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Solar PV Operated Circulating Air Cooler

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ABSTRACT

Solar power systems being considered as one of the path towards more sustainable energy systems, considering solar-cooling systems in villages would comprise of many attractive features. This technology can efficiently serve large latent loads and greatly improve indoor air quality by allowing more ventilation while tightly controlling humidity. Despite increasing performance and mandatory energy efficiency requirements, peak electricity demand is growing and there is currently no prevalent solar air cooling technology suited to residential application especially for villages, schools and offices. This project reviews solar powered air cooler for residential applications.

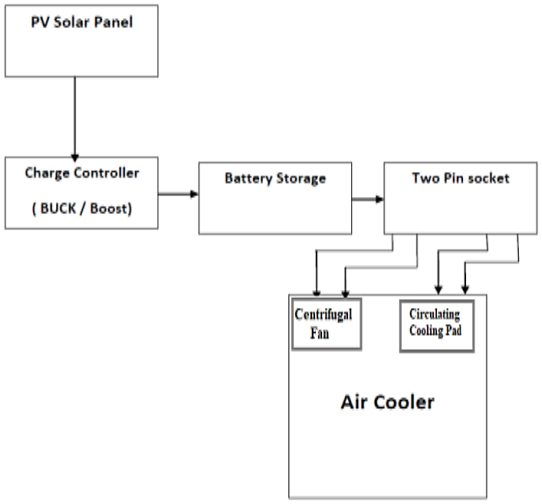
The development of renewable energy is on the rise worldwide because of the growing demand on energy, high oil prices, and concerns of environmental impacts. In recent years, progress on solar-powered air cooling has increased, nowadays it is observed that there are many accident which takes place due to shock from body of air cooler and it was analyzed that, problem occurs due to submerged water pump used in the traditional design of the cooler, so to overcome this problem we have introduce new design of cooling with circulatory arrangement in such a fashion that there is no need of water pump for air cooling.

Keywords : Circulating, Ventilation, Cooling.

I. INTRODUCTION

The demand of air cooling is increasing due to the effect of climate change and global warming if we still rely on the conventional electric air cooling but electricity is generated from fossil fuel,the green house gas emission would continuously worsen global warming ,in turn the demand of air cooling would be further increasing. In subtropical cities, air cooling is a standard provision for buildings. However ,air cooling would commonly take up half of building electricity consumption.

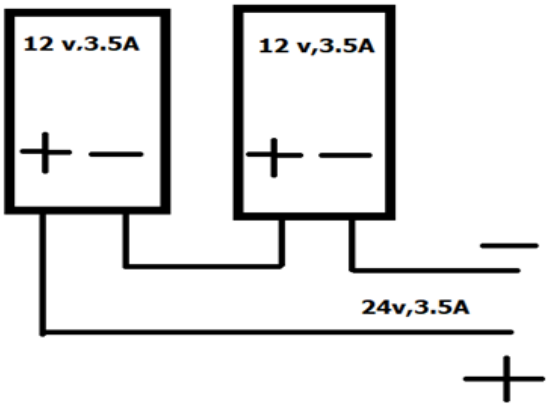
II. BLOCK DIAGRAM



III. SOLAR PANEL (PV)

Solar photo voltaic technology converts the sun energy into direct current electricity by using semiconductor material (silicon). The electrical charge is consolidated in the PV panel and directed to the output terminals to produce low voltage (Direct Current) - usually 6 to 24 volts. The most common output is intended for nominal 12 volts, with an effective output usually up to 17 volts. A 12 volt nominal output is the reference voltage, but the operating voltage can be 17 volts or higher much like your car alternator charges your 12 volt battery at well over 12 volts.

We are connecting two solar panel of 12 v and 3.5A in series .In output ,the voltage of both solar panel get added and the current is remain same .so we get desired output of 12 v with 3.5 A.



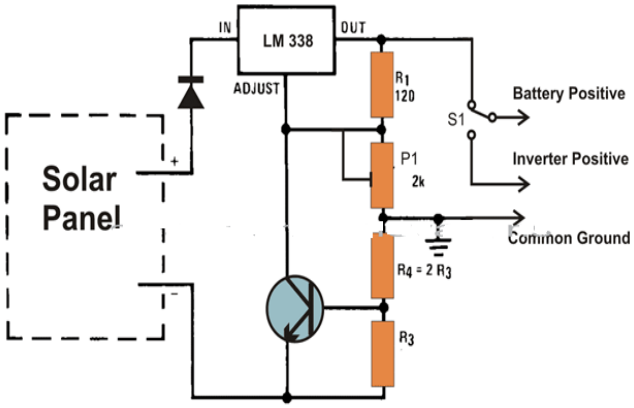
IV. CHARGE CONTROLLER

A solar charge controller is fundamentally a voltage or current controller to charge the battery and keep electric cells from overcharging. It directs the voltage and current hailing from the solar panels setting off to the electric cell. Generally, 12V boards/panels put out in the range of 16 to 20 V, so if there is no regulation the electric cells will damaged from overcharging. Generally, electric storage devices require around 14 to 14.5V to get completely charged. The solar charge controllers are available in all features, costs and sizes. The range of charge controller are from 4.5A and upto 60 to 80 A.

V: FUNCTION OF CHARGE CONTROLLER:

- Charges the battery.
- Gives an indication when battery is fully charged.
- Monitors the battery voltage and when it is minimum, cuts off the supply to the
- load switch to remove the load connection.
- In case of overload, the load switch is in off condition ensuring the load is cut off

VI :CIRCUIT USING LM 338 FOR CHARGE CONTROLLER:



V. VARIOUS COMPONENT FOR HARDWARE IMPLEMENTATION

1.**Battery Description**

A battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, mobile phones, and electric cars. When a

battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy. Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved to include devices composed of a single cell.
Rating of Battery :12V, 8AH

2.Centrifugal Fan

A fan is a powered machine used to create flow within a fluid, typically a gas such as air. A fan consists of a rotating arrangement of vanes or blades which act on the air. The rotating assembly of blades and hub is known as an impeller, rotor, or runner. Usually, it is contained within some form of housing or case. This may direct the airflow or increase safety by preventing object from contacting the fan blades. Most fans are powered by electric motors, but other sources of power may be used, including hydraulic motors, hand cranks, internal combustion engines, and solar power.
We are using DC motor of 12V, 2A . when the motor is operating at normal condition, it will attain the speed of about 1462rpm and when the speed is further increase it will reach to 2800rpm.

3.Circulating Cooling pad:

The cooling pad material play significant role in the cooling. The hot air is first passed through cooling pads the cooling pads is already absorb the cool water are ready to transfer the cooling to the air. Cool air comes out the cooling pads immediately circulating outside with the help of fan.
In solar PV operated air cooler we not used submerged water pump instead of this we make new design of cooling with circulatory arrangement in such a way that there is no need of water pump for air cooling purpose. The cooling pad are made up of wood shavings and synthetic fibre they look like almost grass the most important accepts of cooling pad is they are much cheaper and very economical. The only problem with cooling pad is they need high maintenance, You need to clean the cooling pads very frequently apart from that. They are very less durable and need to replace it frequently.

We are using DC motor of 24V, 2A , 612rpm for rotating the cooling pads.

VI. HARDWARE IMPLEMENTATION

VII. REFERENCES

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