

Solar AC Generator without Inverter

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Abstract - As of now the customary vitality sources are draining at really tremendous rate as the customary sources are in restricted sum and the utilization and customary sources are in more sum. Sun oriented vitality plays critical part in renewable vitality and is compelling among other renewable sources in this venture. Altered standard sun oriented cells are so organized into a circular design mounted on a base. Over the sun oriented cells a turning disk is mounted fueled by a DC electric engine. The DC engine gets its control from four small DC sun based cells mounted within the corners of the base. The disk has entrances cut into it permitting light to pass through to each other sun oriented cell underneath it. As the disk turns each of the banks of sun based cells is on the other hand uncovered to light and on the other hand create control. When the entrance is half way between the two cells the voltage cancels and drops to zero. The coming about voltage is sinusoidal or AC. It can indeed be designed to deliver three stage AC control. In this generally instrument we couple a little DC generator with machine shaft for getting required speed of disk. Since speed of disk is straightforwardly corresponding to the recurrence of AC control created by sun based cells.

Key Words: Solar cell; DC motor; Frequency; AC power

1. INTRODUCTION

Nowadays the foremost vital thing for advancement is vitality. In life the prime significance is given to vitality. So everybody is depend on non-renewable vitality sources but this non-renewable vitality sources are on the way of weariness.[1]Consequently analysts are concentrating more on renewable vitality sources since everybody knows that renewable vitality sources are non-exhaustible. Most of the renewable vitality sources are sun wind geothermal and tidal. Out of these presently a day for the most part utilized are sun powered and wind since it gives more yield with less endeavors. Presently we are more concentrating on sun based And Wind vitality since it is more productive[3]. The sun oriented radiation coming to the earth's surface in one year gives more than 10,000 times -the world 'yearly vitality need'. The Soil gets

174 pet a watts (PW) of approaching sun based radiation (separator) at the upper climate. Around 30% is reflected back to space whereas the rest is retained by clouds seas and arrive masses.[6] The range of sun oriented light at the Earth's surface is for the most part spread over the unmistakable and near-infrared ranges with a little portion within the close bright. In a long time to come the require for vitality will increment complex whereas the save of tradition vitality will exhaust in quick pace. To meet the developing request of vitality saddling of nonconventional vitality is the need among all the accessible non-conventional sources solar vitality is the foremost abundant and consistently convey.[11] Nowadays vitality is the foremost critical portion in our life add up to world is completely depends upon the vitality. One of the greatest requires vitality is nothing but the electrical vitality. One of the greatest sources to create electrical vitality is coal. So everybody tries to deliver better approach to induce greatest electrical vitality. Each nation confronting electrical vitality emergency since nowadays generally electrical vitality produces from coal. Coal is on the way of fatigue since of expanding request of electrical vitality. Coal is the nonrenewable vitality source it get depletes in the event that we ceaselessly utilize this source. In spite of the fact that the innovation of transformation of sun oriented vitality into power is more productive presently a day the sun oriented vitality is changed over into dc since sun powered plate accessible for transformation of sun powered vitality into electricity produces DC. This DC vitality store into battery and after that it changed over into AC vitality through inverter get together. But this prepare is as well complicated less productive and not temperate and more complicated. These days sun oriented vitality has been broadly utilized in our life and it's anticipated to develop up within the another few a long time. One of the cure to create electrical vitality is from non-renewable vitality sources. One of the non-renewable vitality sources to deliver electrical vitality is from the sun which is the greatest source of to deliver electrical vitality by utilizing sun powered board. The sun is non-exhaustible source of vitality it produces energy continuously. So we have to be make increasingly utilize of sun to deliver electrical vitality. To decrease our conditions on the coal for generation

of electrical vitality world is inclining toward sun based vitality framework [16].

2. Literature Survey

The slow, substituting introduction and shading the two anti-parallel sun oriented cell sets. In specific whereas one sun oriented cell of an anti-parallel associated sun based cell combine experiences slow introduction to daylight from no exposure (Greatest shaded) of the sun based cell power producing Jason Allen Oliver “Device Framework and Strategy for Straightforwardly Creating Rotating Current Power from Photovoltaic Cells”. “Reading material of Electrical Technology” AC and DC machines.[6] The display development could be a framework gadget and strategy for specifically creating rotating current electricity from photovoltaic cells. The framework gadget and strategy mechanically steadily uncover and shades photovoltaic cell sets associated in anti-parallel to daylight create substituting current power at an AC intersection of the sun oriented cell sets.[2] Steadily and then again uncovering and shading the two anti-parallel associated sun powered cells of each sun combine causes the adequacy and extremity of the power at the AC intersection to slowly rise and drop to deliver rotating current power. The progressive rotating presentation and shading of the two antiparallel sun oriented cells is finished by zone to greatest presentation (No shaded) of the sun powered cell power producing range the other sun based cell of the sun powered cell match experiences continuous shading from daylight from no shaded (Most extreme introduction) to most extreme shaded (no presentation).[16] Such a slow rotating introduction and covering of each sun based cell of each anti-parallel associated sun powered cell match is intermittent. The rate of introduction and shading decides recurrence. In one form a pivoting plate arranged over the sun powered cell sets has divided separated openings shaping covers between each opening to them again uncover and shade the sun powered cell sets amid revolution. A coordinate current engine is utilized to pivot the fragmented plate. The engine is ideally fueled by partitioned sun based cells. The show development moreover gives a stage synchronizer for keeping up a craved alternating current frequency. The stage synchronizer controls the engine to control turn of the portioned circle[15].

3. Proposed System

This power generator is named as “AC Solar Generator” A modified assembly is made in such a way that the

appearance of cell in light gives out their respective output in the form of sinusoidal voltage and current waveform with desired frequency.

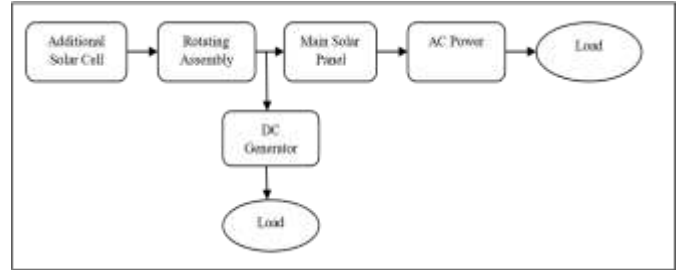


Fig -1: Block Diagram [15]

3.1 Solar Cell

A sun based cell or photovoltaic cell is an electrical gadget that changes over the vitality of light specifically into power by the photovoltaic impact which may be a physical and chemical wonder. It may be a shape of photoelectric cell characterized as a gadget whose electrical characteristics such as current voltage or resistance shift when uncovered to light. Person sun based cell gadgets can be combined to create modules something else known as sun powered boards. The common single intersection silicon sun based cell can deliver a most extreme open-circuit voltage of around 0.5 to 0.6 volts [2].

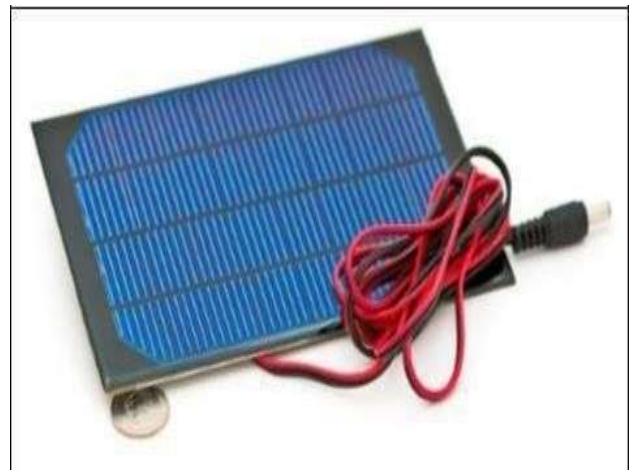


Fig -2: Solar Cell [13]

Sun based cell is primary building square of our venture. Distinctive evaluated sun based cells are accessible in showcase depending upon prerequisite from few milli volts to a few volts. In this extend sun based plate of rating 6V 50mA and 6V 150mA are utilized for trial and blunder premise [9].

3.2 Rotating Disc

A pivoting plate may be a circular sheet made up of any difficult and light weight lean fabric which can effectively pivoted by a DC engine when it is mounted on DC engine shaft. Rectangular windows are made on this circle as appeared in over figure. These windows are made concurring to our necessity. For X number of plates number of windows will be X/2. Here for 16 plates and number of windows are 8. This pivoting circle is made up of fabric like sun mica lean galvanized steel and difficult and light weight plastic fabric. The rectangular windows can cut physically or by machine [7].

The window cutting done by machine is valuable to provide more exact result than that of manual cutting. Moreover circular shape of plate is made physically or by machine. Turning circle at first was made of amid trial and mistake but it is exceptionally light in weight so it get vary due to impact of discuss amid turn (wind age restriction) So it supplant by sun mica circle which is lean tall thickness medium weight and less varied by discuss it has tall idleness sun mica plate so it turn quickly after get in movement [16].



Fig -3: Rotating Disc [16]

3.3 DC Motor

A diverse rating DC engine is accessible in showcase as per client prerequisite in dc engine speed changes relative to voltage and current rating in the event that we require a tall speed engine we ought to select a engine with higher rating of voltage and current and provided it by tall voltage and current. Here we require 325 RPM (insurgency per min) engine to deliver an Ac control subsequently we select engine of 1000 Rpm 12 volt,200mA. We select higher rpm engine since engine speed get minimize amid revolution due to turning circle

we utilize 16 sun based plates among which each plate produces half cycle of one total sine wave. This implies 16 plates produces 16 half cycles which is rise to to 8 total cycles. Presently it makes 8 cycles in one total insurgency but we require 50 total cycles in one moment [3].

Mathematically:

If 1 revolutions/second 8cycles

Then x revolutions / second 50cycles

Hence cross multiplying $x=50/8 =$

6.25revolutions/second(RPS)

$= 6.25*60 =375$ revolutions/minute(RPM).[11]

In this way we require speed of 6.25RPS or 375RPM of the DC engine to meet the recurrence precisely 50Hz. But within the prepare of insurgency of sun mica disc engine encounters an awfully gigantic restricting torque due to weight of circle. Thus we bought a DC engine of 1000rpm evaluated at 12 volt and 200 mA current with a adapt box. Adapt box really diminishes speed but gives expanded torque required to support weight over the shaft. Pivoting sheet (sun mica sheet) is having weight around 300 gm. In this way by doing parcels of explore we come to to the conclusion that providing 12 volt and 200mA to the DC engine it seem spin the rotor sheet within the run of 350rpm to 390 rpm. The variety is due to sun powered concentrated diminish or increment at a few time [11].

3.4 Gear Assembly of DC Motor

Equip get together plays an critical part to alter speed and torque of a engine here we required a tall beginning torque and tall speed and moo voltage DC engine consequently we utilize a equip get together to extend beginning torque which can effortlessly pivot the pivoting plate at starting. Rotating sheet may be a difficult fabric (sun mica) sheet having a few weight almost 300 gm. Weight on the shaft of engine increments contradicting torque due to which speed diminishes. Thus by utilizing torque conditions of DC engine it is simple to decide torque prerequisite on engine to turn the circle with particular steady speed [10]. After the content alter has been completed the paper is prepared for the layout.



Fig -4: Gear Assembly of DC Motor

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4. Methodology

4.1 Design of Solar Module

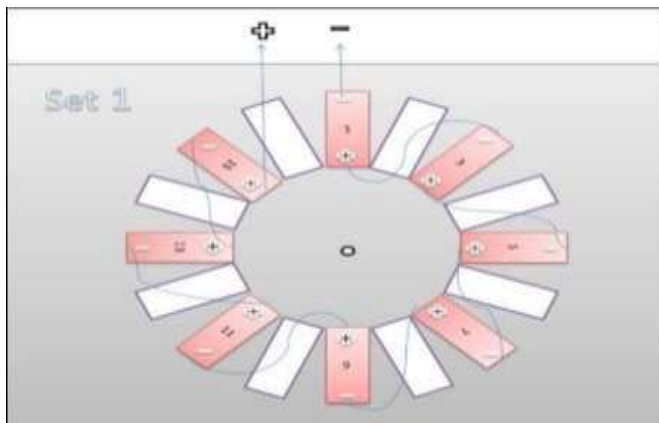


Fig -6: Solar Module

All the modules have two associations drawn out at the foot of the base. The plates are so orchestrated that they are associated in arrangement then again clearing out one plate in between two continuous plates. For disentanglement consider plates 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15 and 16 are add up to plates accessible. These plates are organized in circular way serially. Positive terminal of to begin with plate is associated to negative terminal of following plate. In this way plates 1,3,5,7,9,11,13,15 are associated in arrangement contributing set1 [9].

4.2 Design of Rotor

Rotor plays most vital part in creating AC control in entirety get together. Pivoting sheet is sun mica sheet which is unbending and light in weight which is chosen so as to settle firmly over the shaft and to pivot with craved speed. Sun mica is difficult wooden fabric. Within the starting, it is cut in circular shape so as to create it as a turning fan with normal bend on all side [9].

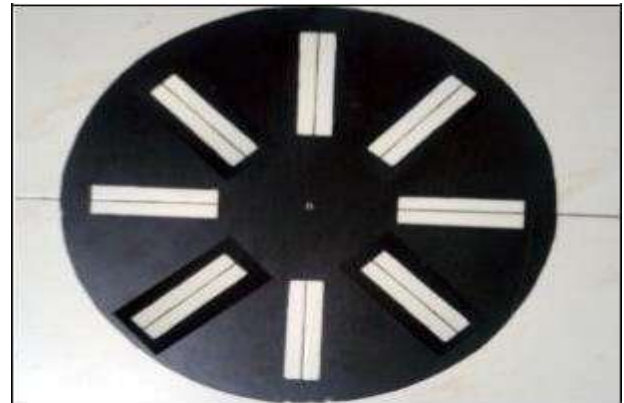


Fig -5: Design of Rotor [16]

At that point windows are cut with measurements precisely rise to measurement of the most sun based module. A gap is made at the center to be mounted over the shaft of DC engine. This sheet is put precisely over the base where modules are settled i.e. Middle of base coincides with center of sheet and windows coincide with cell spaces. Spinning sheet has windows over it cut in such a way comparative to the shape of the most sun based plates permitting daylight to pass through it [4]. The windows are cut on the other hand so as to keep a remove of one near plate between two open plates. Windows are made precisely Fig No.6: Plan of rotor at the center of circle, DC engine is settled forever and associations are drawn out at the foot. A DC engine is utilized to turn sheet mounted over the sun based board. Control to the DC engine is bolstered by extra sun based cells mounted on the corner of unbending base. Engine is coupled to the most shaft through gears to preserve speed and to extend torque. It is uncommon outlined engine 17 closely mounted underneath the adapt get together. Shaft is strung by rolling string machine machine for the reason of settling the lean sheet over the shaft utilizing nuts. Extra sun powered cells are too sun powered modules but having distinctive rating as compared to fundamental sun based board. These sun powered cells as it were take portion in driving the DC engine not in generation AC control. These cells are confined at a few particular remove from the external surface of primary sun based board circle. The rating of these

cells is so chosen that it'll turn the engine with desired speed to preserve recurrence at 50Hz[16].

5. Measurement Parameter

5.1 Frequency Measurement

Frequency plays most vital part in this try, as stack side must requires 50Hz anything the variety in waveform of voltage happens. Recurrence of the yield control can be measured either by multi meter or by CRO (scope). At the conclusion of tests, at long last we get a recurrence of 48.26Hz for a few steady time period as appeared in figure and some of the time it touches to precisely 50Hz.



Fig -7: Frequency Measurement Scope [15]

Frequency is influenced by as it were speed of the rotor. As speed increments, recurrence increments and bad habit versa. Moreover we calculate recurrence from CRO as takes after: When we get a sinusoidal waveform at that point the time/div handle is on position 10 ms (millisecond) from that we calculate the recurrence by the equation. One cycle of sine wave is completed in 2 squares on X hub on CRO screen.

Hence,

$$\text{Time} = 2 \times \text{time/div}$$

$$\text{Time} = 2 \times (10 \times 10^{-3})$$

$$\text{Time} = 20 \times 10^{-3} \text{ sec}$$

Now we have;

$$\text{Frequency} = 1 / \text{Time}$$

$$\text{Frequency} = 1 / (20 \times 10^{-3})$$

$$\text{Frequency} = 50 \text{ cycle/sec} = 50 \text{ Hz. [15]}$$

5.2 Voltage Measurement

Voltage can be measured by voltmeter or by scope. The yield voltage we get is approximately 9 Volts. Voltage is basically influenced by sun oriented escalated. More the concentrated more is voltage and lesser the escalated, lesser is the voltage at yield terminal. Voltage can increment by including a transformer within the outside terminals. Keeping up consistent control, voltage is expanded agreeing to necessities. Amid trial and mistake we get voltage depending upon association of sun based plate i.e.12V, 3V, 22V, 44V, 11V, 8V-9V. We degree this voltage on multi meter.

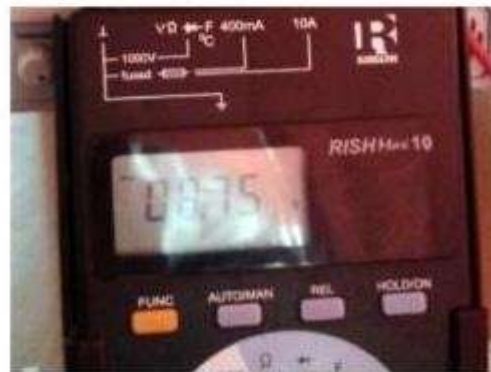


Fig -8: Voltage Measurement [15]

6 Results

After perusing yield voltage and waveform on CRO we got want values of voltage and anticipated exact AC sine wave waveform. Initially we perform parts of test on ancient structures, that time we get square wave sort shape. After that it is kept in intellect that get together ought to be near from all sides. Then a closed gathering is made with tall precision and parcels of splendors .At last we get is absolutely sinusoidal wave.

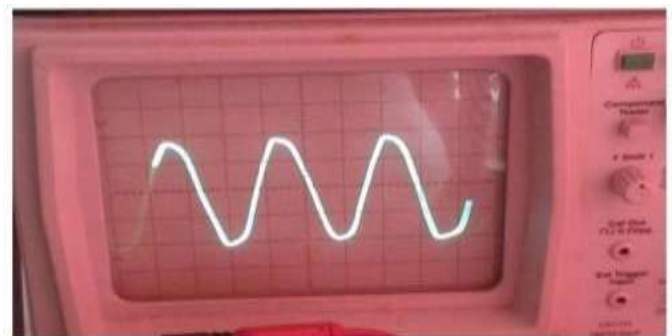


Fig -9: Sine wave on CRO with filter circuit [16]

7. Future Scope

Including transformer at yield side would grant expanded voltage and keeping up consistent control at both sides. Interfacing number of gatherings in arrangement would grant higher wattage of control and can be executed over the roof of house for domestic charge.

8. CONCLUSIONS

By considering the expanded utilize of power, In this venture, after concluding the data gotten within the information examination area, it can be said that the proposed AC and dc sun powered Generator framework is plausible to create AC as well as DC control. Anticipated esteem of voltage has been gotten. Comparing utilized DC engine will competent to run on sun based plate and create required speed dependable for generation of required recurrence. AC and Dc sun based generator is an productive framework to deliver coordinate AC and Dc control from sun based vitality without utilizing inverter and batteries .Considering focal points of moo upkeep and moo fetched per unit etc. The proposed framework is proficient

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