

Mechanical and Electrical mobile charger

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ABSTRACT

This paper, proposes a novel type of mechanical and electrical mobile charger has been designed. A new type of mobile charger has been designed to charge the mobile phone while traveling from one place to another place. It is a combination of 3 mobile chargers which works using wind power, human power and electrical power. Any one of these power sources can be used to charge the mobile phone based on the need. This kind of mobile charger is similar to normal chargers but it can be used to charge while travelling using wind turbines and can be used for instant charging using Geared DC Generator. This mobile charger is better than normal mobile charger as it uses renewable energy source such as wind power and human power.

Keywords - Geared DC Generator, mechanical, electrical, mobile phone, wind turbines.

I. INTRODUCTION

Mobile phone plays an important role in communication. The growth of mobile phone market is phenomenal in recent years and the need for charging the mobile battery is required anytime and anywhere. It becomes very difficult to charge the mobile phone while travelling from one place to another and when current supply is not available while in the home, office etc. This paper targets on the transformation of mechanical energy into electrical energy to charge the mobile phone using DC Generator. Wind powered mobile charger [1] converts wind energy into electrical energy using wind turbines. The generation of current increases as the speed of the vehicle increases. In human powered mobile charger connecting it to, current is obtained by rotating the wheel of geared DC Generator [2]. This kind of mobile charger is used when the power supply is not available at home or office etc. Consistent 5 volts is obtained by a 7805 IC. Different mobiles such as Samsung, Nokia, LG, Micromax, HTC, Black Berry can be charged by using this charger. By this concept we can charge the mobile at any time by using Human powered mobile charger, while travelling using wind powered mobile charger [1]. When the power is available mobile can be charged using 220 V supply using Electrical charger. We can choose power source for mobile charger based on our need. If we want to charge the mobile using wind energy we can disconnect and remove other power sources.

II. OPERATION

2.1 DC Generator

Generator is used to convert mechanical energy to electrical energy. Generator used is a permanent magnet geared dc motor. The stator consists of two magnets aligned with opposite poles facing each other and the rotor consists of three coils. When the shaft of the motor rotates, there is a relative motion between the permanent magnets and the coils which generates ac current in the coil [8]. The flux associated with the coil is radial in nature. Commutator is used as a mechanical rectifier to convert AC current to DC current. The output of generator is 12v at 435 RPM.

2.2 Regulator

7805 regulator IC gives constant output of 5 volts. A capacitor of 1000mfd/25V is used for filtering purpose to get pure dc voltage. All the regulators in the 78 series will deliver a maximum current of 100 mA provided the input-output voltage differential does not exceed 7V. Otherwise excessive power dissipation will result and the thermal shutdown will operate. To obtain the rated output voltages at a current up to 100 mA are given in table 1, together with suitable values for the reservoir capacitor C1. The capacitance/voltage product of these capacitor are chosen so that any one of them will fit the printed circuit board without difficulty.

Table 1: power requirements

V in	V out	Type	I _{max}	C1
5-12 V	5V	7805 IC	100 mA	1000mfd/25V

2.3 Charging requirements of mobile phones

Table 2: charging requirements of mobile phones

SL.NO.	Mobile company Name	Max. charging voltage(V)	Max. charging current (mA)
1	Samsung	5	3400
2	Sony Ericson	4.8	900
3	Nokia	4.8	1500
4	LG	5	2100
5	Micromax	3.7	1200
6	HTC	5	1800
7	Black Berry	5	1300

III. PROPOSED BLOCK DIAGRAM

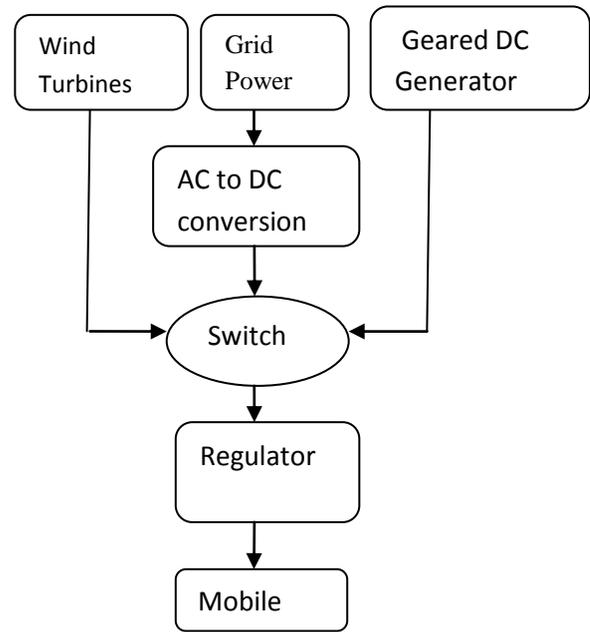


Figure 1: Proposed Block diagram

IV. PROPOSED CIRCUIT DIAGRAM

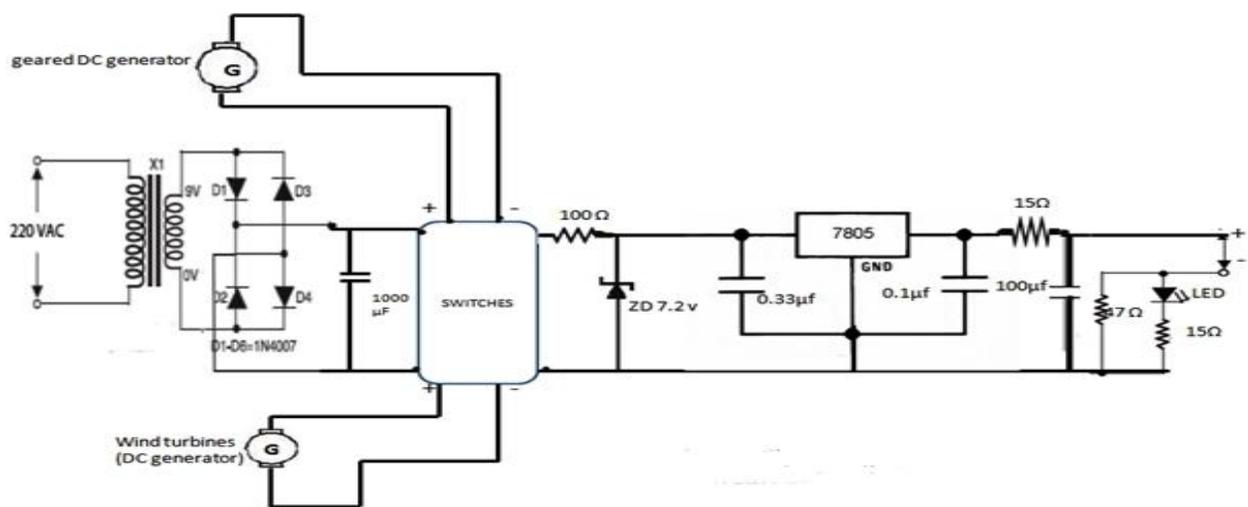


Figure 2: circuit diagram

4.1 Working of wind powered mobile charger

Wind powered mobile charger is used to charge the mobile while travelling. Wind turbine is placed in such a way that it rotates due to wind. DC generator converts mechanical energy (rotational motion) into electrical energy. DC generator which we used is 1200 rpm. Its maximum voltage is 12 volts. As the speed of the vehicle increases voltage generation also increases.

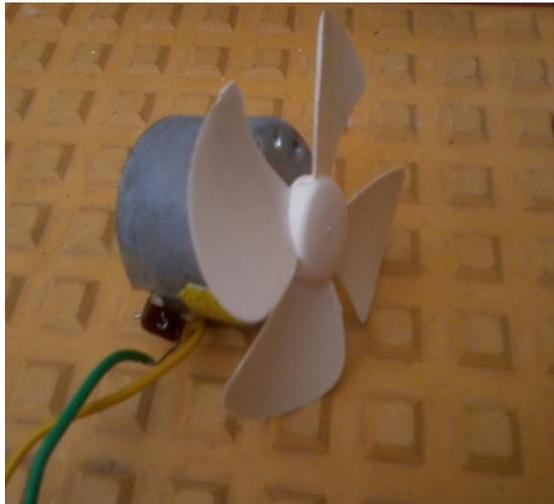


Figure 3: Wind Turbine

Table 3: Speed and Voltage generated relation

Speed	Voltage generated
10 kmph	1.2 volts
30 kmph	3.8 volts
40 kmph	5.3 volts
50 kmph	6.4 volts
60 kmph	7.5 volts
70 kmph	8.4 volts

On an average mobile will start charging around 40 kmph. Consistent output of 5 volts is obtained by using IC 7805 [4]. By using this we can charge the mobile while travelling in train, bus, bike etc.

4.2 Human powered mobile charger

In human powered mobile charger by rotating the wheel of geared DC Generator current is produced to charge the mobile phone. Geared DC Generator is an extension to DC Generator. It has a gear assembly attached to DC Generator. The speed of generator is counted in terms of rotations of shaft per minute and is termed as RPM. The assembly helps in increasing torque and reducing the speed of wheel. With less number of rotations more current is obtained using gears.



Figure 4: Geared DC Generator

The gear assembly is set up on two metallic cylinders whose working can be called as similar to that of an axle. A total of three gears combine on these two cylinders to form the bottom gear assembly out of which two gears share the same axle while one gear comes in between them and takes a separate axle. The gears are basically in form of a small sprocket but since they are not connected by a chain, they can be termed as duplex gears in terms of a second cog arrangement coaxially over the base. Among the three gears, two are exactly same while the third one is bigger in terms of the number of teeth at the upper layer of the duplex gear. The third gear is connected to the gear at the upper portion of the gear head.

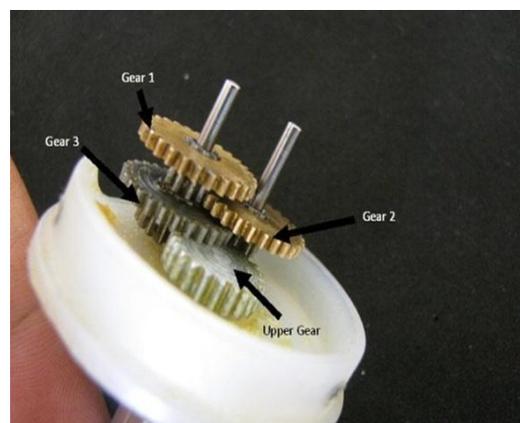


Figure 5: Gears internal structure

4.3 Working of Electrical mobile charger

In this 220 V current supply is used as power source. 220 volts AC is converted into 9 volts AC by using step down transformer. Bridge rectifier is used to convert AC to pulsating DC. A 1000 µf/25 volts is connected in parallel to the bridge rectifier for filtering purpose. IC 7805 voltage Regulator gives consistent 5volts output.

V. RESULTS AND DISCUSSIONS

By using normal mobile charger we can charge the mobile using grid power supply only, by using Mechanical and electrical charger we can add extra features to the normal mobile charger.

Table 4: Comparison of various chargers

Type	Wind powered mobile charger	Human powered mobile charger	Electrical mobile charger
Type of power source	Wind turbines	Geared DC Generator	220V supply
Type of generator	DC generator 435 RPM	DC Generator 100 RPM	none
Input voltage	5-12Volts	5-12volts	9volts
Output voltage	5 volts	5 volts	5 volts
Type of energy used	Wind energy	Mechanica -l energy	Electrical energy
Type of usage	While travelling	Any where	At home, office, etc

Output of 5 volts is obtained in all 3 kinds of charger. Wind powered mobile charger can be used only while travelling. Human powered mobile charger can be used to charge the mobile anywhere. Electrical mobile charger can be used when Grid Power supply is available.

By using normal mobile charger we can charge the mobile using grid power supply only, by using Mechanical and electrical charger we can add extra features to the normal mobile charger. Output of 5 volts is obtained in all 3 kinds of charger. Wind powered mobile charger can be used only while travelling. Human powered mobile charger can be used to charge the mobile anywhere. Electrical mobile charger can be used when Grid Power supply is available.

VI. CONCLUSION AND FUTURE SCOPE

In this paper a novel method of charging mobile batteries of different manufacturers using wind power, human power and electrical power has been designed for travelers, rural and remote areas where the current supply is not available all the time. This paper is very useful in today's life because now days the necessity of communication is very important. Wind powered mobile charger is very useful when we are going for long travel.

Future work focuses on decreasing the size of Geared DC Generator and to increase the efficiency of wind turbines. This mobile charger is better than normal mobile charger because it has more features.

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