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Wind and Solar Mobile Charger

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Abstract: Charging of mobile phone is a big problem when travelling a long distance journey or where power supply is not available. This paper proposes a universal mobile charger which can work on wind as well as solar energy. This charger is highly efficient and very economical as it uses non conventional energy sources of power.

Keywords: Universal mobile charger, economical mobile charger, mobile charger, mobile phones.

I. INTRODUCTION

During travelling, charging of mobile phone is a big problem as power supply source is not generally accessible. Traveling Chargers for Mobile Phones, iPods and MP3 players are available but they are expensive and need separate models for charging at home and in the car. So, a mobile charger using wind and solar energy is proposed. In the proposed work, wind energy is used to get 6 V with the help of generator and solar energy is used to 8 V with the help of solar panel. The proposed charger will solve the problem of mobile charging during traveling, power cut and non availability of power at remote areas.

II. COMPONENTS DESCRIPTION

A. Solar Panel

A solar cell is a solid state electrical device that converts the energy of light directly into electricity by the photovoltaic effect Assemblies of cells used to make solar modules which are used to capture energy from sunlight, are known as solar panels [1].

Fig.1 Solar Panel

PV systems burn no fuel and have no moving parts hence, they are clean and silent and producing no atmospheric emissions of greenhouse gases.
In the proposed work, the solar panel generates different voltage in different time.

In summer weather

Time	Voltage (V)
Morning	9
Mid-day	10.5
Evening	8

In winter weather

Time	Voltage (V)
Morning	8.5
Mid-day	10
Evening	7

B. Dynamo

A dynamo is an electrical generator that produces direct current with the use of a commutator. The word dynamo (from the Greek word dynamics; meaning power) was originally another replacement for the word generator.

A small electrical generator built into the hub of a bicycle wheel to power lights is called a hub dynamo, although these are invariably AC devices and are actually magnetos [2].

Fig.2 Dynamo

In the proposed work, dynamo generates different voltage in different rotation as shown in Table III.

TABLE III

Rotation Per Minutes (RPM)	Voltage (V)
380	10.5
340	9.5
280	8

C. Voltage Regulator IC

Member of 78xx series of fixed linear voltage regulator ICs are used to maintain the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage. 7805 provides +5V regulated power supply. Capacitor of suitable values can be connected at input and output pins depending upon the respective voltage levels [3]. Pin description is shown in Table IV.

TABLE IV

Pin No	Name	Function
1	Input voltage (5-18V)	Input
2	Ground (0V)	Ground
3	Regulated output; 5V	Output

D. Battery

An electric battery is a device consisting of one or more electrochemical cells that convert stored chemical energy into electrical energy. Each battery consists of a negative electrode material, a positive electrode material, an electrolyte that allows ions to move between the electrodes, and terminals that allow current to flow out of the battery to perform work [4].

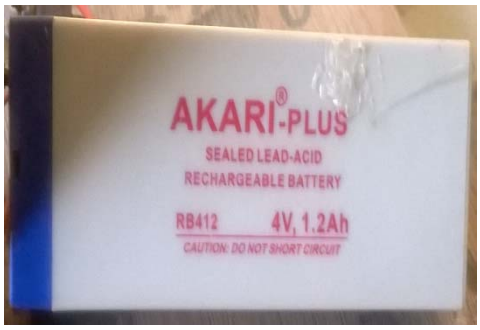


Fig.3 Battery

Primary batteries also called single-use or disposable are used once and discarded i.e. the electrode materials are irreversibly changed during discharge. Common examples are the alkaline battery used for flashlights and a multitude of portable devices.

Secondary (rechargeable batteries) can be discharged and recharged multiple times i.e. the original composition of the electrodes can be restored by reverse current. Examples include the lead-acid batteries used in vehicles and lithium ion batteries used for portable electronics [4].

E. Diode

A diode is a two-terminal electronic component with asymmetric conductance which means it has low (ideally zero) resistance to current flow in one direction, and high (ideally infinite) resistance in the other [5].

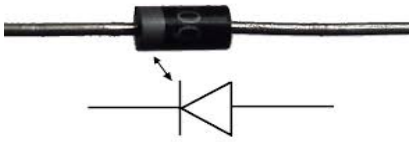


Fig.4 Diode

F. Resistor

The electrical resistance of an electrical conductor is the opposition to the passage of an electric current through that conductor. An object of uniform cross section has a resistance proportional to its resistivity and length and inversely proportional to its cross-sectional area. All materials show some resistance, except for superconductors, which have a resistance of zero [6].

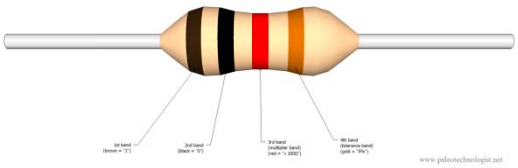


Fig.5 Resistor

G. Wind Fan

A wind turbine is device that converts kinetic energy from the wind into electrical power. A wind turbine used for charging batteries may be referred to as a wind charger [7]..

H. Wire

Wires are used for the connections of the elements.

I. Wood Stand

It is used to support project components.

J. LED

LED stand for Light Emitting Diode. LEDs allow the current to flow in one direction [8].

K. Charge controller

A charge controller limits the rate at which electric current is add to or down from electric batteries. It prevents over charging may protect against over voltage, which can reduce battery performance [9-10].
The circuit of charge controller is shown in fig. 6.

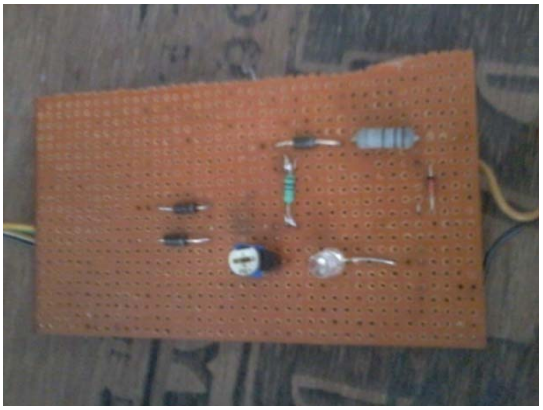


Fig. 6 Charge Controller

III. WORKING OF UNIVERSAL MOBILE CHARGER

We are charging batteries by connecting them to a wind-powered generator, consisting of fan blades, a rotor that picks up energy from the blades and accelerates it, and a motor which receives energy from the rotor and produces DC current.

When we use massive fans to generate electric power, we're relying on the motion of wind. In the simplest terms, the blades of the fans capture kinetic energy, or the energy of motion, from the movement of the wind. As the blades spin, the shaft attached to the blades also move. As the shaft spins, it creates rotational energy, and it transfers this energy over to a generator. A generator, in the case of a wind turbine, is simply a set of magnets that spin around a coiled wire. The magnets spinning around the wire create an electrical current and provide power. Here, we are using a 12 volt gear motor as generator.

Fig.7 Complete Diagram of Project

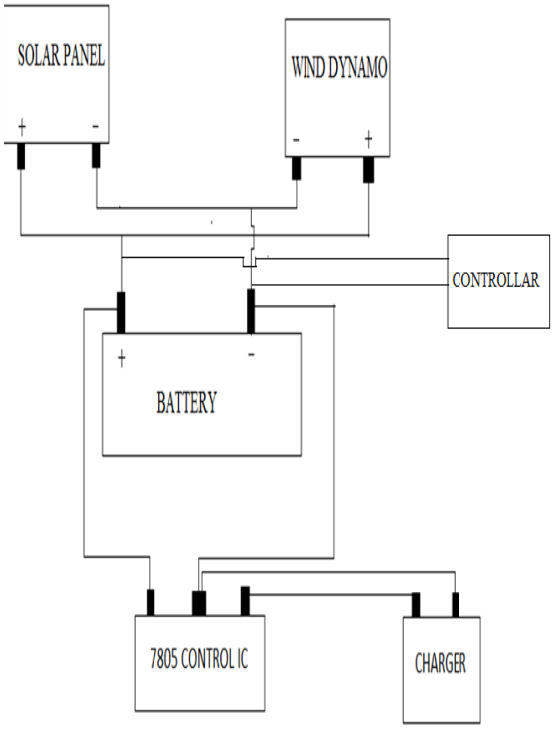
Phones have rechargeable batteries which are to be charged with a DC voltage. Here, wind energy is used to generate 9v, by the rotation of generator shaft to get 9 volts. This will pass through IC 7805 and voltage maintained at 5 V and current becomes 660 mA. Diode prevents high voltages so output voltage always will be 5 V.

Similarly, 5 watt, 12 V solar panel is used as the source of current This solar panel converts the light energy in to electrical energy. When the sunlight is maximum, the solar module can generate around 16.5 volts at 400 mA. This current is used to charge the battery. Here, 7805 voltage regulator IC act as a step down converter. That is 12V is step down to 5V. This voltage is used for charging the phone.

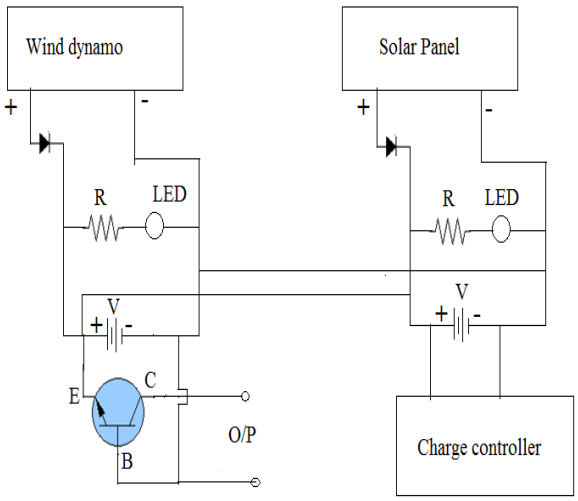
A LED glows when power is available at the mobile charger. Maximum current output is 660mA, more than adequate to run any charger-powered accessory. Since the Universal Serial Bus specification provides for a five-volt power supply, it is possible to use a as a power source for recharging batteries. Output is taken across the cable. This is given to mobile phone.

Fig.8 Front view of project

IV. BLOCK DIAGRAM COMPLETE PROJECT



V. PROJECT CIRCUIT DIAGRAM



VI. CONCLUSION

In this paper, wind and solar hybrid systems have been designed for travelers and remote areas where electricity is not easily available. Since, this charger is based on non conventional source of energy and hence, the running cost of this charger is very low.

VIII. REFERENCES

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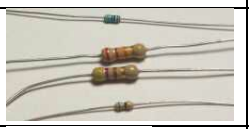
LIST OF PROJECT COMPONENTS

S. No.	COMPONENTS	QUANTITY	RATING	USE	IMAGE
1	Solar panel	1	8 V	Convert into solar energy to Electrical energy	
2	Dynamo	1	500RPM	Convert into wind energy to Electrical energy	
3	Battery	2	4 V, 1.5 ohm	Charge stored to DC Power	
4	IC	1	7805	Voltage regulation	
5	Diode	2	4007	Convert some AC Power to DC	
6	Resistance	2	220 ohm	Protection of LED	
7	Wind fan	1	-	Rotate to dynamo	
8	LED	2	-	Check to solar and wind power	
9	Wood stand	1	-	Manage to all component	