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Solar energy harnessing to charge laptop battery by desk solar panels

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Abstract:- *Solar panels are used for electricity production even for the supply of power, solar panels companies are making huge amount of money and people are getting benefits in reduction of electricity bills whether it is a water bill in the agriculture sector or residential savings or commercial apartment's savings. This paper focuses on connecting the desk solar panels to the laptop charging battery and even it may work with the window sunlight coming in the rooms. The size calculation of solar panels for charging laptop battery is demonstrated with the industry size constraints available in the market.*

Key Words: *charging circuit, conducting strip, PWM (Maximum power controller), bypass diode.*

1. INTRODUCTION:

The solar panel theory deals with band theory. From literature it is evident that the as the sunlight falls, the mixed radiation excites the conduction band and then the forbidden band and finally it will go the valence band and removes the free electron and sends the collectors of the panels. The problem solving model is shown in fig 1 and fig 2 shows the connection method where the anode of the solar panel is connected to anode of the laptop charger battery and cathode of the panel is connected to the cathode of the battery and charging is done by the desk solar panels. The size selection of the solar panel is important which is also calculated here.

2. MODEL STRUCTURE: The size selection of the solar panel is important which is calculated here.

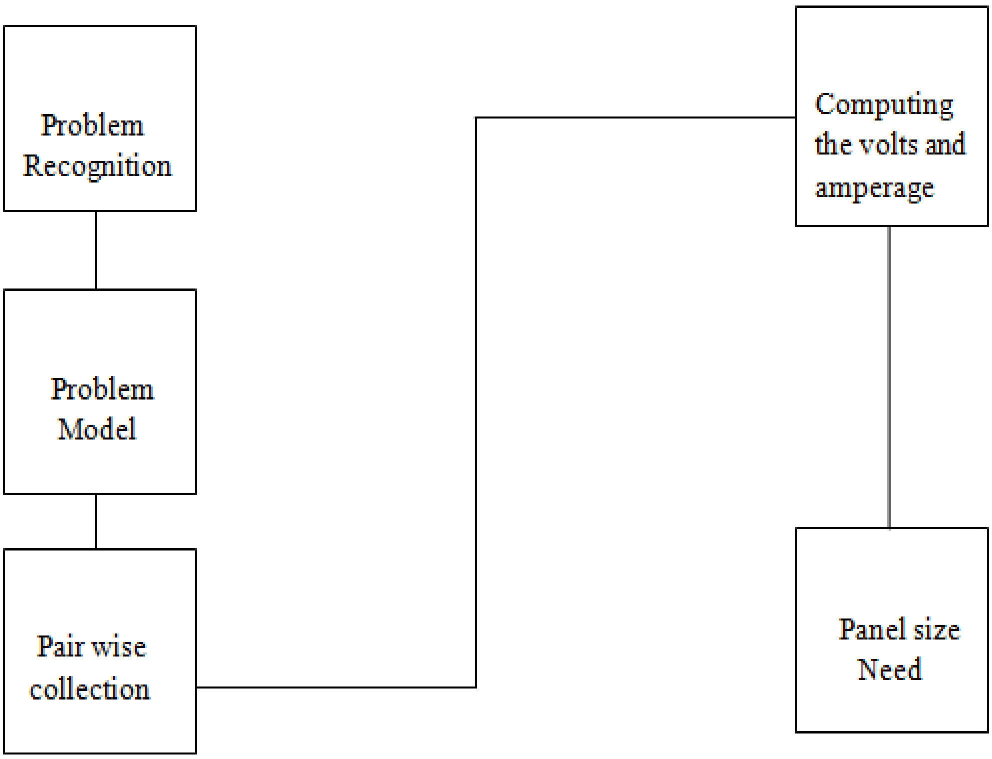

Fig 1. Model method

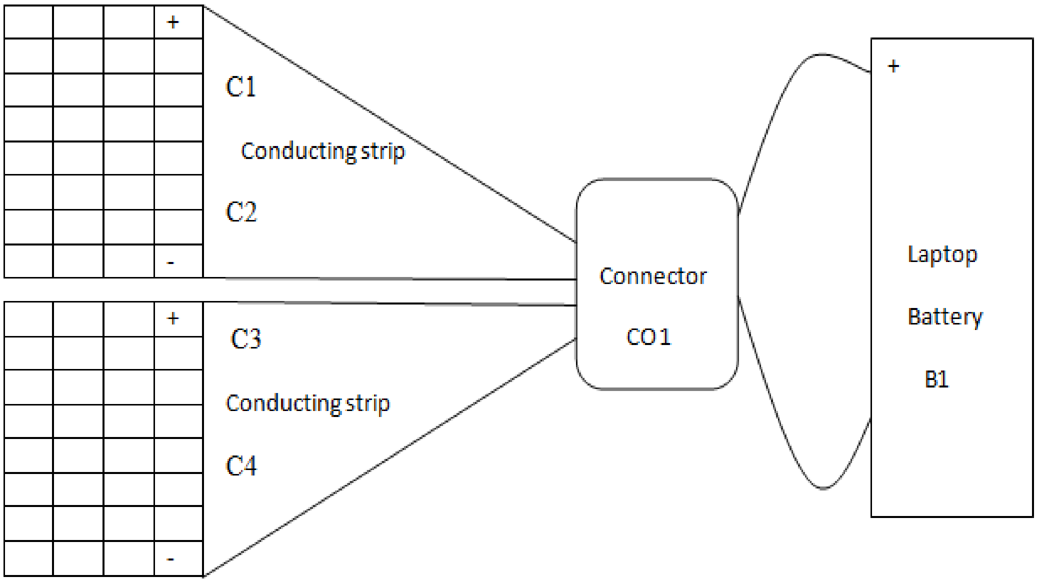

Fig-2 Desk solar panel charging circuit (C1, C2, C3 and C4 connected in the same manner with connector C01 to battery B1)

3. METHOD:

The above diagram shows a desktop solar panel circuit where the conducting strips, C1, C3, is connected from cathode of the panel to cathode of battery and strips C2, C4 is connected anode of panel to anode of battery through connector, in which the bypass diode is there which will direct the current in one direction.

4. CALCULATION:

Solar panel size-The normal battery size of a typical laptop is 40 Wh

Battery size = (Total watt hours/day used by appliance x Days of autonomy)/(0.85x0.6xNormal battery voltage)
= (40x0.3)/ (0.85x0.6x12) = 2 Ah

Now solar panel size = 40Wh x 3 office hours= 13.33 w
Let say 20% is the loss, this employs 13.33 x 0.20 =2.66 w
Therefore net wattage required =13.33-2.66 = 10.664 w
Thus three, 3 w panel sizes in solar panel required

Charge controller sizing:

Voltage level of the system=12v
Max Amperage = 2 Amperes, therefore the PWM controller should be used of 12 volt and 2 ampere

5. RESULT:

As there is a cost associated with the electrical grids and wires with the electrical energy, As the laptop battery is of 10v, then to charge the battery, three 3 watt small desktop panels needed which will perform the required application. The normal industry size of panels that are available in the market is 250 w and to charge a laptop battery, there is a need of producing the size by 83 times and portable desk solar panels on office windows will be fixed easily which is suffice for this application. The different collectors that may place alternatively inside the room shows the different collector efficiencies as the orientation of the panels are different. It is found that the collectors and shows the efficiencies as 18, 38, 20.5, 16.9 and 12% respectively which will not be affected in any case and verify the literature efficiencies.

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