IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Multi Charging Electric Vehicle using Wind Energy

Prof. Sunil Parge[1],Prof. Husain Shaikh[2], Vikas Iste[3], Ganesh Pedate[4]

[1]Asst.Professor Mechanical Engineering Vidya Prasarini Sabha's College of Engineering and Technology ,Lonavala

[2]Asst.Professor Mechanical Engineering Vidya Prasarini Sabha's College of Engineering and Technology ,Lonavala

[3]Student Mechanical Engineering Vidya Prasarini Sabha's College of Engineering and Technology ,Lonavala

[4]Student Mechanical Engineering Vidya Prasarini Sabha's College of Engineering and Technology ,Lonavala

ABSTRACT

Multi Charging Electric Vehicle Using Wind Energy is a very useful and innovative method for charging the batteries of an electric vehicle. The common problem of charging in EV's is battery efficiency, mileage, charging station, bulky heavy battery charger and wall socket. Now this all problem can solve by using new innovative method of charging system. The conversion of wind energy here acts as a charger, as the vehicle is in motion. The PWM (Pulse Width Modulation) fans are having coin shape magnets mounted on their blades. As the wind strikes or drop on the blades of fan the magnetic force will convert into magnetic motion, as a result the fan start rotating and develop a power of 3.96 to 4 volts. Since this power is generated from a single fan. And the power develop from 25 fans will be 98 volt without considering losses. A Charge controller is installed between fan and battery which control the voltage and allow the suitable voltage pass to the respective load. Here load is Brushless Direct Current Motor (BLDC).

Key words: - battery efficiency, bulky heavy battery charger, charging station, mileage, wall sockets.

I. INTRODUCTION

Multi Charging Electric Vehicle by using wind energy consist of major component like **PWM fans, Charge controller, BLDC motor and batteries with controller.** As a vehicle moves the wind speed increases. And the air speed which was not used is our attempt to charge the electric car battery by using the same. Where PWM fans are used as a receivers and a stainless steel magnet are installed on the periphery of fans for its smooth and easy rotation. These fans can generate the voltage up to 3.96v to 4v and at least 2.35v in minimum speed of vehicle. A charge controller is installed to supply the sufficient voltage to the load also to avoid the chances of shot circuit. Here, lead acid batteries are used lithium ion and lithium phosphate ion can also be. A 1000w 48v BLDC motor with its controller are used which provide a torque of 18 Nm and the speed up to 50 – 55 km/hr.

The big issue of charging the batteries and its efficiency can be solved here as the electric vehicle are future scope for us since the fossil fuels are continuously are in used to generateelectricity for charging EVs and for other used too. It may largely impact on the rate of fossil fuels which can also be a big problem for our environment just like Electric Solar Vehicle (ESV) which uses unconventional energy for developing power for a particular; similarly WVCS can also be a very useful innovation of power generation for electric vehicle. It can increase the efficiency of vehicle up to 25 % and the charging rate from plug in system / valve socket system can be reduced and gradually it will affect in the rate of fossil fuels and helps to increase it. We developed a kit which will be very useful for E- rickshaws and can be selling after market.

II. LITERATURE SURVEY

For the fabrication and making a kit of charging system of EV's the existing technologies for EV's by using wind energy has been studied.

"POWER ELECTRONIC EMPLOYED IN EV"

2019 Chennai, The power electronics, electric motors should plan for Indian conditions. A battery ecosystem needs to be develop which can support many companies and start-ups developing battery pack up and cell manufacturing. Charging infrastructure needs to be adequately built to address range anxiety.

The options of swapping also are explored. It is also very important to create demand generation by making all government buses electric and offering tax exemptions for private EV owners.

"ANALYSIS OF WIND TURBINE" 2011. This paper is based on the concept of charging the batteries of an electric vehicle when it is in motion or propelling. This may be done by using the energy of wind which is caused by the relative motion between the vehicle and the wind surrounding it. Wind turbines can be mounted on the body structure of the vehicle to generate electricity in such a way that it must not create any additional drag force (rather than the existing drag force due to frontal area and skin

friction) upon the vehicle. An elaborate aerodynamic analysis of the structure of the vehicle along with the flow pattern and wind turbine is presented in the paper. Some techniques and methods are proposed to minimize the drag imposed by the introduction of the turbines as much as possible.

"PROPOSED DESIGN OF WIND TURBINE"

2016. The assembled turbine is fastened to a framelike structure provided on the roof of the vehicle as shown in Fig. 2.5 by a set of bolts with the inlet facing the front of the vehicle. The shrouded diffuser augmented wind turbine is chosen for the design since that is the most efficient wind turbine. The main components of the proposed design are the rotor, main shaft, main bearing coupling, generator, top shroud, base shroud, inlet safety guard, exhaust safety guard. The rotor (1) is coupled to the main shaft (2) by a set of four hexagonal head bolts. The main shaft (3) and the generator (5) are fastened to the supports on the base shroud (6) by a set of hexagonal head bolts.

"VEHICLE MOUNTED WIND TURBINE"

2015. The designing of VMWT need careful considerations. VMWT has the basic configuration of a HAWT. However, the field of application makes it different from conventional HAWT. VMWT has some additional design criteria over conventional HAWT. Namely, rotor, generator, gear box (optional) and storage system designs are different. Moreover, VMWT has to be light weight, high RPM, highly rigid, low cost unlike conventional designs. Hence, the VMWT has to be designed carefully to compromise with these aspects. The principle of this work is presented in figure 1. As the Figure-1 illustrates, a wind turbine is mounted on a running vehicle and an airfoil is comingthrough opposite direction. The direction of the airfoil can either be natural or artificially directed to the rotor. They collide and make a resultant force in a modified direction.

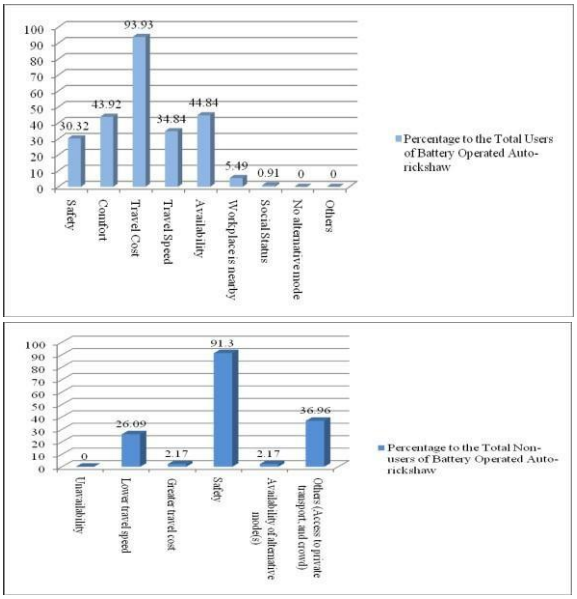
"PROBLEM IDENTIFIED "

In a passenger vehicles such as E-Rickshaw's the driver needs to charge his/her vehicle for at least 6-8 hours and sometime even twice a day when in use with more passengers.

This extra charging time may cause the loss of driver up to Rs.180-200/- per day similarly Rs.6,000/- per month and approximately Rs.72,000/- annually

For 1.5 million of E-Rickshaw's in India Power consumption of e rickshaw the average specific energy consumption of the e-rickshaws has been found to be

53.76 kJ /passenger-km, which is the most efficient among other forms of motorized threewheeled passenger vehicles.



3.Aim

- To charge the batteries of electrical vehicle using wind energy and to develop a kit for E Rickshaw's which can be installed after market.
- The existing technology of charging system in EV takes more time to charge battery so that it is an alternative of those technologies in affordable price.

4.Research objective

- Our primary object is to charge the batteries of electric vehicles (Two, Three & Four) wheelers via. Wind Energy as per the Design and Ergonomics of the vehicle.
- This system will work for duration of charging discharging cycle time which will reduce the extra charging hours even having more than 10-12

  rides per day.
- Since no extra charging time is required the operator can save money up to Rs.72,000/- annually.
- One should no need to adopt any other systems as this kit improves the efficiency up to 48 -50%.
- This kit's are very less expensive and one time investment, any one can easily afford it with quick and simple installation process.
- The No. of rides has gradually increased and no need for extra charging time for the batteries which will be beneficial to the drivers/operators.
- Since charging hour is reduces which directly effect in electric energy consumption rate.

Current scenario: - In large population cities like Amritsar, Kanpur, Delhi, Indore, Udaipur, Kakinada, Bardhhaman, e-rickshaw plays a major role as feeder services to public transport in metro cities, public transport in small &medium towns and mode of transport for tourists. All age group

people travel by e-Rickshaw mostly for their work trip. Urban Mobility India Conference & Expo 2015 says 90% erickshaws on average carry more than 50 passengers per day. In areas like Kanpur, most of the erickshaws carry more than 80 passengers per day due to overloading and used as a public transport. In cities like Amritsar, 90% are occasional users (tourists) and in Kanpur & Delhi, there is 70:30 daily and occasional users respectively. In Delhi, 70% of e- Rickshaws are owned while other 30% are rented on average Rs. 300 per day.

Sr. No.	Vehicles	Mileage (avg.)	**Cost(avg.) in Rs.**	**Rank**
1.	LPG	21 km/kg	**40/kg**	**3**
2.	Diesel	17 km/litre	**55/litre**	**4**
3.	Petrol	15 km/litre	**65/litre**	**5**
4.	Ericksh aw	18 km/kWh	**10/kWh**	**2**
5.	Solar ericks haw	18 km/kWh	**1.30/kWh**	**1**

5.METHODOLOGY

Problem: - The problem in the EV's charging system of EV is it takes more time to charge the battery and also required charging station if the battery get discharge on the way.

Collecting research paper:-Collecting research paper from the internet on the pre concept of wind energy charging system. Collect research paper on design and parameters of electric vehicle. Also collect the research paper on wind turbine used in electric vehicle.

Project proposal:-Making a project proposal for the selection of project and experiencing our ideas with project in charge. Getting suggestions and implementing that suggestion and submitting the project proposal to the project in charge.

Selecting area of work:-After project finalization we have to decide and area of work for fabrication of electric vehicle with respect to the residence of group members as the suitable area of work is other workshop for fabricating body of electric vehicle.

Finding resources:-Resources should be fined for fabrication of body of EV it requires some predesigned parts which are readily available in market. Also it required electric material which also readily available in the market

Collecting different components:-After fabrication and purchase of all the components all the components should be collected from various locations at the workplace.

Assembly:-Assemble all the components of EV as according to design setup make sure that is relative motion between parts is efficient and the mechanism used in machine is properly working.

Trial on project:-Take a trial on project and find out some parameters such as

- How long will it take for the battery to be fully charged?
- Once we fully charge the battery, we will check how many kilometers it will run.
- Speed of vehicle as per the mounted motor in the vehicle.

6.CONSTRUCTION AND WORKING

Fig. 1 Conversion of wind energy charging system

Construction: - The above figure show systematic view of WVCS (Wind velocity charging system). It consist of major component like PWM fans, Charge controller, BLDC motor and batteries with controller. PWM Fans are light in weight and can easily rotate with the help of wind. It generate 3.96 to 4 volt. Charge controllers regulate the energy and transfer it directly to the batteries as a DC-coupled system, which is the most efficient and effective manner. In brushless motors, permanent magnets rotate around a fixed armature and overcome the problem of connecting current to the armature.

The controller provides pulses of current to the motor windings that control the speed and torque of the motor. The lead acid battery is most commonly used in the power stations and substations because it has higher cell voltage and lower cost.

Working: - As a vehicle moves the wind speed increases. And the air speed which was not used is our attempt to charge the electric car battery by using the same. Where PWM fans are used as a receivers and a stainless steel magnet are installed on the periphery of fans for its smooth and easy rotation. These fans can generate the voltage up to 3.96v to 4v and at least 2.35v in minimum speed of vehicle. A charge controller is installed to supply the sufficient voltage to the load also to avoid the chances of shot circuit. Here, lead acid batteries are used lithium ion and lithium phosphate ion can also be. A 1000w 48v BLDC motor with its controller are used which provide a torque of 18 Nm and the speed up to 50 – 55 km/hr.

7.COMPONENTS USED

Lead acid battery: The Lead acid battery which uses sponge lead and lead peroxide for the conversion of the chemical energy into electrical power, such type of battery is called a lead acid battery. The lead acid battery is most commonly used in the power stations and substations because it has higher cell voltage and lower cost. Specification:

- Specific Voltage: 12v
- Charging time required 6-8hours
- Battery weight: 5kg
- 400 to 600 life cycles
- Current: 32 amp

Fig. 2 Battery

BLDC Motor with controller: A **brushless DC motor** (also known as a BLDC motor or BL motor) is an electronically commuted DC motor which does not have brushes. In brushless motors, permanent magnets rotate around a fixed armature and overcome the problem of connecting current to the armature.The **controller** provides pulses of current to the motor windings that control the speed and torque of the motor. This control system replaces the commutator (brushes) used in many conventional electric motors.

Specification:

- BLDC Motor: 4.9 kg
- Controller: 1 kg
- BLDC Motor 48v, 1000W
- Rated voltage: 48v
- Rated power: 1000W
- Maximum power: 1000W
- Rated Speed: 3300 rpm
- Rated current: 26 amp
- Running current: 12 - 15 amp
- Operating temperature:

  Max 100 degree Celsius

  Min. -20 degree Celsius •

  Rated Torque: 18 Nm

Fig. 3 Motor

Differential: The automotive differential is designed to drive a pair of wheels while allowing them to rotate at different speeds. In vehicles without a differential, such as karts, both driving wheels are forced to rotate at the same speed, usually on a common axle driven by a simple chain-drive mechanism.

Specification:

- Color: Black
- Size: 33”
- Brand: CY

Fig. 4 Differential

PWM Fans controller: Charge controllers regulate the energy and transfer it directly to the batteries as a DC-coupled system, which is the most efficient and effective manner. Giving batteries as long of a life as possible is an important function of a charge controller.

Specification:

- Size: 30A
- Voltage: 12v

Fig. 5 PWM Fan Controller

Wheel:A circular object that revolves on an axle and is fixed below a vehicle or other object to enable it to move easily over the ground.Specification:

- Size: 12” diameter
- Stainless Steel

Fig. 6 Wheels

Steering system: The steering system converts the rotation of the steering wheel into a swiveling movement of the road wheels in such a way that the steering-wheel rim turns a long way to move the road wheels a short way. The system allows a driver to use only light forces to steer a heavy car.

Specification:

- Steering wheels
- Steering column
- Wheel column
- Hub

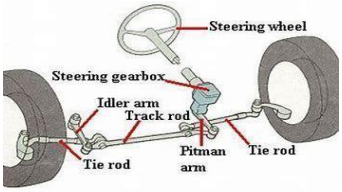


Fig.7 steering system

Braking system:A brake system is designed to slow and halt the motion of vehicle. To do this, various components within the brake system must convert vehicle's moving energy into heat. This is done by using friction. Friction is the resistance to movement exerted by two objects on each other.

Specification:

- Type: Mechanical brake type
- Brake Drum
- Brake shoes
- Brake pad / Friction pad
- Cam
- Brake rods

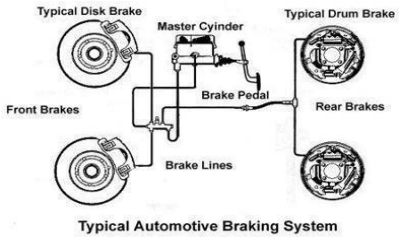


Fig. 8 Braking System Brake pedal

PWM fans (CPU cooling fan): It helps pull and blow hot air off the processor, helping keep it cooler.

Power supply fan - a fan located inside a power supply. It is light in weight and can easily rotate with the help of wind. While continuous rotation a single fan can generate 3.96 – 4 volts.

Fig. 9 Pulse Width Modulation fan

VI. VOLTAGE CALCULATION

One single fan develops a voltage of 3.96 - 4 volts.

Total battery charging voltage needed is 52 – 53 volts The initial single battery voltage is 12v, 32ah. (Lead acid battery) 12v x 4 = 48 volts (4 batteries) To charge the battery we need 48 volts

Without considering losses

4 volt of single fan x 12 fans = 48 volts

4 volt of single fan x 16 fans = 64 volts 4 volt of single fan x 18 fans = 72 volts (including all air losses)

With considering losses

3.96 volts of single fan x 18 fans = 71.28 volts 48 volts < 71.28 volts (Charging ON)

***Maximum single fan voltage** = 4 / 3.96 volts **Minimum single fan voltage** = 2.25 volts*

2.25 volts x 18 fans = 40.5 volts

40.5 < 48v (Charging OFF)

2.25v x 25 fans = 56.25v

(25= no. of fans) 53.2volts

(including all losses)

53.2v > 48v (Charging ON)

If we will connect all 25 fans in series 5 rows x 5 column = 25 fans and connected together with battery then the fans will start on battery power To avoid this we have to install a device which will take power from these fans to the battery (charge controller).

A charge controller is a device which supplies the required power to battery and the respective load.

CONCLUSION

The kit installed in electric vehicle in which the PWM (Pulse Width Modulation) fans are mounted for the charging of batteries. So the single fan can generate 3.96 volts with considering losses and 4 volts without considering losses. If we mount 18 fans in this kit for charging the batteries of EV's then it calculated as it can generate 71.28 volts with considering losses. The single fan minimum voltage including all losses is 2.25 volts by which it can generate 56.25 volts of 25 fans. Hence through the theoretical calculation on the power generated by the PWM fans with the help of wind, a significant amount of electric power is restored to the batteries.

REFERENCES

[1] 'Electric Vehicle with Charging Facility in Motion using Wind Energy' Conference Paper · May 2011 DOI: 10.3384/ecp110573629 S.M. Ferdous Murdoch University SayedusSalehin Islamic University of Technology Enaiyat Ghani Ovy University of Alberta *World Renewable Energy Congress 2011 – Sweden Sustainable Transport (ST) 8-11 May 2011, Linköping, Sweden*

[2] Advanced Electric Vehicle FastCharging Technologies, Ryan Collin Baylor University Article *in* Energies · May 2019, DOI: 10.3390/en12101839.

[3] Design and implementation of vehicle mounted Wind turbine, @2006-2015 Asian Research Publishing Network, (ARPN), Vol.10, NO 19,October 2015.

[4] 'DESIGN AND ANALYSIS OF AN ELECTRIC KART'IJRET: InternationalJournal of Research in Engineering and Technology eISSN: 2319- 1163 | pISSN: 2321-7308.

[5] DESIGN AND FABRICATION OF HYBRID GO-KART, International Research Journal of Engineering and Technology (IRJET) eISSN: 2395-0056 Volume: 06 Issue: 07 | July 2019 pISSN: 2395-0072.

[6] 'Review Paper on Electric Vehicle Charging and Battery Management System' KadlagSunildattaSomnatha, Mukesh Kumar Gupatab, International Conference on Communication and Information Processing (ICCIP-2019) Available on: Elsevier-SSRN.

[7] Generation of Electrical Power by a Wind Turbine for Charging Moving Electric Cars Gideon Quartey*, Stephen KwasiAdzimah Journal of Energy Technologies and Policy www.iiste.org ISSN 2224-3232 (Paper) ISSN 2225-0573 (Online)

[8] Vol.4, No.3, 2014

[9] Wind Energy Based Electric Vehicle Charging Stations Sitting. A GIS/Wind Resource Assessment Approach George Xydis Aarhus University Article *in* Challenges · November 2015 DOI: 10.3390/challe6020258[9] Automotive Mechanics by William H Crouse and Donald L Anglin

[10] Vehicle Maintenance and Garage practice by Jigar A. Doshi, Dhruv U. Panchal and Jayesh P. Maniar

[11] Automobile Engineering by Upkar's Objectives (R. K. Mishra)