

Enhancement Efficiency of Solar Cell using Simple Mirror Technique

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ABSTRACT: The key purpose of this new paper is to expose an type of Enhancement of efficiency of solar cellular to drive load. In that we use optic lenses such as parabolic lenses or simple hand mirror to enhance the efficiency of solar cell. With enhancement we use the boost converter to create regular output voltage. Following generation of standard end result voltage we store that energy using battery of input 12V. Output of battery is DC volts, to drive AC weight we use inverter for DC-AC volt converter. Inverter produces AC output ac electricity by using that we drive AC load. Trial and error works were carried away with the designed increase conversion software which has an electric power ranking of 40 Watt and 12 V outcome ac electricity operated in regular bail mode at 20 kHz switching frequency. The test results show that the proposed design displays a good performance. This kind of research paper clarifies a practical approach to increase the efficiency of photo voltaic power panel by the use of mirrors system. These sorts of mirrors are cheap, easy to handle, less than difficult to use and does not need extra equipment or devices to work.

KEYWORDS: Efficiency improvement, Audino uno, simple mirrors, concentrated photovoltaic, Boost converter, Inverter.

I. INTRODUCTION

The sunlight is main energy source on the planet. All fossil fuels used today are indirect kinds of solar powered energy. On Earth all renewable and non-renewable energy sources all are the indirect or direct varieties of solar energy. Hence photo voltaic energy is essential for all things those can be found on Earth. Therefore collecting energy from sun is very good and beneficial idea. As we all are know the Sun is very big alternative energy source. We can take massive amount power from sun to do our day to day activity. Currently, photo voltaic (PV) based solar component development started with strict silicon solar panels. Consequently flat-panel type solar powered energy enthusiasts have their technology advantages in manufacturing and assembly.

Nowadays use of solar electrical power for domestic and professional purpose is increases because of after using of sun power no any harmful pollutant are stay on Earth. Pertaining to that reason development in solar power generation product is increases. Mobile-panel, Spherical sun power electrical generator, Hybrid solar power electrical generator etc are the recently made concepts in photo voltaic market.

Solar powered energy uses solar panel to convert sun irradiation into electricity using photovoltaic (PV) effect. The output volts of a solar-panel are varying depending on sun irradiation and temperature [2]. Because direct sunlight irradiation and temperatures changes, output voltage changing as well. Since the voltage produced is rising and falling, a lot of electronic digital equipment are not able to be straight connected. As a result, a DC-DC boost ripping tools with regular output volts is needed. The raise converter will step up the solar power electrical voltage to the suitable voltage required by electronic equipment's. Intended for AC electrical equipment's, the device requires an additional AC-DC inverter which converts the regular DC voltage to AC voltage. This system is called dual electric power processing stage system. In that in among boost converter and inverter we use battery to save voltage and which will assist to run tool big time. For this required voltage can be produce the usage of small solar panel with optic lenses such as replicate or parabolic lenses.

Parabolic lenses or mirror each one is optic improved lenses are used in task to raise the solar power electrical

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getting power to produce volt quality. Using such an improved lenses we can produce large output voltage from small solar solar power electrical. Concentrated photovoltaic can capable to acquire solar electric power at moments of low solar irradiation, that isn't very possible in only photo voltaic panel [1].

II. RELATED WORK

Using of renewable sources generation of electricity is now day becomes popular. To generate electric power from solar panel and use storage devices to store electricity for night time or other that the electricity generation time in increases [6]. In that hybrid concept for circuitry is developed [6] [5]. In than basically this concept is used in car, motors wheelchairs [5] [6].

Generation of electricity using simple solar panel is very hard because of sun is rise at East side and set at West side. Hence whatever electricity is generated using simple solar panel is less because of sun direction. To overcome this disadvantage in solar panel researcher starts use of Mobile solar panel for generation of electricity [5]. Using of this phenomena day time voltage is increase. For cars this method is very useful by using this 2-3 hours of car can drive using this electricity [5].

Enhance efficiency is required for all motors also those are run using solar power electricity. To drive AC or DC motor constant output voltage is required. To generate constant output voltage Boost converter is connected to solar panel which boost the output voltage of solar panel and helps to drive DC motor without short-circuit [2]. Also using this voltage also AC motor can drive using inverter circuit after Boost converter [2][3].

To enhance efficiency of solar power DC-DC boost converters with new coupled inductor for the solar power applications [3]. This has to achieve high step-up voltage gain by adjust the turn's ratio of the coupled inductor and varying the capacitor with proper rating of all the parameters. It is recycled the energy stored in the leakage inductor of the new coupled inductor is giving high efficient of proposed converter [3].

To charge small devices new solar devices are developed [4]. Solar sun power generator is used for small as well as big equipment for drive purpose [3].

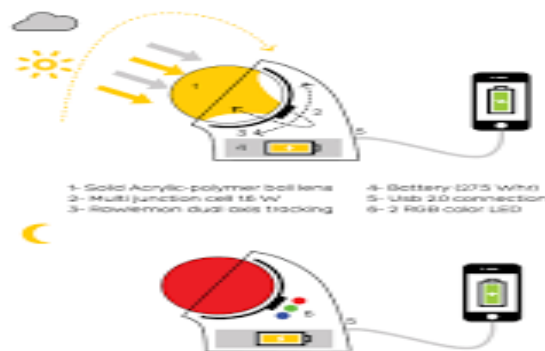


Fig 1: Spherical solar sun power generator

Above fig 1 is shows the spherical sun power generator is used for the charging of mobile phone. This device is very use full which collect energy day as well as night time also [4]. Spherical solar power generator is collect day time energy from sun and also collects night time energy from moonlight [4].

The beta Ray comes with a hybrid collector to convert daily electricity and thermal energy at the same time. While reducing the silicon cell area to 25% with the equivalent power output by using our ultra-transmission Ball Lens point focusing sun, solar panels tend to be aesthetically uninspiring.

III. PROPOSED SYSTEM

A) System Block Diagram

Fig 2 shows the block diagram of developed system. In block diagram basically we see the solar panel with automatic optic lenses such as parabolic lenses or simple mirror, output of this is DC voltage.

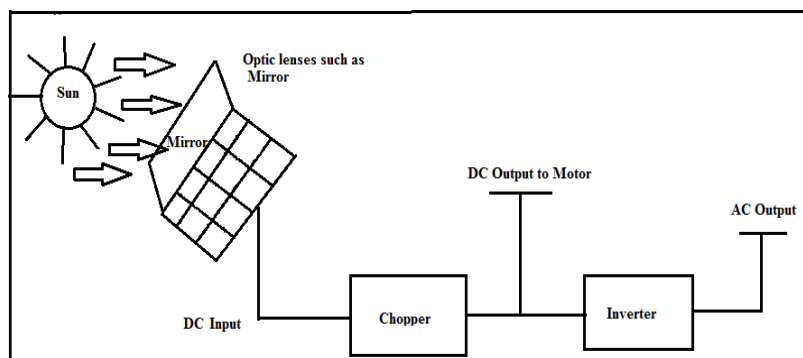


Fig 2: Block diagram of developed system

After that we connect Chopper i.e. Boost converter which is DC to DC converter. Boost converter converts variable DC voltage into constant DC voltage. Using we charge battery of 12V. After battery we connect Inverter to battery i.e. DC to AC converter. Inverter produces AC output voltage. After that we connect AC load to drive using 12V AC voltage.

B) Circuit Diagram Of Developed System

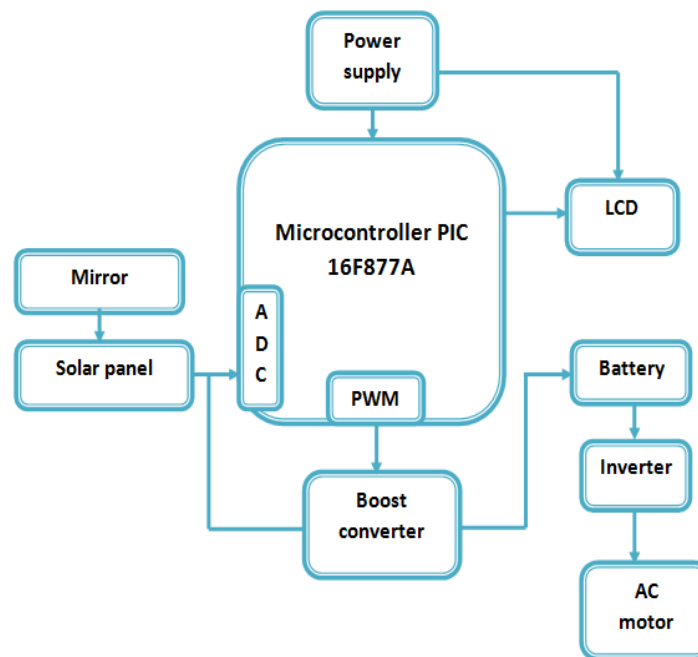


Fig 3. Circuit diagram of developed system

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Fig 3 shows the overall circuit diagram of our system. In that we use solar panel with optic lenses here we use simple mirror as optic lenses. Mirror is connected to solar panel which is automatically rotate according to sun direction, because of that when panel gaining power is reduces at that time by using of mobile mirror it starts increasing which result in as compare with only solar panel its efficiency ratio is higher'.

Then we use boost converter circuit which convert solar panel DC voltage into constant DC voltage. In our system we use batteries to store energy produced by solar panel. We place battery to charge in between DC-DC boost converter and DC-AC inverter. Battery stores DC voltage which we can able to use for DC or AC equipment's .

We use Pic microcontroller 16F877A which produce PWM waves which we applied as gate pulse to switching MOSFET in Boost converter. As per the PWM pulse voltage boosting is measured in circuitry. Boost converter voltage is constant voltage. Input of boost converter is variable but it produce constant output voltage which prevents battery from high or low load voltage. Whatever output voltage comes from solar panel with mobile mirror and boost converter constant output voltage both are displayed on 16*2 LCD display. Power supply is used to generate power for Pic microcontroller.

To convert DC voltage into AC voltage we use 4-matrix inverter. Which convert DC-AC voltage which comes from battery backup Using inverter we connect AC equipment to our system. We use up to 40W AC motor which connects to inverter.

To increase power up to 40W we use 20W solar panel with mobile mirror. Mirror helps to increase voltage using reflection technique of rays. Mirror reflects rays when solar panel cannot able to tack energy from sun. because of than we collect large output voltage from solar panel because of mirror reflections .

IV. BASIC OPERATION

A) Boost Converter

The increase converter is a medium of power transmission to perform power absorption and injection from sun panel to grid-tied inverter. The method of electricity absorption and injection in boost converter is executed by a aggregate of four additives which can be inductor, digital transfer, diode and output capacitor. the relationship of a lift converter is shown in fig4 . The manner of strength absorption and injection will represent a switching cycle. In other phrase, the common output voltage is managed by way of the switching on and off time duration. At constant switching frequency, adjusting the on and off duration of the switch is called pulse-width-modulation (PWM) switching. The switching obligation cycle, k is described as the ratio of the on period to the switching time period. The energy absorption and injection with the relative period of switching period will function the converter in distinct modes called continuous conduction mode (CCM) and discontinuous conduction mode (DCM) .

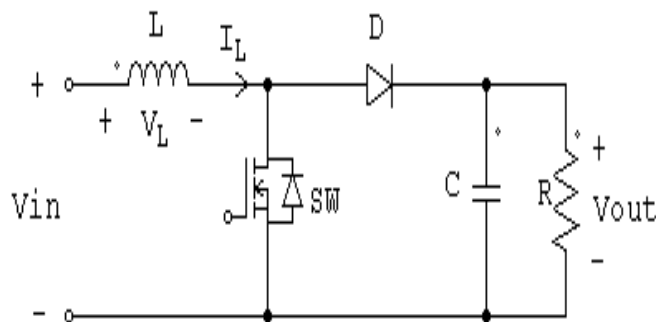


Fig4: Schematic of Boost Converter

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B) Experimental setup of our Project Experiment

Fig.5 shows the actual setup of our experiment diagram in that we use 20W solar panel and simple mirror. Here we place solar panel horizontally and mirror was connecting vertically but in automatically rotated.

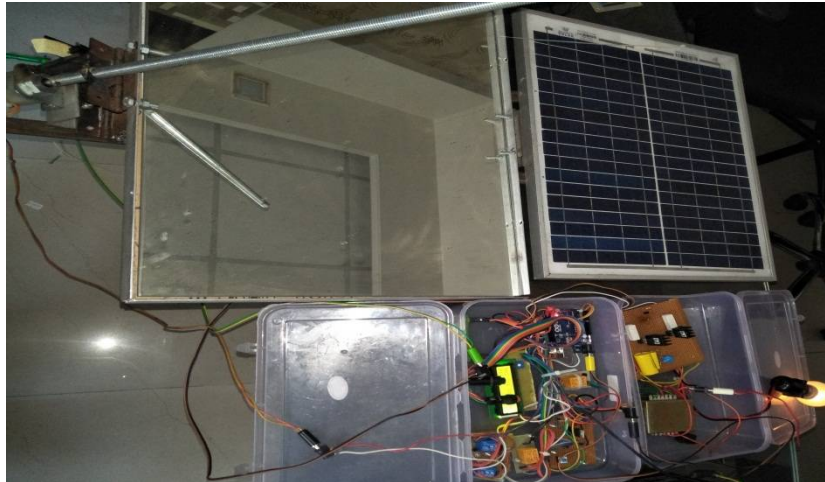


Fig.5: Our Experiment solar panel with auto rotate mirror

Fig.6 Shows the DC motor which connects in between solar panel and mirror in circuitry. Which operate using run command in our circuitry. This rotates after power supply and track the output voltage of solar panel and move mirror up and down direction according to sun rays.



Fig.6: DC motor which rotate mirror in Experiment

V. SIMULATION AND EXPERIMENTAL RESULTS

A) Simulation results for Boost converter

Based on proposed design, computer software Proteus 8 is use to simulate our circuit. Fig7 shows the simulation for with mirror and without mirror for solar panel.

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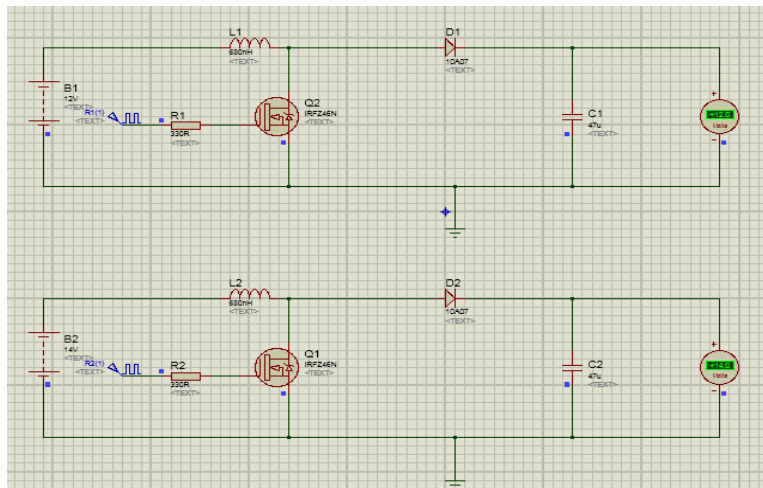


Fig.7: Simulation output of DC Boost converter

B) Output voltage for the solar panel with and without mirror

Fig 8 shows solar panel output which is with mirror and without mirror. Here we compare efficiency generate from solar panel and solar panel with mirror. Red line shows the voltage generated from using only solar panel from day time 9AM to 6PM. Blue line in graph shows the output generated from solar panel using mirror technique.

| Time in hours | With mirror vtg | Without mirror Vtg |
|---------------|-----------------|--------------------|
| 9 | 14 | 11 |
| 10 | 16.5 | 13 |
| 11 | 18.9 | 15.1 |
| 12 | 21.2 | 19.2 |
| 13 | 20.5 | 18 |
| 14 | 18.5 | 15.6 |
| 15 | 17.6 | 13.8 |
| 16 | 16.6 | 10.2 |
| 17 | 13.4 | 8.5 |
| 18 | 12 | 6.7 |

Table1: solar panel voltage with and without mirror

Using table1 value we drown efficiency graph of solar voltage vs time duration. This can be shown in fig.8 below. Red colour shows voltage from solar panel only and blue line shows the voltage generated from solar panel using mirror at day May 27 from morning 9AM to evening 6PM.

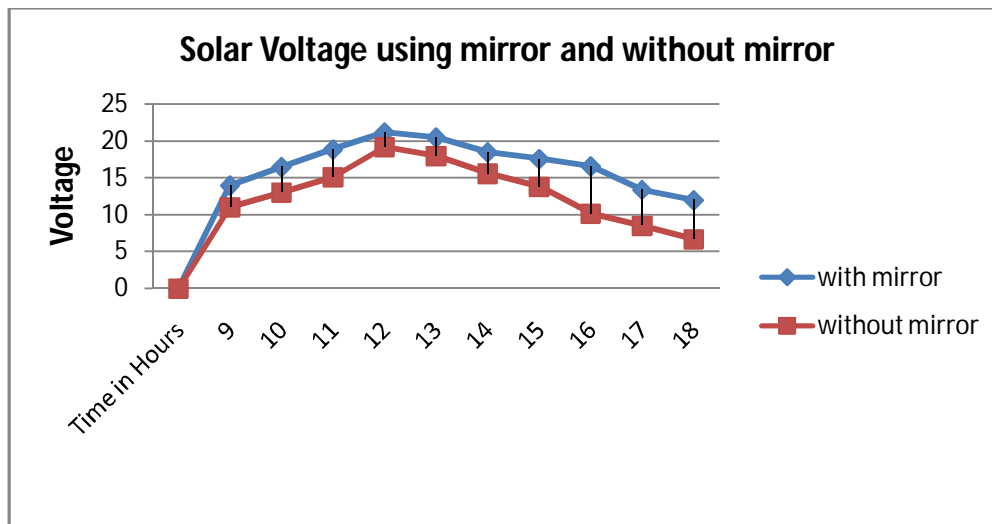


Fig.8: Enhancement of efficiency of only solar panel and with mirror

VI. CONCLUSION

Solar power electricity generation using mobile mirror offers many advantages when compared to simple solar panel. One of the main advantages is that increase output voltage of solar panel throughout the day. Also when sun power is less that time by using of optic lenses that is mobile mirror can provide reflected rays to increase the output voltage of solar panel while sunshine time and sunset time basically.

After generation of large output to generate constant voltage boost converter is used for DC motors and inverter is used for AC motors.

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