

Low Power Solar Tree

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Abstract— Renewable energy plays a major role in today's energy sector. Among many renewable energy sources available, solar energy plays the major role and it can be utilized as efficient as it can be. In this work a low power solar tree has been designed in order to extract maximum power from the natural energy for charging applications. Extraction of power is done using a stepper motor which turns based on time period so that the whole solar power is utilized. It's a tree shaped structure where the stems connected act as branches and solar panels are like leaves. The paper describes a solution along with technical specifications and its operation

Index Terms—Renewable energy, solar tree

I. INTRODUCTION

Solar tree is a metallic construction that resembles like a real tree. Solar panels are placed on the top of branches. The energy generated from it can be used to charge mobile phones, laptops, tablets and other low power electronic devices. Its very attractive and modern design which can be used in college campus, where students will also be benefited by using this free resource. Solar tree also promotes the use of energy efficient technologies like solar street lights.

Solar tree is an autonomous photovoltaic system. It is designed with a long stem that are illuminated by sunlight and produce the maximum voltage. The generated voltage can be stored in batteries and also can be used for the applications. The total energy produced from the system is completely free of cost; rather we have to change batteries when necessary.

II. BLOCK DIAGRAM

The solar power falls on the module and that extracted power is given to the charge controller which is stored in the battery. Based on the applications DC can be directly used for charging mobiles and electronic appliances or it can be inverted using an inverter for the usage of AC loads. The purpose of charge controller is to regulate the flow of electricity from the module to the battery. Its also used in order to prevent overcharging and over discharging of the battery. The application will be varied based on ON grid and OFF

grid. Inverters are used to convert DC to AC. This type of designs can be implemented in public places where many common people meet.

III. TECHNICAL SPECIFICATIONS

Equipment	Specifications
Panel	<ul style="list-style-type: none"> Dimension:80x40mm Output current 500Ma Output voltage: 6V
Battery	<ul style="list-style-type: none"> 12V EOD:10.5v to 10.8V
Servo motor	<ul style="list-style-type: none"> Rated Voltage : 220V Rated output power : 1.5KW Shaft type :Key way Rated current: 8.3A Vibration grade:15 μm Motor frame size: 130mm
Cables	<ul style="list-style-type: none"> 2x4mm Safety fuse
Others	<ul style="list-style-type: none"> Installation of wifi hotspot LED

Table 1: Specification of the equipments used

The above mentioned are the technical specifications of the components used in the solar tree system. With these components a low cost solar power generation and panel monitoring system has been developed. The system measures the voltage and current of the solar panel and stores in battery.

IV. HARDWARE DESCRIPTION



Fig1: Hardware circuit

The above mentioned is the hardware circuit for the project. The structure shows that it has eight branches where eight solar panels have been connected, where one solar panel can produce an output voltage of 6V, and an output current of 1A. By connecting all the 8 panels the total output generated was 38V and output current was 1A. But the estimated output voltage was 48V and losses in wire are considered to be 10V. Using stepper motor rotation is also done based on the timing. Without rotation if its placed on the same side the efficiency may not be met and power extraction will also be very low. So the early morning solar power is tracked and the stepper motor is fixed to rotate the solar tree 360 degrees so that more power can be tracked from the solar every day. If its excess also it can be stored in the battery for the future purpose.

In Fig 2. The output voltage from the controller is shown.



Fig.2: Output Voltage

V. CONCLUSION

Renewable energy sources, more precisely the solar energy can be utilized for the projects which generate power that is useful for the public places. Our community does not value the use of renewable sources of energy. This project has been planned in order to communicate to the society that we can utilize our sources usefully. In future the exact work is to be transferred to the society for the charging purpose.

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