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Mobile charger from wind energy during bike journey

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Abstract

Electricity production now a days, a hectic process. Electricity consumption bill is alarming for the common people. To minimize this load a device has been investigated in the present study. An attempt for a mobile charger from wind energy during bike journey was made in this finding. Mobile charger unit produced the electricity of 5.8 volt from the wind generated during the ride on a bike. When it was connected to a mobile phone the phone got recharged efficiently. At 70 km speed of the bike this electricity was generated, therefore a continuous journey of 80 km speed produced the electricity of more than 6 volt which is highly sufficient to charge a mobile phone.

Introduction

Energy is a property of objects which can be transferred to other objects or converted into different forms. “Ability of a system to perform work is misleading because energy is not necessarily available to do work. Energy can be defined based on the context such as thermal energy, radiant energy, electromagnetic energy, nuclear energy, wind energy etc. Maintaining sustainability of energy in the phone battery by “Wind Driven Mobile Battery Charger” is the keen alternative to save electricity (Designing, 2013, Sudhakar and Priyanka Saxena, 2013). Kinetic energy of a moving object is the common energy, the potential energy stored by an objects positioned in a force field. Example fan or turbine rotation to the wind. All the many forms of energy are convertible to other kinds of energy. Wind driven mobile charging of automobile battery was a success (Singh *et al*., 2011). Wind energy can be transformed into electrical energy by the rotation of fan or wind turbine. Examples of energy transformation include generating electric energy from heat energy via a steam turbine land photovoltaic-array in feed-forward controlled PWM inverter (Daniel and Gaunden, 2001).

Lifting an object against gravity using electrical energy driving a crane motor. Our Sun transforms nuclear potential energy to various forms of energy. Rotation of wind mill leaves and leaves of fan generated electricity. Due to the convertible nature of energy, its utilization is of high value and hence can be promoted economically, for the benefit of human society. Review of literature reveals that enormous works have been done in wind turbines, magnet power generator, and by automobile generator (Eltamaly, 2005 Rizk and Nagriak, 2010, Singh *et al*., 2011). Digital Energy Meter, (2011) was introduced for the first time to measure the electrical energy; however no findings were reported on charging the mobile phone from the wind energy during the bike journey. Therefore an attempt was made to conserve the electricity and make best utilization of the renewable resources, wind energy and solar energy to investigate a charger unit at cheaper cost.

Materials and Methods

Mobile Charger Unit Fitted on the Moped Bike

FAN: A fan with 3 leaves. Each leaf is made up of strong plastic blue colour. Radius of fan is 8 cm. Fan is attached with 9V Dynamo.

9 volt DYNAMO : Capable to work a 9V electricity . It is a in built coil dynamo which is capable of producing electricity up to 9V at the speed of bike 70 km/hr (wind speed). Fixed in a stand mounted to the box.

USB Port : Gives 6V output from the motor to the Phone charger cable. Connected to the 9V Rechargeable battery as well as to the dynamo.

Mobile Charger Unit Fitted on the Moped Bike

USB Port **DC Motor** **3 leaf Fan**



Anemometer **Multimeter** **USB Cable**



Wind Energy Bike Mobile Charger Device

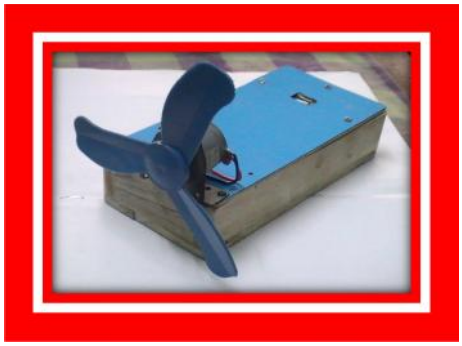
Box : The overall unit is attached to the wooden box which contains PCP Circuit board, 9V DC motor and a fan .

Multimeter : Gives the volts produced in 9V DC Motor.

Mobile charger: Mobile charger with capacity of charging the mobile phone of 3 -5 volt. A charger have the range of 3 -5 volt can charge the mobile. Charger must have enough wire cord length so that it can be of maximum distance between the mobile and the unit.

Android Mobile phone: Mobile phone of high sensitivity is used in the present study. Micromax luminous model with the charger is tested.

Wind Energy Bike Mobile Charger Device



Electricity producing unit was assembled with the help of above given tools. Assembled unit is a wooden box with 9 volt DC motor in front end of the box. Leading from the edge of the motor plastic fan was attached. Motor was connected to PCB inside the box. From the PCB the wire was connected to the USB port at the fag end opposite to fan inside the box. USB port holder was positioned as an opening on the surface of the box. Holder was plugged with a charger which is connected to a Android mobile phone.

I. FIRST TRIAL – Testing with Bicycle.

The wind energy conversion to electricity is first experimented in the simplest vehicle that is Bi-cycle.

To begin with the trial of wind energy conversion to electrical energy in the basic vehicle that is cycle.

1. Whole unit is fit in the handle bar of the cycle firmly with the clamps. Care should be taken that there is no vibration, no loose fitting and traffic rule specific.
2. Charger as well as the mobile is kept in front in a basket facing towards the cycler, so that the readings can be easily recorded.
3. Cycle pedaling was gradually increased from the speed of 10 km, 20 km up to 30 km. The voltage was measured with the help of multimeter and recorded.
4. Cycling was done in different directions of the wind and three times the experimental cycling was recorded.

II. SECOND TRIAL – Unit Tested with Moped Bike

In moped bike the wind energy will be severe therefore the Charger assembly unit is fitted in the handle bar tightly with the help of clamps and base sheet.

1. Care should be taken that the unit in no way fall in the dislocation since the bike will have enormous speed.

2. Bike mobile charger is clamped in the handle bar in such a way, the fan is facing towards forward at the front end of the wooden box.

3. One end of the Charger is connected to the USB port holder and the other terminal is connected to the mobile phone.

4. Fan started rotating in CLOCKWISE direction.

5. Bike speed from the speedometer, Wind speed from the Anemometer and Electricity produced from the dynamo was recorded (multimeter) for the speed of the bike from 20km, 30km, 40km, 50km, 60km and 70km.

6. Recording was done for three times to obtain the mean average value. Each time it was travelled for 10 minutes continuously.

After the completion of the procedure the results of the every objectives has been tabulated in the Tables 1 and 2.

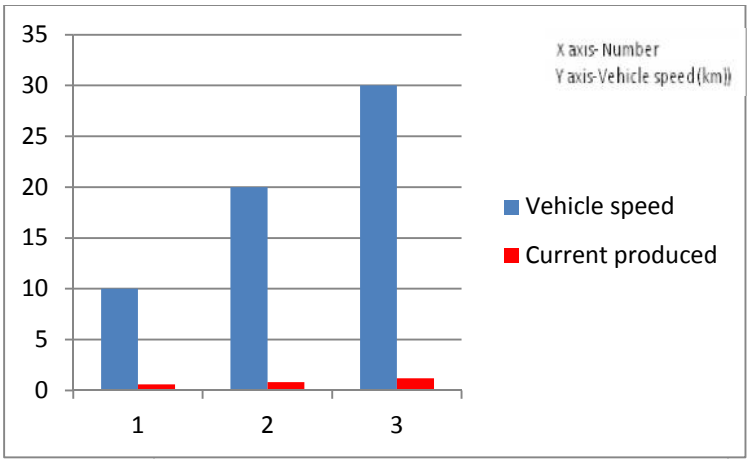
Wind Energy conversion to Electrical energy in the Bicycle. It is tested with the help of Avon normal bicycle.

Table 1: Testing by Bicycle.

Sl.No.	Speed of the Wind (Km/hr)	Replicates	Acceleration of the Bicycle (Km/hr)	Voltage produced (Volt)	Average Voltage produced (Volt)
1	10	1	10	0.6	
2	10	2	10	0.5	**0.6**
3	10	3	10	0.7	
4	25	1	20	0.8	
5	25	2	20	0.9	**0.8**
6	25	3	20	0.8	
7	35	1	30	1.0	
8	35	2	30	1.2	**1.2**
9	35	3	30	1.2	

During the bicycle experimentation, acceleration of the cycle is gradually pedalled from 10km/hr to 30km/hr. Trial was done in different directions to find out the accurate readings. At the speed of the wind 10 km/hr average current produced was 0.6 volt. At the speed of the wind 25km/hr was 0.8 volt and at the speed of the wind 35km/hr average current produced was 1.2 volt. Experimentation was done three times for each and every speed of the vehicle generation of the current is directly proportional to the Speed of the vehicle (Table.I).

Graph-I. Bicyle: Relationship between speed of the vehicle & current produced.



When the speed of the cycle is increased from 10 to 20 km/hr the produced electricity also increases. But the produced electricity was responding very slowly to the speed was revealed from the Graph.I. When the speed of vehicle is 30 km the electricity produced was mere 1.8 volt. Therefore my research shifted towards higher mode of vehicle that is Moped Bike. Dynamo of bike also cannot be used since the speed of bicycle never be raised beyond 30 km speed.

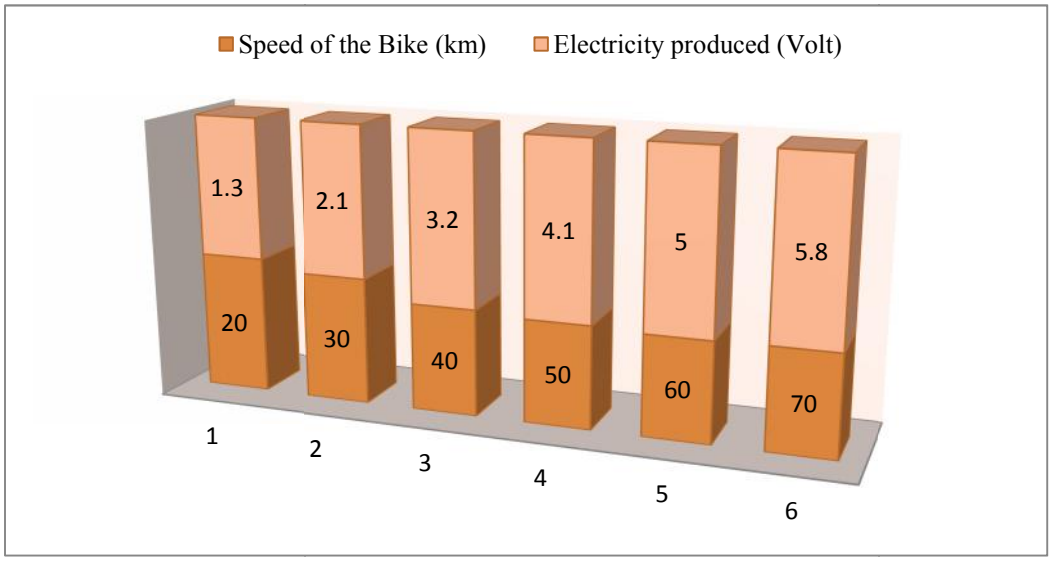
Table 2: Testing by Moped Bike

Sl.No.	Speed of the Wind (Km/hr)	Replicates	Acceleration of the Moped Bike (Km/hr)	Voltage produced (Volt)	Average Voltage produced (Volt)
1	25	1	20	1.1	
2	25	2	20	1.2	**1.3**
3	25	3	20	1.3	
4	35	1	30	2.0	
5	35	2	30	2.2	**2.1**
6	35	3	30	2.1	
7	45	1	40	3.2	
8	45	2	40	3.2	**3.2**
9	45	3	40	3.4	
10	52	1	50	4.1	
11	52	2	50	4.3	**4.1**
12	52	3	50	4.1	
13	65	1	60	5.2	
14	65	2	60	5.4	**5.0**
15	65	3	60	5.5	
16	72	1	70	5.7	
17	72	2	70	5.9	**5.8**
18	72	3	70	5.8	

During the Moped Bike Anti-Clockwise rotation of fan experimentation, acceleration of the Bike is gradually raised from 30km/hr to 70km/hr. Trial was done in different directions to find out the accurate readings. At the speed of the wind 35 km/hr average current produced was 2.1 volt. At the speed of the wind 45km/hr was 3.2 volt, at the speed of the wind 52km/hr average current produced was 4.1 volt. at the speed of the wind 65km/hr average current produced was 5.0 volt at the speed of the wind 72km/hr average current produced was 5.8 volt Experimentation was done three times for each and every speed of the moped bike.

Test drive was done in different directions. Towards northern direction the drive was done up to Kalligudi station. Towards Eastern side of the Virudhunagar town test drive was conducted up to the distance of Vallikulam. Up to Amathur towards the Western side of the town the test drive was done. Towards the southern part of the Virudhunagar town test drive was conducted up to RR Nagar Thulukkapatti.

Graph-2: Comparison between the Speed of the Bike and Electricity generated



Experimentation with Bike and from the Graph-II it reveals that A. On increasing the speed of a vehicle gradually the rotation of the fan also increased. B. When the rotation of the fan was so high the electricity was produced. This electricity produced was measured with the help of multimeter. It was observed that from the speed of 20 km the voltage electricity produced raised from 1.3 to 5.8 volt in 70km bike speed. Mobile phone started to charge. From this experiment it was confirmed that the mobile phone can be charged during the bike drive.

Discussion

An investigation with the bicycle was not productive. When the bicycle speed was increased from the 10 km to 30 km electricity produced was very low of 0.6 to 1.8 volt. This is not sufficient to charge a mobile phone. A minimum of 5 volt is required to charge a normal mobile phone. Speed of the cycle may not be matching with the generation of the electricity. When the same trial was done in the bike moped, at the speed of the wind 52km/hr average current produced was 4.1 volt. at the speed of the wind 65km/hr average current produced was 5.0 volt at the speed of the wind 72km/hr average current produced was 5.8 volt. Same trend was reported by Saikumar Pattabiraman (2014).

This electricity produced is enough to charge the mobile phone. In the present study during bike journey the mobile started charging at the speed of 70 km/hr thrusting the close association between the speed of the wind and electricity produced. This is well supported by the findings of Muljadi, *et al*., (1998) as the wind turbines can be regulated by the control strategy for variable speed. With the help of capacitors the electricity of 5 volt was produced at the wind speed of 45 km/hr (Sudhakar and Priyanka saxena, 2017). By applying this principle, in the present investigation without the usage of capacitors electricity of 5.8 volt was produced at 70 km/hr speed during the bike journey.

Conclusion

- Current can be produced from the wind energy in the bicycle pedaling up to 1.2 volt which can utilized for the lighting of the LED bulbs while cycling, particularly for the fire wood cutters into the forest.
- From wind energy through rotation of the fan with the leaf of small size have greater power of current production than the lengthy fan leaf.
- Current generation out of wind energy by bicycle is maintained at constant after a particular speed of the cycle.
- Rotation of fan in the Bike charger unit produced 5.8 volt at 60 km/hr speed of the bike which is sufficient to charge a mobile. It was invented from the present study that, at a bike speed of 60 to 70km/hr generaedthe current of 5.8 volt and charging of the mobile was done during the bike ride at cheaper cost.

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