

FABRICATION AND ANALYSIS OF COOLING SYSTEM IN CAR USING SOLAR ENERGY

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Abstract—Main Objective of this proposed work is to reduce the Inner temperature of the car while it is parked in an open space, with the use of Renewable -Solar Energy. The proposed project work is in the field of automobile, when a vehicle is parked in an open space, due to sun radiation, the vehicle get hot. This work also reduces the battery consumption of the car. When the persons start occupying the vehicle which is being parked in sunlight for a period, will feel high discomfort which is lasting for at least 10-15 minutes even after switching on the Air-conditioner of the vehicle. The proposed project will avoid such discomforts to the occupants, which is proposed to obtain through renewable solar energy.

1. INTRODUCTION

In today's climate of growing energy needs and increasing environmental concern, alternatives to the use of non-renewable and polluting fossil fuel have to be investigated. One such alternative is solar energy. Solar energy is obtained from sun. This solar energy is absorbed using solar panels. There are different types of solar panels they are monocrystalline silicon, polycrystalline silicon, building integrated photovoltaic, solar thermal panels. In this types each one produce different types of energy and have different efficiency. For this project the solar panel chosen is monocrystalline silicon. Comparing to other panels it has more efficiency and low cost. There is another type of solar panel which is transparent i.e. luminescent solar concentrator. This solar panel look like a transparent glass. Since, it has more efficiency than other solar panels it is not available in market. So, this project uses monocrystalline solar panel. Solar panel absorbs solar energy from sun and it converts it to electrical energy. This electrical energy is used in various appliances.

Now a days in the increasing temperature of earth's atmosphere Air Conditioner become a major usable material in human's day to day life. Air conditioner removes the heat from the particular area and provides a cool air i.e. it reduces the temperature of the particular area. Even in car they uses Air conditioner. Car's air conditioner uses battery of car for its working. But when it is parked under the sun the air conditioner does not works, and at a certain period of time the car temperature gets increased. In that situation using solar energy the temperature of the car is reduced in this project.

Temperature sensor is a device which senses temperature of the particular area. It is used in this project for sensing temperature inside the car. Voltage regulator is used to increase the volts of the produced electric current by solar panel to store in a battery. Battery is used to store the electric current generated. The major concept of this project is to reduce inner temperature of the car when is parked under the sun.

Blower is one of the major components in this project. Blower is used to circulate the air inside the car. There are different types of blowers used in the car, which does a various functions with different efficiency. This project includes CFD (Computational Fluid Dynamics) of the air circulation inside the car. CFD is the flow analysis of fluids.

2. LITERATURE REVIEW

Car Air Conditioning System

S.Lakshmi Sowjanya (2013) has reported the thermal analysis of a car air conditioning system based on adsorption refrigeration cycle using energy from exhaust gas of internal combustion engine. Air conditioning is the process of altering the properties of air (primarily temperature and humidity) to more favourable conditions. More generally, air conditioning can refer to any form of technological cooling, heating, ventilation, or disinfection that modifies his condition of air. The components of air conditioner are compressor, condenser, receiver dryer and evaporator.

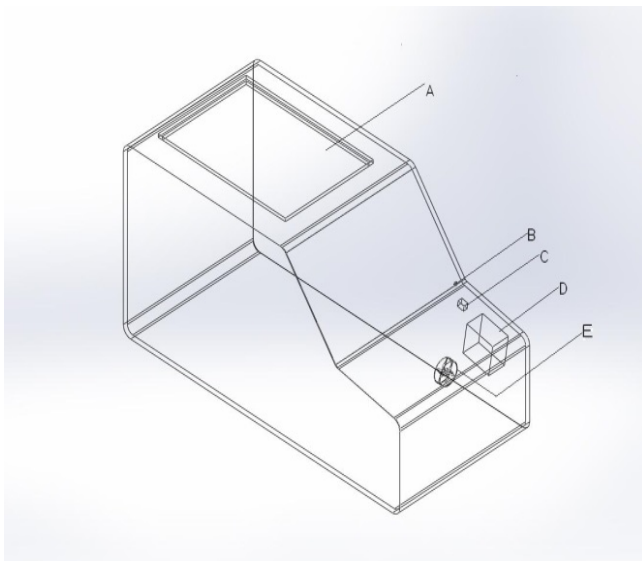
Solar Energy

C.Bhuvaneshwari et al (2008) has reported Analysis of Solar Energy Based Street Light with Auto Tracking System. In India, so many types of energies playing a major role. It has been inevitable to seek no polluting renewable energy sources for the power generation. So, renewable energy technologies range from the well-established, such as hydro power to the emergent. Each technology has its own individual measurement and requirements. Among all energies solar energy is the most abundant stream of energy. It is available directly as solar isolation and indirectly as wind energy. Solar

energy has the sources of renewable energy. Its potential is 178 billion MW which is about 20,000 times the world's demand. Sun sends out energy in the form of electromagnetic radiation. Solar cells are used for the generation of electrical energy. The solar cells receive the solar energy. The solar cells operate on the photo-electric energy by using solar cells principle. The energy from the photovoltaic cells is used to switch on the lights. At present solar electric power generation systems are having fixed solar panels whose efficiency of generation is less.. Hence from this journal it is observed that solar cells are used in solar panels for generating electrical energy. The conversion efficiency of solar panel is based on number of solar cells used in the solar panel.

Centrifugal Blowers

Sushanth wagh et al (2013) has reported the Air flow prediction of centrifugal blower using CFD. Fans and blowers are turbo machines which deliver air at a desired high velocity (and accordingly at a high mass flow rate) but at a relatively low static pressure. The centrifugal blowers have following components. They are Blower pump, Impeller, and Blades. Each of the parts has some certain specification such as inlet and outlet diameter of blower, thickness of the blade etc. The centrifugal blowers have following components. They are Blower pump, Impeller, and Blades. Each of the parts has some certain specification such as inlet and outlet diameter of blower, thickness of the blade etc.



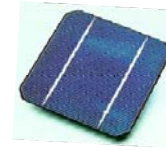
Skeleton Sketch

COMPONENTS

- A. 12V Monocrystalline silicon Solar Panel
- B. Temperature Sensor
- C. Voltage Regulator
- D. 12V Battery
- E. Blower

Solar Panel

Solar panel converts solar energy to electrical energy with the help of photovoltaic cells. This project uses 12V solar panel.



Voltage Regulator

DC regulator: Its function is to make a stable DC voltage on its output while its input has some ripple. You use one when you want, for instance, 5V output but your input swings a little above 5 V (not stable). Usually, regulators need its input voltage to be a little above its output voltage because of loss problems.



Battery

In this project 12v battery is used to store the electric power generated from the solar panel. The battery is connected with blower and is connected with solar panel through voltage regulator.

Temperature sensor

In many systems, temperature control is fundamental. There are a number of passive and active temperature sensors that can be used to measure system temperature, including: thermocouple, resistive temperature detector, and thermistor and silicon temperature sensors. These sensors provide temperature feedback to the system controller to make decisions such as, over-temperature shutdown, turn-on/off cooling fan, temperature compensation or general purpose temperature monitor.



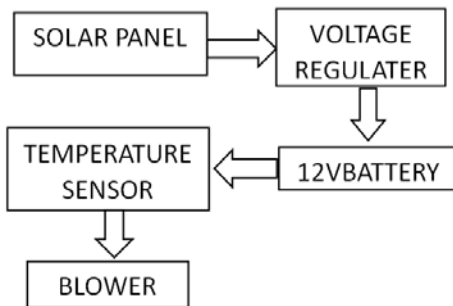
Blower

Blower is a device which is used to exhausting the inside hot air to the atmosphere. This is connected with temperature sensor. When the temperature is exceeds in the sensor the blower will be activated. The power to the blower is obtained from solar panel through battery.



3. WORKING

The solar panel is fitted at the top of the car which receives the solar energy from the sunlight. The received solar energy from the sun is then converted into electrical energy with the help of solar panel. The solar panel is connected with voltage regulator. The function of this voltage regulator is to maintain the voltage as stable without any fluctuations which is coming from solar panel. The voltage regulator is connected with battery which powers the battery. After the battery gets filled the charge will get overflow. The blower is used to remove the hot air from the car. The blower and the batter is connected with help of temperature sensor. The blower works on the command send by temperature sensor. This temperature sensor is programmed with the normal temperature level of 30°C. When the temperature exceeds this level, the temperature sensor sends the signal to the blower and the blower will automatically switched on and removes the heat inside the car. If the temperature inside the car is 29°C centigrade the blower is in off condition because temperature sensor will not send any signal to the blower.



Circuit diagram

4. RESULT

Thus the blower receives electric current from solar panel and removes the hot air inside the car, when the temperature is above setted temperature. The blower will get automatically switched off when the temperature reaches the normal level.

5. CONCLUSION

The development of this proposed work is mainly to increase the sophistication inside the car during sunny sunlight. The development cooling system in car is equipped with solar panel, blower, temperature sensor, battery and voltage regulator. Descriptions of components, working have been discussed. The main objective of the work is to propose a

cooling system that able to control and maintain temperature inside the car at the range of 25 to 30 when parked under very hot condition. In a Coimbatore zone the average temperature during summer season is 32-34°C and during winter season the average temperature is 25-29°C. Hence, the temperature to be maintained in car is 28°C. This temperature will be acceptable in every region.

6. SCOPE FOR FUTURE

This proposed work has proved valuable in all automobile sectors especially in cars. In future the luminescent solar concentrator can be used, which will not affect the aesthetics of the car and it will be more efficient than other solar panels. Since, it is a transparent glass it can use as a window tints. If it is been constructed like that instead of connecting with blower it can be connected with Air conditioner of the car. This project will be more valuable in future market.

REFERENCES

- [1] Md Shahid Imam Journal on "International Journal of Control and Automation Vol.7, No.5 (2014), pp.227-234" about Design of Air Conditioning System in Automobile.
- [2] Satish K. Maurya et al Int. Journal of Engineering Research and Applications. ISSN: 2248-9622, Vol. 4, Issue 3(Version 1), March 2014, pp.441-444, about A Cooling System for an Automobile Based on Vapour Absorption Refrigeration Cycle Using Waste Heat of an Engine.
- [3] C.Bhuvaneshwari et al International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 2 about Analysis of Solar Energy Based Street Light with Auto Tracking System.