A Review on Solar Powered Lawnmower with Mobile Charging

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ABSTRACT *Now a days the utilization of non-renewable energy leads to environmental, noise pollution and exhausted. The alternate source of energy is solar energy. The present work determines the applications of solar energy into lawn mower, which is used to cutting the grass. It is also operated by electrical energy when solar energy not available by maintain a battery. During the carried of work the mobile phone also charged by charging option. It can be used to keep the lawn in gardens, school, colleges etc. with good finishing.*

Keywords: *Solar Panel, 12v Battery, Relay, Stepdown Transformer, D.C Motor, Blades, Adaptor.*

I. INTRODUCTION

The objective of the present work is to design the lawn mower which operates on solar energy and avoids the drawback of old lawn mowers. The past technology of grass cutting is manually operated by the use of hand devices like scissor, these results into more human effort and more time required accomplishing the work and in old methods lack of uniformity of the remaining grass. The purpose is to avoid energy crisis in India and reduces the human efforts, operating cost and maintenance cost. Also solar based grass cutter keeps the environment clean and healthy. The whole machine operates on the solar energy.

Table: Capacities of different components

Component	Voltage(in volts)	Current(in amps)
Motor	12	0.2
Battery	12	7.5
Solar panel(32W)	12	6.5

II Methodology and hardware description

In the present work the device which is able to perform the task is based on solar energy .The system depending on the charging circuit the motor can be controlled using relay switch. The solar energy stored in the battery and then runs the motor through the relay switch. The motor is continuously functioning still energy supplied from the battery.

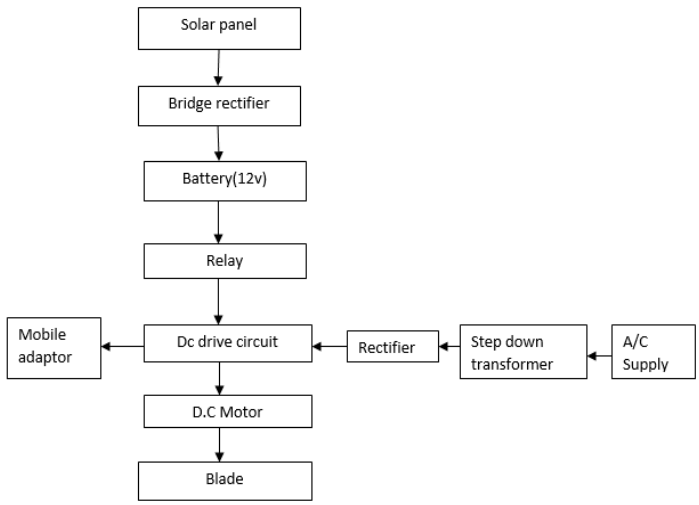

Fig 2.1: Block diagram of solar powered lawn mower with mobile charging

The various components comprises of present work are explained below:

2.1 Components

Solar Panel

A solar cell or photovoltaic cell is a device that converts solar energy into electricity by the photovoltaic effect. Sometimes the term solar cell is reserved for devices intended specifically to capture energy from sunlight, while the term photovoltaic cell is used when the source is unspecified. Assemblies of cells are used to make solar panel, solar modules, or photovoltaic arrays. Photovoltaic is the field of technology and research related to the application of solar cells for solar energy. Here the panel capacity is 32W

Fig 2.1.1: Solar Pane

Relay

Relay is an electromagnetic switch. It consists of a coil of wire surrounding a soft iron core, an iron yoke, which provides a low reluctance path for magnetic flux, a movable iron armature, and a set, or sets, of contacts; two in the relay pictured. The armature is hinged to the yoke and mechanically linked to a moving contact or contacts. When an electric current is passed through the coil, the resulting magnetic field attracts the armature and the consequent movement of the movable contact or contacts either makes or breaks a connection with a fixed contact.

12v D.C Battery

A rechargeable battery is used to run the system and it comprises of one or more electrochemical cells, and this type of batteries come in different shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. Several different combinations of chemicals are commonly used. but at present work lead–acid battery is used. Voltage: 12v, current: 7.5amp.

Fig 2.1.2: 12v D.C battery

D.C Motor

A DC motor uses electrical energy to produce mechanical energy through the interaction of magnetic field and current-carrying conductors. Main frame is constructed with one inch square tube of metal mild steel with certain dimensions as per specified, with length of 460mm, width 410mm and height 140mm.

Fig 2.1.3: D.C motor

The reverse process, producing electrical energy from mechanical energy is accomplished by an alternator, generator or dynamo. Many types of electric motors can be run as generators, and vice versa. The input of a DC motor is current/voltage and its output is torque (speed).

Voltage:12v, current:0.2am.

Blade

The blades have a length of 150mm and thickness 3mm. They are welded as pillars, which will give the support for the surface of the platform with lever arrangement. At the bottom of the platform a lever is attached. Hence when a pressure is applied on the surface of the platform it supports strongly because of the welding.

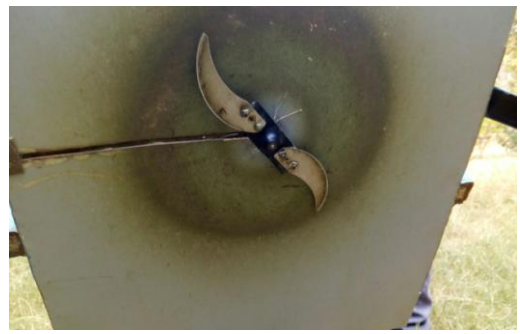

Fig 2.1.4: cutting blade

2.2 Working principle

Coming to the working of solar powered grass cutter, it has panel mounted in a particular arrangement in such a way that it can receive solar radiation with high intensity easily from the sun. This solar panel convert solar energy into electrical energy as studied earlier. Now this electrical energy is stored in battery by using a solar charger. The motor is connected to the battery through connecting wires. Between these a motor driver is provided. It starts and stops the working of the motor. From this motor, the power transmits to the mechanism and this makes the blade to rotate with high speed and this makes to cut the grass.

III Fabrication

In the present work gas welding is performed to join the hollow type, rectangular iron rods.

Four 42 cm, five 35 cm, four 17 cm and two 72 cm rods are separated by fitting tools. The all rods are assembled as per requirement design. 100mm diameter and 120mm height of four plastic wheel are arranged as a front and rare wheels to the design. The motor bed is constructed with grey cast iron sheet with specified dimensions as length 30 cm and breadth 35cm.

Motor is placed at centre of rectangular field clamped with two bolts with a fixture of rubber. Motor bed is attached to main frame with bolts and nuts which is adjustable with respect to height. The wooden board with specifications of 20cm×36cm is placed at the top of main frame and which consists of electronic components, circuits and battery. The solar panel is positioned on the wooden board and attached to the frames by the means of plastic strips.One meter long wire is used to connect the solar panel and bridge rectifier so the electric energy generated at the solar cells are freely transmitted to bridge rectifier.

After the fabrication is completed the equipment is painted to resist the corrosion, so the final fabricated lawn mower is as shown in the figure.

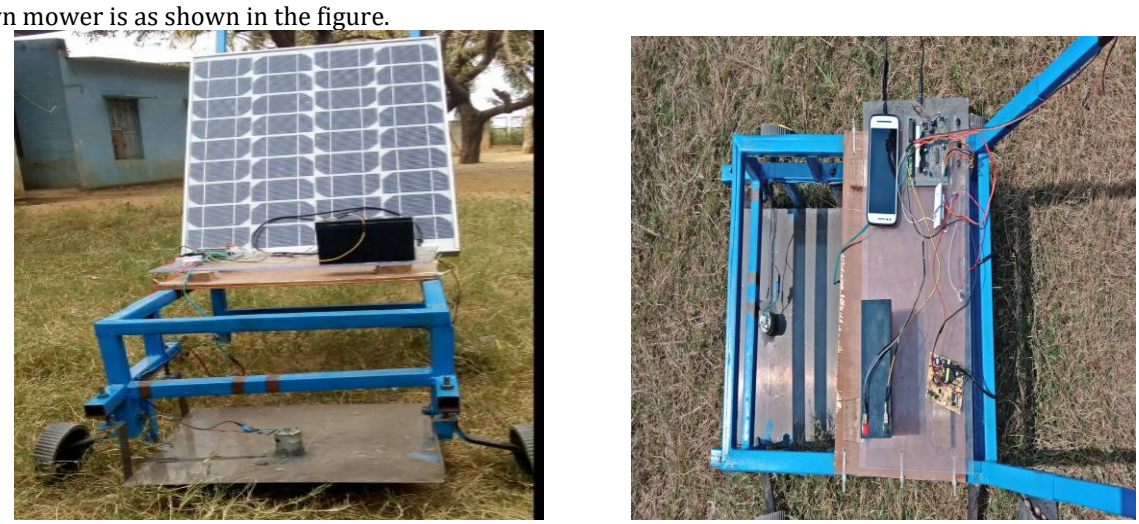

Fig 3: Solar powered lawn mower with mobile charging

IV CONCLUSION

After implementation of all the hardware components used have been developed in solar powered gross cutter the following conclusions are drawn.

1. It can be worked by solar power as well as electrical power, when solar energy is not available in raining season.
2. During the working of gross cutter the operator can also charge his mobile phone.

Future work:

It can be further extended to higher power rating and used for agriculture applications such as paddy, wheat and maize crops cutting purpose.

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Simplicity is the key to brilliance.

~ Bruce Lee