

INVESTIGATION OF SOLAR OPERATED DC COMPRESSOR FOR CAR AIR-CONDITIONING

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Abstract – Sunlight is now a day's consider to be source of energy which is implemented in various day to day applications .solar energy is begin used to produce electricity through sun light. When sunlight falls on the solar panel then solar energy gets converted into electrical energy which can be stored in battery. As well as the energy source from the solar panel are directly used for operate the DC compressor in an A/C in the car. The controller circuit supplies the required power to the motor since petrol and diesel is not required uses solar energy which abundant in nature. With the help this technology we are suggesting to implement the solar energy in the automobile according to the energy resources. With this proposal we can extent our future work on building an actual car powered by the solar and electrical energy which is both cost effective and of course environment friendly.

Keywords: solar energy,battery, dc motor, and dc compressor .automobile.

I.INTRODUCTION

Now-a-days, dealers of natural resources like fuel, coal etc. are facing a hard time to keep pace with the increasing demand. At one hand, there are more cars or motor vehicles are dominating the transport medium, on the other hand these cars are being dominated by the fuel. As a result, the limited resources are being quashed by the producers and dealers to satisfy this need which is leading us to an uncertain future with having the scarcity of fuel and minerals .This project is mainly designed to build solar and electrical powered car that is completely eco-friendly as it does not emit any harmful gases. The greater community on alternative energy and its applications, as well as to build a practical that could have real world application upon further technological advances. This project has a strong desire to innovate and use local technology and resources. Since petrol and diesel is not required, it uses solar energy which is abundant in nature and similarly it regenerates the energy through dynamo and its energy efficient.

2. LITERATURE SURVEY

1. **Yogesh Sunil Wanborikar, Abhay Sinha** studied that the renewable energy is vital for today's world as in near future the non renewable sources that we are using are going to get exhausted. The solar vehicle is

a Step in saving these non renewable sources of energy.

2. **Daut, M. Adzrie, M. Irwanto, P. Ibrahim, M. Fitra** they has investigated the design and construction of a direct current (DC) air conditioning system integrated with photovoltaic (PV) system which consists of PV panels, solar charger, inverter and batteries. how to design and they design and construct the system with enough electrical energy supplied to it. With considering of these several factors, it will help to improve the stability and efficiency of the system for greener solutions to the world's energy needs.
3. **E. Janotkova, M. Pavelek** presented new trends in the area of automobile air conditioning, which is fast becoming standard equipment. Their Attention is focused on the refrigerant and ventilation circuit of the air conditioning equipment, and on the control system.
4. **cecila pistanti** in the 2015 they have designed a prototype of tracking solar system for vehicles and the energetic analysis also presented using an solar couples they have designed that het can be a modification of automobile.
5. **zou et al.** In the year of 2014 they proposed the thermal management of electric car by coupling heat pump and battery that the energy obtained from an solar energy is used for an electric car that they can be an thermal coupling heat transfer.
6. **Ranjeet singh et al.** In the year of 2013 they studied about hybrid solar car by desiging and analysing using CATIA V5R19 and ANSYS 10.5 they have went with an study about an hybrid technology with an non convenmsinal sources of energy as an solar energy

3. EXISTING METHOD

Solar cars use energy that comes from the sun. Direct exposure to sunlight doesn't move cars or other devices that can use this energy, so the converter of sun rays into usable power is needed. When it comes to solar cars, specially designed batteries serve as converters. Solar energy also needs to be stored since sun is not always available. Silicon-based photovoltaic cells are still most common solar collector and storage space where, due to electron movements and interactions, accumulated sunlight moves electrons around. These movements and interactions of electrons trigger electrical current or energy that eventually runs the car through DC motors

4. PROPOSED METHOD

Sunlight is now-a-days considered to be a source of energy which is implemented in various day to day applications. Solar energy is being used to produce electricity through sunlight. With the help of this technology we aim to make solar and electrical energy which is used to run an car AC compressor. Preliminarily our objective would be to implement our idea on a Hyundai i10 car and afterwards with help of this we can extend our future work on building an solar application in cars by the solar and electrical energy which is both cost effective and of course environment friendly.

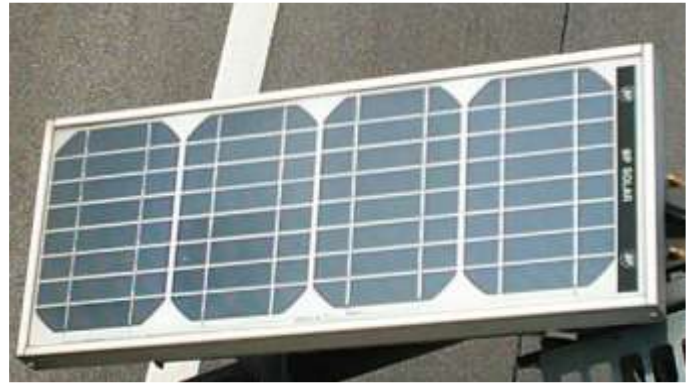
When sunlight falls on the solar panel then solar energy gets converted into electrical energy and stored in the battery. Mechanical energy is most common renewable source of energy. It can be converted into various forms of energy such as electrical energy. The dynamo converts mechanical energy into electrical energy. It is implemented in our project such that it regenerates the electrical energy which is spent by the batteries to run the motor and it is stored in the battery, and supplement batteries are employed, and solar controller circuit supplies required power to the motor. The change in batteries is automated using a relay switch, which automatically switches between batteries as shown.

5. COMPONENTS USED

- Solar Panel
- Solar controller circuit
- battery
- DC Motors
- compressor
- Pic Microcontroller 16F877
- Interfacing Circuit
- Dynamos
- LCD display

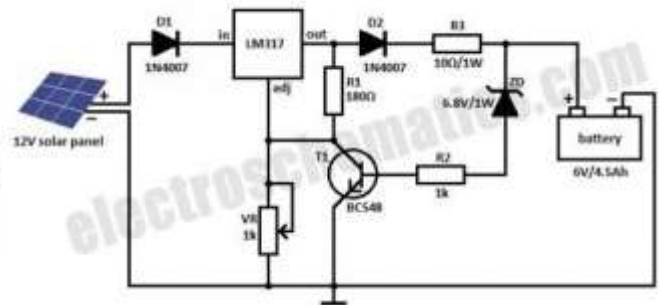
SOLAR PANEL:

Solar panels are actually "boards" that collect the sun's rays, and host the whole process of transforming energy coming from the sun into electricity and power



SOLAR CONTROLLER CIRCUIT:

This charge controller was designed for high efficiency, use of common parts, and operation with common ground circuitry



BATTERIES:

Lead-acid battery having a very low energy-to-weight ratio and a low energy-to-volume ratio, its ability to supply high surge currents means that the cells have a relatively large power-to-weight ratio



Compressor:

In the air-conditioner system compressors are use for the compression of refrigerant to operate the AC system. In automobile use mostly swash plate type compressor

Specification:

Type of Compressor= Swash Plate Type
 Piston=5 Pistons
 Displacement=117 cc
 Compressor oil= Denso 8
 Type of pulley= Polygroove
 Pressure Range= 1.3MPa (inlet) to 2.7MPa (outlet)



PIC MICROCONTROLLER:

PIC 16F877 is one of the most advanced microcontroller from Microchip. This controller is widely used for experimental and modern applications.



LCD

LCDs can add a lot to your application in terms of providing a useful interface for the user, debugging an application or just giving it a "professional" look

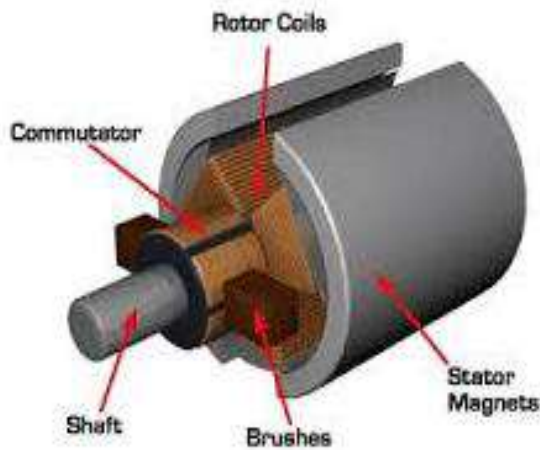
RESULT:

1 Measured output of solar panel:

- Voltage=24V
- Current=10Amps
- Power=250Watts

Generated power is directly allowed to run the motor.

DC MOTORS: A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power



POWER CONSUMPTION						
Power Input	Cooling	W	650-770	800-1050	1250-1560	1700-1900
	Heating	W	450-780+350	600-1050+350	1250-1590+350	1700-1950+350
Rated Current	Cooling	A	2.95-3.50	3.64-4.66	6.14-7.09	7.73-8.64
	Heating	A	2.95-3.50+1.6	3.64-4.77+1.6	6.14-7.25+1.6	7.73-8.66+1.6

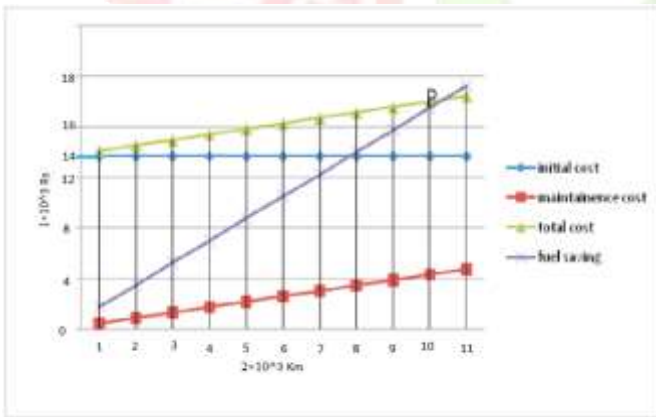
DIMENSIONS						
Indoor Unit	Net	mm	706x238x160	785x285x210	995x320x215	965x325x238
	Shipping	mm	822x315x250	910x370x330	1080x390x390	1160x400x330
Outdoor Unit	Net	mm	790x260x540	790x260x540	850x300x755	940x300x755
	Shipping	mm	916x370x610	910x370x610	950x410x760	990x400x770
Collector	Net	mm	1000x555x80	1000x555x80	1000x555x80	1000x555x80
	Shipping	mm	1100x600x110	1100x600x110	1100x600x110	1100x600x110

WEIGHT						
Indoor Unit	Net / Gross	kg	10/11	10.5/13	17/18.5	21/23
Outdoor Unit	Net / Gross	kg	31/34	38/40	53/52	55/58
Solar Collector	Net / Gross	kg	16/17	16/17	16/17	16/17
Loading Qty	in 20 feet	sets	72	72	59	58

REFRIGERANT GAS USED						
Freon: R410						

2 Fuel saved value by solar air conditioner:

As we have already assumed that, car gives the mileage of 20km/litre when car run without air conditioner operation and 16 km/litre with air conditioner operation



ADVANTAGES

- ✓ Unlike regular cars, solar energy powered cars are able to utilize their full power at any speed.
- ✓ Solar powered cars do not require any expense for running.
- ✓ Solar cars are quite.
- ✓ Solar cars require very low maintenance.

- ✓ A solar car produces no harmful emissions

APPLICATIONS

- Solar car which completely uses renewable sources of energy.
- It uses the dynamo which is used to regenerate electric energy.
- This technique using renewable resources which runs completely free of cost can be used for private use.

Conclusion:

It reduces the cost of air conditioning compare to normal air conditioner. It is eco-friendly. It is efficient for cooling in small area. Initial cost of its installation is high but on long run it proves eco-friendly. We got lot of knowledge regarding our field which is not available in the book. We learnt how to work in team by dividing the load and work with team spirit.

Feasibility of the solar driven auto air conditioner is checked under different working conditions and following conclusions

SUMMARY:

WITH THIS PROPSAL WE ARE CONCLUDING THAT THE ENERGY SOURCE FROM THE SUN IS CONVERTED INTO ELETRICAL ENERGY AND WHICH IS STORED IN THE BATTERY AS WELL AS ENERGY ALSO USEDE AS A DIRECT ELETRICAL WORK IN AN AUTOMOBILE.

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