

# Solar Umbrella Charger

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**Abstract**—Solar energy is the energy produced with the help of sunlight and is a renewable source of energy. It is completely free of cost as it is obtained from nature. Today as everything is working on electricity, we need alternative sources of energy. An alternative source of energy is required to replace the current source of energy which is obtained from the burning of coal. Solar energy also helps in decreasing air pollution which is caused due to burning of fuel, etc. Solar energy is a good alternative to energy as it is free of cost and is a renewable source of energy.

## I. INTRODUCTION

Solar Charger Umbrella is a solar project which is installed in public places such as public parks, colleges, schools, cafes, gardens, societies, etc. Our project will have the capacity to charge at least 2 laptops and 2 mobile phones simultaneously. Firstly, solar panels will convert solar energy to DC Electrical energy. Rechargeable batteries will store the energy and then supply the energy to the output in absence of solar energy that is in the nighttime. We will connect smart electronics which will balance production and consumed energy. Energy conservation is a need today. Everything is digital now. The use of mobiles and laptops is at its peak. In colleges students are finding sockets for charging, so we have created this project which will help students as well as people in this area to charge their devices on solar energy.

## II. METHODOLOGY

Solar umbrella charger is a project which will convert solar energy to electrical energy. The sunlight will be absorbed by the solar panel and will produce electricity. Then the produced DC will be stored in the battery going through the solar inverter. The solar inverter will convert DC electricity into AC electricity and store it in into the battery. Now as the battery is charging, there will be output from the inverter where we can connect our load. The load consists of 4 5A sockets. In which we can connect 2 mobile phones and 2 laptops simultaneously. There will also be a light

bulb that will turn on at night so that students can read books while charging their devices.

## III. PROJECT GOALS

As we are seen there are many advancements in the solar electric field. Many new solar projects are built to convert electricity and solar electricity instead. In schools and colleges, there is a constant need for electronic devices. The use of electronic devices like mobile phones and laptops has increased due to online study methods and online education after the covid-19 pandemic school breaks. The use of a mobile phone is a necessity nowadays. So, we are building a project where students can come and charge their devices free of cost. Our charger will charge their phones with solar electricity and also save the electricity which the students will use to charge their phones instead of in the classrooms where the electricity supply comes from the power grid.

### Goals Related to Community

- Promote the use of solar energy.
- Encouragement of this idea which will improve the quality of life in the society
- Promote Renewable sources of energy.

## IV. CHARACTERISTICS AND DESIGN

It is a known fact by everyone that solar energy can be utilized. Sunlight falls on each surface daily. It is a renewable source of energy and is unlimited in nature. The only factor affecting solar energy production is the weather. Whether change determines the amount of energy produced. In summer the production is at its peak. As the sunlight is strong and the clouds are clear. In the monsoon season energy production is very low as the clouds are filled in the sky which blocks the sunlight necessary. In winter the production is more than in monsoon but less than in summer season. Taking all this into consideration we have created a 3d model on Solid Works Software. This help study more on our project and help us to create a hardware of it.

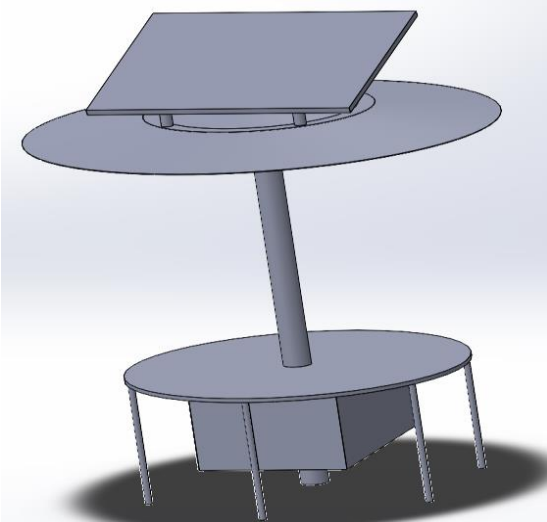


Fig:1 3D model of Solar Umbrella charger

We have considered our project suitable for all seasons. We have taken reference from a solar tree in our area which helps us in getting the perfect shape for our project and get the preferable direction that will collect maximum solar energy from the sun.

#### V. EQUIPMENT AND SPECIFICATIONS

Solar Umbrella consists-

- 1) Solar panel
- 2) Solar Inverter
- 3) Battery
- 4) MCB
- 5) Switches(output)
- 6) Wires
- 7) LED

<b>Panels:</b> 1 x 330W = 330W Voltage = 12V Open Circuit Voltage = 22V Short Circuit Current = 18A Weight = 23kg
<b>Batteries:</b> 1 x 150Ah V = 12V Energy Stored = 1.28KWh Efficiency = 98%
<b>Inverter:</b> 12V/500VA Output = 230V AC
<b>Cabling:</b> RYB x 30m; 4 sqmm Green x 30m; 2.5 sqmm
<b>Control Switchbox:</b> MCB = 6A Socket = 6A X 4
<b>Other:</b> LED = 2V

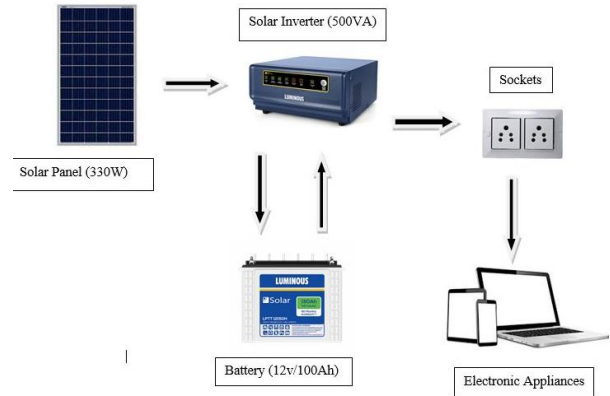


Fig:2 Block Diagram

#### VI. WORKING

**Solar Panel:** The solar panel is the solar Umbrella charger's primary component. It transforms solar power into electrical power. The solar panel produces an electrical current when sunlight strikes it, doing so by causing an electron flow. For best efficiency, the solar panel must be positioned where it receives the most sunshine.

**Battery:** The part that stores the electrical energy produced by the solar panel is the battery. It usually consists of a rechargeable battery with energy storage capabilities. The charging circuit and solar panel are both connected to the battery.

**Solar Inverter:** To make sure that electrical gadgets are charged safely, the charging circuit is in charge of controlling voltage and current. It attaches the battery to the gadget being used. The charge controller is inbuilt the solar inverter we are using in our project.

In our project, solar energy is produced using sunlight. The produced energy is converted into electrical energy and is stored in the battery.

Before getting stored in the battery, the DC power generated by the solar panel is controlled and stored in the battery.

Solar Inverter then further converts DC power to AC power and is given to the output.

The output we are using is through 6A sockets. We can charge 2 mobiles and 2 laptops from that socket.

#### VI. CONCLUSION

Portable electronic device chargers that use solar energy provide a dependable and sustainable source of power. A solar table charger has a straightforward design and construction, and it is

simple to mount on a table or stand. The experiments carried out for this study revealed that the type of gadget being charged and the weather have an impact on the solar table charger's efficiency. The solar Umbrella charger is a step towards environmentally friendly and sustainable charging options, albeit being less cost-effective than conventional charging techniques.

#### ACKNOWLEDGMENT

We would like to offer our sincere gratitude to everyone who helped make this investigation into solar table chargers a success. First of all, we would like to express our gratitude to our supervisor for offering advice and support during the course of the project. We are grateful for their insightful comments and recommendations, which helped us raise the caliber of our work. We also want to express our gratitude to the workers at the factory that makes solar panels for their technical support and assistance during the development of the solar table charger. We would like to express our gratitude to our friends and family for their moral support and encouragement during the course of the research. Finally, we would like to thank every participant.

#### REFERENCES

Here are some references that can be used for a research paper on solar Umbrella chargers:

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These references cover various aspects of solar Umbrella chargers, including design, implementation, and efficiency. They can provide a good starting point for further research and analysis on solar table chargers.