WIND POWER GENERATION FOR MOBILE CHARGING

[1]B.Srinivasa Rao, [2] Dr.M.Saravanan
[1]Assistant Professor, [2] Professor
[1] Electronics and Instrumentation Engineeirng,
[1] Sree Vidyanikethan Engineering College,Tirupati,India.

Abstract: ***An attempt has been made to develop a small compact and easy to carry mobile charger which utilizes wind energy to charge mobile phones with ease during travelling. It minimizes the dependability on conventional chargers. It utilizes a fan connected to a DC generator, and voltage regulator. It works effectively between vehicle/wind speed of 50kmph and 80kmph. It can be easily installed in the bike and mobile phone can be charged. The charger consists of minimum number of parts making it cheaper and affordable. A small rechargeable battery is also provided so that it can save energy when wind energy is available and can provide alternate source of power when wind energy is absent.***

Keywords: wind energy, mobile charger, voltage regulator, fan blade

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1.INTRODUCTION

Generating power is a great importance in today's world. Due to the pending exhaustion of fossil fuels, it is crucial to develop alternative energy sources. Wind powered generators are capable of producing significant amounts of electricity worldwide, an attractive alternative because wind is a renewable resource. The technologies behind wind energy converters still have much room for improvement in efficiency. Most modern wind power is generated in the form of electricity by converting the rotation of turbine blades into electrical current by means of an electrical generator. In wind powered generators. Wind energy is used to turn mechanical machinery to do physical work, like crushing grain or pumping water.

Wind power is used in large-scale wind farms for national electrical grids as well as in small individual turbines for providing electricity to rural residences or grid-isolated locations. Wind energy is ample, renewable widely distributed, clean and mitigates the greenhouse effect if used to replace fossil-fuel-derived electricity. Wind, as an energy input of wind powered systems, can be given by two parameters: speed and direction. Because the energy output of the wind powered generator is determined from the input. It is important to be able to understand the stochastic fluctuations in wind. Wind behavior will be approximately constant over long periods of time, but for any given period wind can be extremely variable in speed and direction.

2.MATERIAL AND METHODS

2.1 Design Considerations

This is one of the simple and possible way to design the wind powered generator and the some of the crucial components present in the basic block diagram of wind powered generator for design purpose are:

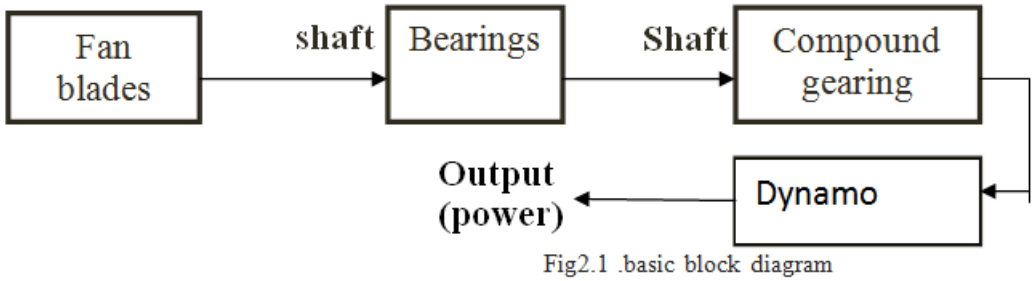

Fig2.1 .basic block diagram

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The main components for wind powered generator are:

• **Rotor blades -** The blades are basically the sails of the system they act as barriers to the wind (more modern blade designs go beyond the barrier method). When the wind forces the blades to move, it has transferred some of its energy to the rotor.

• **Shaft -** The wind-turbine shaft is connected to the center of the rotor. When the rotor spins, the shaft spins as well. In this way, the rotor transfers its mechanical, rotational energy to the shaft, which enters an electrical generator on the other end.

• **Dynamo-** At its most basic, a dynamo is a pretty simple device. It uses the properties of electromagnetic induction to produce electrical voltage a difference in electrical charge. Voltage is essentially electrical pressure it is the force that moves electricity, or electrical current, from one point to another. So the generating voltage is in effect generating current. A simple dynamo consists of magnets and a conductor. The conductor is typically a coiled wire. That voltage drives electrical current (typically alternating current, or AC power)out through power lines distribution.

3. DESIGN PROCEDURE

3.1.Design of wind power generator:

The simple design of the wind power generation will be splitted in to two stages. As the stages were increasing the problems will be decreased and the efficiency will also be increased At the first stage we directly connected the shaft of dynamo to the fan blades the draw backs come from the process will be removed and we will adding the gearing system and bearings we will placing the circuit along with the first stage.

3.1.1 Description:In this analysis we directly connect the shaft of the dynamo to the fan blades. The designed part will be fixed in the bike if the speed is less i.e. there will be very less moment of the fan rotation where as if the speed of the fan is more automatically the rotational speed of the fan will be increased . The fan rotation will be started at the speed of 40 km\hr. By taking air as input the rotation of fan takes place .here air forces for the moment of the fan blades as the fan blades automatically moves the rotational energy i.e. mechanical energy will be shifted from fan blades to dynamo. The main principle of the dynamo is to convert the mechanical energy into electrical voltage. So t3e dynamo takes input from the fan blades and converts them to the voltage form whereas the speed increases automatically the output voltage also increases.

Fig 3.1: Basic diagram

Table 3.1:Speed VS voltage:

Speed(Km/hr)	Voltage(volts)
40	**0.5v**
45	**1.2v**
50	**2.5v**
55	**3.6v**
60	**4.2v**

Draw backs:

- Friction.
- Speed is less.

3.2. Stage-0 analysis:

In this analysis we will not connect the shaft of the dynamo directly to the fan blades. In between the fan blades and dynamo there will be a shaft and gear system (large and small size gears) and bearings. Here we will use compound spur type gear system and jewel type bearings and shaft as a screw.

3.2.1. Description: In this analysis fan blades are directly connected to the compound gear system i.e. large gear with help of a shaft and 2 jewel bearings are placed in between the large gear and fan blades because bearings will rotate the shaft and very less amount of friction will be present to reduce the small amount of friction we use jewel type of bearings .In jewel bearings jewel type of material will be placed in between stationary and moving parts . And a small gear will be placed compound to a large gear and one end will be fixed to the shaft of the dynamo. The complete arrangement will be fixed on the wooden piece with the help of clamps and glue. The wooden piece will be fixed on the bike. When we started travelling at below 30km/hr speed the rotation of fan will be failed . The fan rotation will started at the speed of (35-40)km\hr. if we increase the speed of the bike automatically the speed of the fan blades and rotations of the fan blades will be increased.

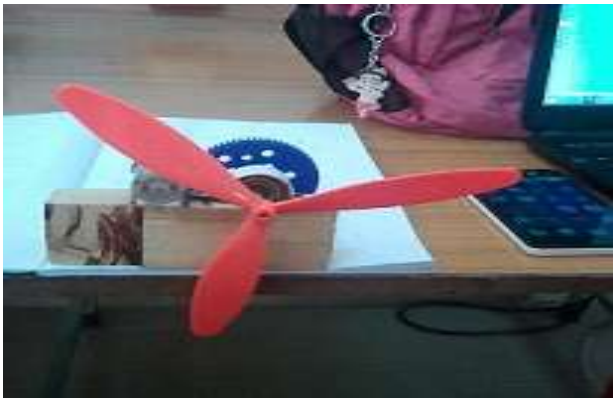

Fig 3.2: Design of wind power generator

When fan blades are moving automatically the rotational energy i.e. mechanical input will shifted by the shaft to the large gear so automatically the large gear also rotates. When large gear is rotating automatically the small gear will be rotated because they are fixed in compound arrangement. When small gear is rotating the power will be generated because the shaft of the dynamo will be fixed to the small gear .While the whole set up is rotating very small amount of friction will be developed the bearings will reduce the friction. The amount of power generated can be stored in a battery or can be used for different home appliances. Here in our project the generated power is using for mobile charging. The mobile charging takes place while we are travelling. But for mobile charging we need exactly 5v but here we are getting 7v as output. So we are limiting to the 7v to 5v by voltage regulator in stage-3 analysis. If we connect the one end of the USB cable directly to the dynamo and the other end to the phone we will get such type of notifications.

Fig 3.3: notification in mobile

When the speed increases automatically the output voltage also increases.

Table 3.2:Speed VS voltage:

Speed(Km/hr)	Voltage(volts)
40	**0.8v**
45	**1.9v**
50	**3.2v**
55	**4.7v**
60	**6.2v**
65	**7.3v**

Here in this analysis charging of mobile phone takes place in between (55 -60) speed and the time duration for 1 percent of charging is 40 sec.

3.2.2. Drawbacks:

For mobile charging we need exactly 5v but here we are getting 7v as maximum output. So we are limiting the 7v to 5v by voltage regulator in next process.

1.Circuit Design And Analysis

The main purpose of the circuit design is to limit the voltage to 5v for mobile charging.

1.1 Circuit diagram:

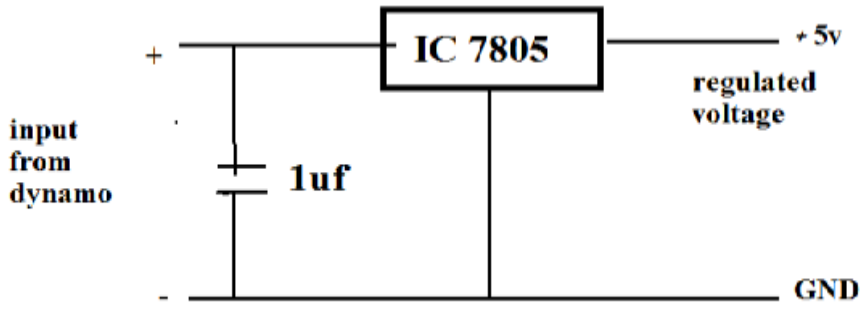

Fig 3.4: mobile charging circuit diagram

3.2.3 . Description:

In this circuit we are having only 2 components they are:

- IC 7805
- Capacitor(1uf)

IC 7805: IC 7805 is also known as voltage regulator. Voltage regulators are used to regulate voltage. Voltage Regulator is one of the most important and commonly used electrical components. Voltage Regulators are responsible for maintaining a steady voltage across an Electronic system. Voltage fluctuations may result in undesirable effect on an electronic system, so to maintaining a steady constant voltage is necessary according to the voltage requirement of a system.7805, a voltage regulator integrated circuit (IC) is a member of 78xx series of fixed linear voltage regulator ICs used to maintain such fluctuations. The xx in 78xx indicates the fixed output voltage it provides. IC 7805 provides +5 volts regulated power supply.

Let us assume a condition when a simple light emitting diode can take a max of 3V to the max, if the voltage input exceeds 3V the diode will burn out. This is also common with all electronic components like, led's, capacitors, diodes etc. The slightest increase in voltage may result in the failure of entire system by damaging the other components too. For avoiding Damage in such situations voltage regulator are used for regulated power supply.Voltage sources in a circuit may have fluctuations resulting in not giving fixed voltage outputs. Let's look into some of the basic ratings to get an overview.

3.2.4 **Block diagram**:

Fig 3.5: block diagram of stage -1

3.2.5 . Description of the block diagram:

In this block diagram the output of stage-2 analysis will be input for the next block (circuit). For the circuit if the input value is below 5v then output will be zero. As the input value is greater than 5v then output also increasing. When the input value is 7v to the circuit then we get appropriate output i.e.5v.In stage-2 analysis fan blades are directly connected to the compound gear system i.e. large gear with help of a shaft and 2 jewel bearings are placed in between the large gear and fan blades because bearings will rotate the shaft and very less amount of friction will be present to reduce the small amount of friction we use jewel type of bearings.In jewel bearings jewel type of material will be placed in between stationary and moving parts. And a small gear will be placed compound to a large gear and one end will be fixed to the shaft of the dynamo. The output of the dynamo is directly given to one end of the USB cable. The other end of the USB will be connected to the phone. The complete arrangement will be fixed on the wooden piece with the help of clamps and glue. The wooden piece will be fixed on the bike. When we started travelling at below 30km/hr. speed the rotation of fan will be failed. The fan rotations will started at the speed of (35-40) km\hr. if we increase the speed of the bike automatically the speed of the fan blades and rotations of the fan blades will be increased.

Table 3.3 : Speed VS voltage:

In stage-1 analysis we will get exactly 5v at 65km\hr speed. By that while we are travelling the mobile charging takes place. Not only in bikes but also we can keep this set up in buses, cars, cycles etc.

Table 3.3: Speed vs Voltage

Speed(Km/hr)	Voltage(volts)
45	**1.5v**
50	**2.0v**
55	**3.6v**
60	**4.5v**
65	**5v**

3.2.6. Stage -2 Analysis:
The main drawback in stage -1 analysis is we are getting output at 60km\hr. speed. To reduce the speed and to increase the output efficiency we are going to stage -2 analysis. In stage -2 analysis we are placing two set ups and
the output of one set up will be connected either in series or parallel to another setup.

3.2.7. Series connection:
The output of one dynamo is connected in series with output of other dynamo. With simple series circuit, all components are connected end-to-end to form only one path for electrons to flow.

Advantages:
- Voltage drops add to equal total voltage
- All components share the same (equal) current.

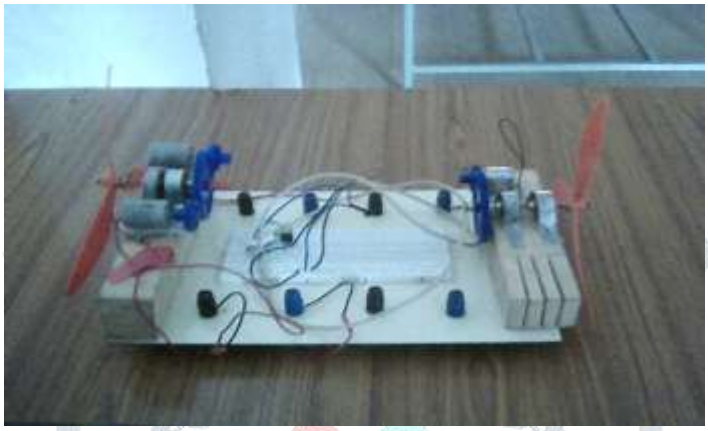

Fig 3.6:Serial connection set up

When the fan blades are rotating the output will be generated from the dynamo. The outputs from two dynamos are connected in series. When they are connected in series the voltage drop will be more and we don't get efficient output. So we go to parallel connection.

3.2.8. Parallel connection:
The output of one dynamo is connected in parallel with output of other dynamo. With simple parallel connection, all components are connected between the same two sets of electrically common points, creating multiple paths for electrons to flow from one end of the battery to the other.
Advantages:-
- All components share the same (equal) voltage
- Branch currents add to equal total current.

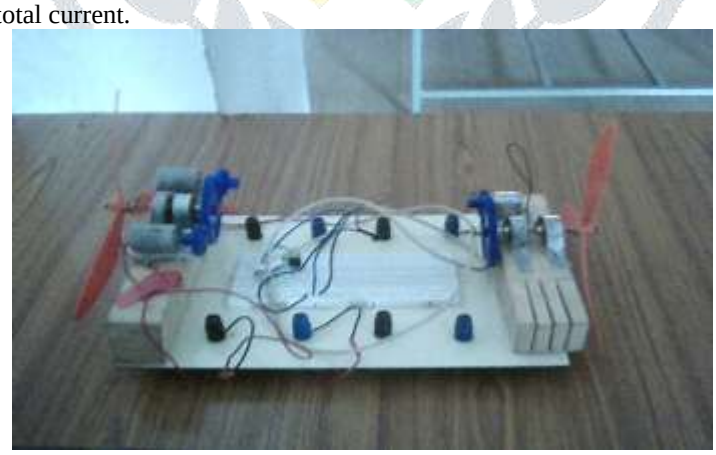

Fig: 3.7 parallel connection

When the fan blades are rotating the output will be generated from the dynamo. The outputs from the two dynamos are connected in parallel. When they are connected in parallel we will get output at less speed when compared to stage -1 Here, we are getting output at 51 km\hr.speed.

Table 3.4: Speed VS Voltage:

Speed of the bike(km/hr)	Output voltage(volts)	Speed of the fan blade(rpm)
35	1.5v	296.8
40	2.8v	416
45	4.1v	788

50	5	1023

4.CONCLUSION

The fossil fuels are highly polluting and cannot form a completely sustainable society. The renewable energy sources do have the potential to provide significant amount of energy to meet requirement of increasing demand. Wind energy is the growing energy source in the world. Wind energy does not harmful to environment. Wind battery charger has been implemented to charge the mobile phone or battery while travelling .This technology can help to meet the emergency power requirement. The above design uses this wind energy and converts it into useable power, which can be directly feed into the mobile phone .To accommodate the frequent change in the wind direction, a joint has been given in it allowing it to rotate in any direction. It can be completely disassembled ;thereby making it lighter in weight and portable, fulfilling its basic function of being a travel charger battery gets charged and provides an added advantage. The intension of this project is to make travel hassle free and minimize dependency on regular power supply for charging gadgets. Though there are certain challenges need to overcome. The maximum voltage generated by model at the speed of 60km/hr is 7.8volt. The generated electricity can be used for different applications

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