side. Wind turbulence at the highways directly depends upon size and speed of the automobile along with the traffic frequency. For highway side application, wind turbine should have capability to utilize moderate wind speed. . All these parameters can be obtained by the combination of two VAWT turbines-Savonius and H type Darrieus Turbine. In other hand we generate power from another free energy source i.e., solar power generation. In our approach we place solar panels on dividers so that solar panel will generate power from sun light during day time and produce energy from vehicle headlights during night time. We cannot assure 100% accuracy during night time but we can assure at least 30-40%. Along with solar system we are using solar tracking system to improvise the efficiency. We monitor the energy produced by both the energy sourcesusing sensor network and upload the data into cloud using IoT technology. This data will be used for future analysis. We use thingspeak cloud for data storage. We also implement automatic street light controller to make efficient usage of generated power. This stored energy which can be further used for street lighting, toll gates, etc.

2. Literature Survey

1) **Hybrid Power Generation Using Smart Highway** Authors: Payal S. Burande1, Jagannath A. Shinde2, Shubham R. Talmale3 In today's technology driven world electricity is one of the foremost things for our day to day life activities. As we all are

* *Corresponding author.*
E-mail address: rakshitha2578@gmail.com

oblivious of the fact that renewable sources of energy are depleting at a lightning fast rate. So it's time for us to shift the focus from conventional to non-conventional sources of energy to produce electricity. The output of the electricity produced by non-conventional sources is less than their counterparts. Renewable sources do not have any detrimental effect on the environment. Solar-wind hybrid system is basically an integration of solar plant and a wind energy plant. It will help in providing the uninterrupted power supply. As during bad weather conditions, the production can be shifted from one plant to another with the help of a microcontroller.

2) **Innovative Hybrid Power Generation on Highway** Authors: Ms.Sulochana B Belavi, Ms.Savita B Dasangali, Ms. Akshata B Nandaganv, Ms.Gayatri T Gharabude A single turbine can easily provide the average daily electricity needs of households. The safety and comfort of the city are also ensured. The turbine can be installed in parks, near seashores, rooftops, households but the roads are the ideal locations for the device. The big vehicles like buses can provide a lot of wind energy. The speeding the turbine is designed vertically with long blades. It covers less area on the ground and is easy to handle. It can easily be assembled and disassembled which makes it durable. Solar panels are fixed at the top of the turbine to generate extra electricity. The device is capable of producing vehicles on the highway can provide enough wind for these turbines to work all day and night without stopping.

3) **Power Generation by Hybrid VAWT System for Highway Applications** Authors: Menaka R, Mohan K, Muthu Vijay P, Ranjith I The rapid growth of renewable energy generation is increasing to meet the demand for electricity. In this paper, the generation of electricity is achieved by using vertical axis wind turbine using the force created by moving vehicles. For that purpose, wind turbines are placed at the center of the highway for the generation and utilization. There are two types of the axis is available in wind turbines, horizontal and vertical axis. The horizontal axis is commonly used but it is not applicable for highway applications. There are some types of turbines are available in the vertical axis. In this paper, two types of turbine blade model are made as a hybrid in VAWT (Vertical Axis Wind Turbine) which increases the efficiency in wind energy utilization. Due to this hybrid model, drag and lift are increased and rotate automatically even with low wind speed. The power generated by this VAWT can be utilized for highway applications, and then the excess power will be injected into the grid or local area.

4) **Power Generation on Highway by using Vertical Axis Wind Turbine & Solar System** Authors: Prof. Sachin Y Sayais, Govind P Salunkhe, Pankaj G Patil, Mujahid F Khatik This paper focuses on use of air on highway divider with the help vertical axis wind turbine. When the vehicle passed on the highway it produces a considerable amount of air due to its speed. This air tangentially strikes on the blade of the vertical axis wind turbine and its makes a rotation of the turbine in only one direction. The solar system is used to generate electrical energy and also installed in a way that it diverts the vehicle air towards the turbine. The generator with the gear mechanism is connected to the shaft of the vertical axis wind turbine to generate electricity. The electrical output of vertical axis turbine and the solar system is stored in a battery.

3. Proposed System

- Vertical turbines placed at highwayswill rotate with wind speed and it gets converted into electrical energy. The turbulence directly depends upon size and speed of the automobile along with the traffic frequency.
- Solar panels are placed on dividers so that power will be generated from sun light during day time and from vehicle headlights during night time. Solar tracking system is also used to improvise the efficiency.
- Arduino receives the signal from the voltage and current sensors, then upload the obtained data to the cloud using wifi module.
- The electrical energy produced by the system should be either completely utilized or stored. Automatic street light controller is implemented to make efficient usage of generated power. So that we can save 50% energy.
- LDR's is used to detect the day/Night time, based on the signal from LDR ,controller will turn on/off the lights.
- We will monitor power generation and consumption using sensor network and upload the data to cloud using IoT technology.

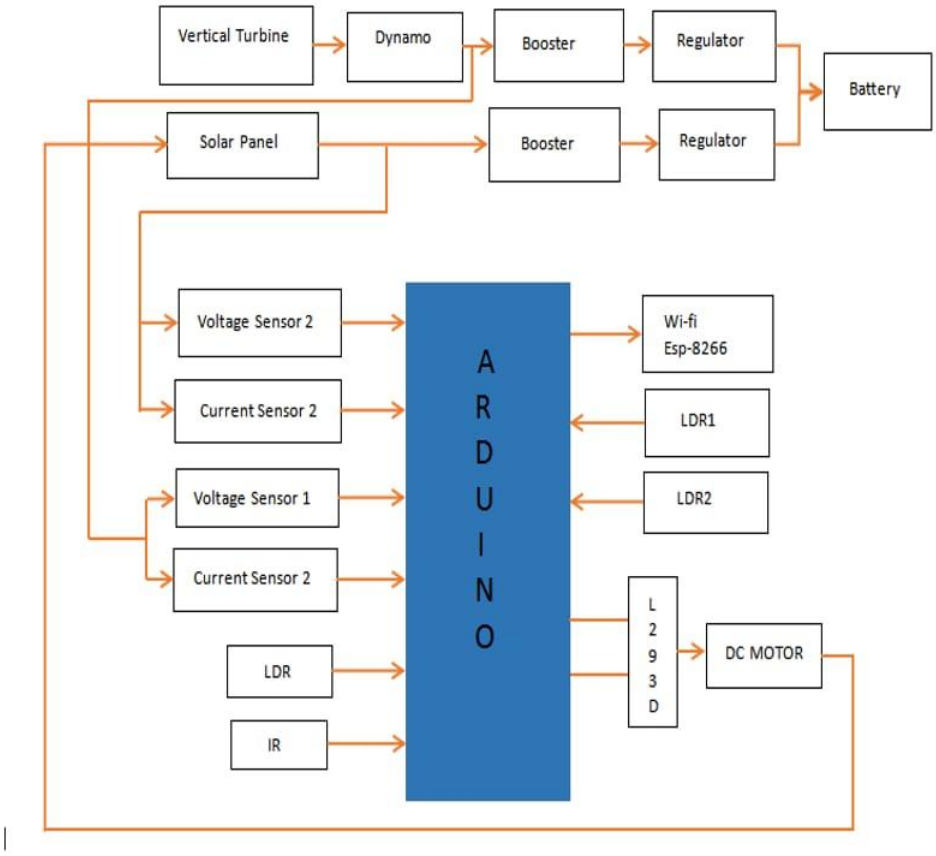

Fig. 1 –Block Diagram

4. Project outcome

1. The power generated from both solar plant and wind energy plant is monitored using sensor network and the data is uploaded to the cloud using IOT.

2. Solar tracking system is used to increase the efficiency.

3. During night we also use vehicle's headlight to generate power.

4. Automatic street light controller is implemented to make the efficient usage of generated power.

5. The energy stored in the batteries can be further used for the purpose of street lighting, toll gates etc.

Advantages

- To make use of non-conventional energy resources like Wind and Solar Energy.
- Minimizing the usage of conventional energy resources like coal,diesel and nuclear.
- To make use of Huge Wind Turbulence which is wasted on highways.
- This model is reliable, pollution free and economical.
- There is no requirement of power to initialize the system.

Disadvantages

- This system is subjective to climatic variations.
- The efficiency is comparatively lower to non renewable resources.

REFERENCES

1) Sulochana B Belavi, Savita B Dasangali, Akshata B Nandaganv, Gayatri T Gharabude, "Innovative hybrid power generation on highways" ref no 42S_BE_1148, July 2019.
2) Payal S Burande, Jaganath A Shinde, Shubham R Talmale, Yogesh S Rathod, Nikhil G Patil, "Hybrid Power Generation Using Smart Highway" Vol. 8, Issue 11, November 2019
3) Walunj Pranit1, Varpe Vishal2, Machhi Amol3, Kumawat Mukesh4 "Hybrid power generation by using vertical axis wind turbine and solar panel" Vol. 6 ,Issue 04 , Apr 2019 .
4) Menaka. R , Mohan. K , Muthu Vijay. P , Ranjith. I ,Ragul. D "Power Generation by Hybrid VAWT System for Highway Applications" Vol.3, Issue 3, pp . 224-226, 2018.
5) Manikanda Gokul A, Krishna M, Venkadesh B, Kalyani. S, Karuppasamy. A "Design and analysis of highway wind power generation using vertical axis wind turbine,"Vol.6, Issue 3, Mar 2019.
6) S.Selvam, Edison Prabhu.K, Bharath Kumar M.R, Andrew Mathew Dominic "Solar and Wind Hybrid power generation system for Street lights at Highways," Vol.3, Issue 3, pp. 2278 – 7798, March 2014.
7) SachinY .Sayal, Govind P Salunkhe, Pankaj G Patil, Mujahid F Khatik, " Power Generation on Highway by using Vertical Axis Wind Turbine & Solar System," Vol.5, Issue 3, pp 2133 -2136 ,Mar-2018 .
8) Shwetha Singh, Sarita Singh, Priyank Srivastava "Vertical Axis Wind Turbine for Generation of Electricity through Highway Windmill," Vol.7, Issue 2, pp. 2229-7111, Feb 2014.
9) Zarkesh A, Heidari M, "Developing a New Application for Wind Generators in Highways," Vol.6, Issue 3, pp. 279,282, June 2013