OPERATION OF SOLAR BASED WATER PUMPING SYSTEM WITH CHARGE CONTROLLER

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ABSTRACT: Agricultural innovation is evolving quickly. Agrarian applications appropriate for photovoltaic (PV) arrangements are various. These applications are a blend of individual establishments and frameworks introduced by service organizations when they have discovered that a PV arrangement is the best answer for remote farming need, for example, water siphoning for yields or animals. A sun based fueled water siphoning framework is comprised of two fundamental parts. These are PV boards and siphons. The littletest component of a PV board is the sun based cell. Each sun oriented cell has at least two extraordinarily arranged layers of semiconductor material that produce direct flow (DC) power when presented to light. This DC current is gathered by the sun based cells in the board. The gathered current is then given to the Boost converter so as to the lift voltage and is given to AC siphon through the Solar Charge Controller. The point of this article is to clarify how sun based fueled water siphoning framework works.

Keywords – AC pump, Boost converter, Inverter, Photo-voltaic, Solar

INTRODUCTION

Usually to utilize hydro, warm, diesel based vitality to run the engines required for various purposes. While these frameworks can give control where required there are some critical disadvantages, including: Fuel must be transported to the generator's area, which might be a significant separation over some difficult streets and scene. Fuel costs include, and spills can debase the land. Generators require a lot of support and, similar to every mechanical framework, they separate and need new parts that are not constantly accessible. Need of Water for hydro and Coal for warm make them less productive when contrasted with Solar because of its bottomless accessibility of vitality asset. For some rural needs, the option is sun powered vitality. Current, very much planned, easy to keep up heavenly bodies can give the vitality that is required where it is required, and when it is required. These are frameworks that have been verified far and wide to be practical and solid, and they are as of now raising dimensions of farming efficiency around the world.

A solar module. In a sun based module the sun oriented cells are connected in same fashion as the battery cell units in a battery bank framework. That implies positive terminals of one cell are connected to negative terminals of another when the sun is sparking, it encourages the water system framework, well, we realize that crops needs more water when the sun sparkles, particularly in parched districts. The principle reason is that utilizing the sun for water system speaks to a temperate circle: when the sun sparkles, it encourages the water system framework, well, we realize that crops needs more water when the sun sparkles, a great deal. Consequently, a vast amount of vitality is accessible when it is really required.

SOLAR PV MODULE

A solitary sun based cell can't give required valuable yield. So to expand yield control dimension of a PV framework, it is required to associate number of such PV sun based cells. A sun based module is ordinarily arrangement associated adequate number of sunlight based cells to give required standard yield voltage and power. One sun based module can be evaluated from 3 watts to 300 watts. The sun powered modules or PV modules are monetarily accessible essential building square of a sun based electric power age framework. As a matter of fact a solitary sunlight based PV cell produces extremely modest sum that is around 0.1 watt to 2 watts. Be that as it may, it isn't down to earth to utilize such low power unit as building square of a framework. So required number of such cells are consolidated together to shape a useful monetarily accessible sun based unit which is known as sun powered module or PV module. In a sun based module the sun oriented cells are associated in same design as the battery cell units in a battery bank framework. That implies positive terminals of one cell associated with negative terminal voltage of sun based module is basic whole of the voltage of individual cells associated in the arrangement module. The ordinaryyield voltage of a sun based cell is around 0.5 V consequently in the event that 6 such cells are associated in arrangement, at that point the yield voltage of the cell would be 0.5 × 6 = 3 Volt. In a solar module the solar cells are connected in same fashion as the battery cell.
units in a battery bank system. That means positive terminals of one cell connected to negative terminal voltage of solar module is simple sum of the voltage of individual cells connected in the series module. The normal output voltage of a solar cell is approximately 0.5 V hence if 6 such cells are connected in series then the output voltage of the cell would be 0.5 × 6 = 3 Volt.

3. BOOST CONVERTER

The ordinary lift converter which could be utilized in many power electronic applications, for instance in controlled DC control supplies, and in photovoltaic frameworks. The incentive to venturing up a low DC input voltage to higher DC yield voltage of wanted burden. The converter has two method of current activities, spasmodic current mode (DCM) and ceaseless current mode (CCM). In power applications, the regular lift converter can work in any method of current activity under changed power levels, and with every mode has fluctuation attributes. The standard activity of the DC-DC regular lift converter appeared in . At the point when the switch is on, the diode winds up turn around one-sided, subsequently, detaching the heap arrange. The info source stores vitality in the inductor. When the power turn is off, the heap organize gets vitality from the inductor just as from the source, in this manner the heap voltage is more noteworthy than the source voltage. Regular lift converter has a straightforward circuit and ease. The inconveniences of customary lift converter are high swell current on dynamic and aloof parts, vast voltage worry for power switches, and require a huge capacitor incentive to keep the yield voltage consistent. This trouble can be illuminated by utilizing interleaved lift converter which is another power support converter circuit.
The effectiveness of the converter has expanded because of the utilization of intensity FETs, which can switch all the more productively with lower exchanging misfortunes at higher frequencies than influence bipolar transistors and utilize less unpredictable drive hardware. Another enhancement in DC-DC converters is finished by supplanting the flywheel diode with synchronous correction utilizing a power FET, whose 'on opposition' is much lower, which diminishes exchanging misfortunes. Most DC-DC converters are intended to move unidirectionally, from contribution to yield. Be that as it may, the exchanging controller topologies can be intended to move bidirectionally by supplanting all diodes with autonomously controlled dynamic amendment. For instance, in regenerative braking of vehicles, where control is provided to the wheels while driving, yet provided with the wheels while braking. Consequently a bi-directional transformation is helpful.

4. **Solar Charge Controller**

A charge controller, charge controller or battery controller restrains the rate at which electric flow is added to or drawn from electric batteries. It anticipates cheating and may secure against overvoltage, which can decrease battery execution or life expectancy, and may represent a danger. It might likewise counteract totally depleting (“profound releasing”) a battery, or perform controlled releases, contingent upon the battery innovation, to secure battery life. The expressions "charge controller” or “charge controller” may allude to either an independent gadget, or to control hardware coordinated inside a battery pack, battery-fueled gadget, or battery charger. An arrangement charge controller or arrangement controller impairs further current stream into batteries when they are full. A shunt charge controller or shunt controller redirects abundance power to an assistant or “shunt” load, for example, an electric water radiator, when batteries are full. Basic charge controllers quit charging a battery when they surpass a set high voltage level, and re-empower charging when battery voltage drops back underneath that dimension. Heartbeat Width Modulation (PWM) and Maximum Power Point Tracker (MPPT) innovations are all the more electronically modern, modifying charging rates relying upon the battery's dimension, to permit charging nearer to its greatest limit. An accurate controller of MPPT capacity liberates the framework fashioner from firmly coordinating accessible PV voltage to battery voltage.

Important productivity additions can be accomplished, especially when the PV cluster is lo

![Fig.5 Solar Charge Controller Circuit](image)

5. **Inverter**

A power inverter, or inverter, is an electronic device or equipment that changes direct current (DC) to trading current (AC). The information voltage, yield voltage and repeat, and when all is said in done power managing depend upon the structure of the specific device or equipment. The inverter does not convey any power; the power is given by the DC source. A power inverter can be totally electronic or may be a blend of mechanical effects, (for instance, a turning contraption) and electronic equipment. Static inverters don't use moving parts in the change method. Equipment that plays out the opposite limit, changing over AC to DC, is known as a rectifier. In one fundamental inverter circuit, DC control is related with a transformer through the center tap of the basic winding. A switch is immediately traded forward and in
reverse to empower current to stream back to the DC source completing two substitute ways one end of the fundamental winding and a short time later the other. The revolution of the heading o of current in the basic contorting of the transformer produces trading current (AC) in the helper circuit. The electromechanical interpretation of the trading device fuses two stationary contacts and a spring supported moving contact. The spring holds the adaptable contact against one of the stationary contacts and an electromagnet pulls the compact contact to the opposite stationary contact. The current in the electromagnet is impeded by the movement of the switch with the objective that the switch endlessly switches rapidly forward and in reverse. This kind of electromechanical inverter switch, called a vibrator or ringer, was once used in vacuum tube vehicle radios. A practically identical framework has been used in passage ringers, chimes. As they ended up available with adequate power examinations, transistors and diverse sorts of semiconductor switches have been joined into inverter circuit designs. Certain examinations, especially for broad structures (various kilowatts) use thyristors (SCR). SCRs give colossal power managing capacity in a semiconductor gadget, and can immediately be controlled over a variable terminating range. SCRs give huge power managing with ability in a semiconductor gadget, and can promptly be controlled over a variable terminating range.

6. AC PUMP

An AC engine is an electric engine driven by a rotating flow (AC). The AC engine usually comprises of two fundamental parts, an outside stator having loops provided with substituting current to deliver a turning attractive field, and an inside rotor connected to the yield shaft creating a second pivoting attractive field. The rotor attractive field might be delivered by perpetual magnets, resistance saliency, or DC or AC electrical windings. Less normal, AC direct engines work on comparative standards as turning engines however have their stationary and moving parts orchestrated in a straight line design, delivering straight movement rather than pivot. The two primary kinds of AC engines are acceptance engines and synchronous engines. The acceptance engine (or nonconcurrent engine) dependably depends on a little distinction in speed between the stator turning attractive field and the rotor shaft speed called slip to prompt rotor current in the rotor AC winding. Thus, the acceptance engine can't create torque close synchronous speed where enlistment (or slip) is insignificant or stops to exist. Interestingly, the synchronous engine does not depend on slip-acceptance for activity and uses either changeless magnets, notable shafts (having anticipating attractive posts), or a freely energized rotor winding. The synchronous engine creates its evaluated torque at precisely synchronous speed. The brushless injury rotor doubly sustained synchronous engine framework has a freely energized rotor winding that does not depend on the standards of slip-enlistment of current. The brushless injury rotor doubly sustained engine is a synchronous engine that can work precisely at the supply recurrence or sub to excessively various of the supply recurrence.
Different kinds of engines incorporate swirl current engines, and AC and DC mechanically commutated machines in which speed is subject to voltage and winding association.

Minimized, submersible water siphons are for the most part utilized on air coolers, aquariums, and wellsprings. In the event that the siphon comes up short on water and keeps on working — an issue known as dry running — it can end up harmed. This circuit shields submersible water siphons from dry running with the assistance of related dimension terminals. The circuit identifies the nonappearance of water and screens the water level to keep dry running from happening.

**INSIDE ELECTRONICS OF AC PUMP**

The water siphon monitor gadgets comprise of two dimension cathodes, a water level finder, an electromagnetic hand-off, and the transfer driver hardware. Supporting parts are important to avert restarting if the siphon monitor is utilized in tempestuous water. The prescribed supply voltage is 5 V. While it is conceivable to run the unit off of a higher voltage, minor alteration is required. The completed hardware can be housed into an infinitesimal case (the dimension anodes, shaped from two short-length inflexible copper wires, go out through the case). Remember to waterproof the case (and joints) utilizing any suited epoxy cement. As should be obvious, the gadgets utilize a promptly accessible and ease 555 IC as the hand-off driver. Despite the fact that the 555 IC is ordinarily utilized as a clock/oscillator, it is likewise very appropriate for hand-off driving applications. The yield (stick 3) can both source and sink current up to 200 mA and the inner flip-flop is activated between its two states by inside comparators associated with the two detecting contributions on pins 2 and 6. At the point when these pins are taken to a voltage over 2/3 of the supply voltage, the yield switches low (0 V); when they are taken underneath 1/3 of the supply voltage, the yield swings high. As the 555 IC can cheerfully work at 5 V, it is useful for driving a little 5-V hand-off curl from a 5-V dc supply voltage. Dry running is profoundly hazardous for submersible siphons. Engines of submersible siphons are intended for running submerged. They additionally use water as a warmth exchange medium. In the event that the water level goes down and the siphon runs dry,
the engine gets overheated and wears out. For security against dry running, a detecting nudge (level cathodes) is typically utilized. It is inundated in water, marginally over the dimension of the siphon. At the point when the water level drops lower than the detecting push, it is relied upon to trip the siphon protect. Since this methodology has a few confinements, the inclination identification strategy is frequently utilized as an option. It is conceivable to offer insurance against dry running by detecting the engine current, which changes amid dry running conditions. On the off chance that appropriate gadgets are utilized to detect the engine current, at that point it is conceivable to give solid security against dry running. An electric submersible siphon (ESP) is a gadget which has a hermetically fixed engine close-coupled to the siphon body. The entire gathering is submerged in the water to be siphoned. Submersible siphons drive water to the surface, rather than stream siphons, which need to pull water. Note that we can likewise identify the dry run state of a submersible siphon without utilizing the dimension anodes just by estimating the engine current. Since the engine draws minimal current (inclination) in dry running circumstances, it isn’t extremely hard to fix a circuit to turn the engine off when a preset propensity esteem is come to. The extraordinary preferred standpoint of this method is that the plan utilizes the engine itself as a sensor and does not require any extra outer sensors like the dimension terminals.

7. Operation

The system operates on power generated using solar PV (photovoltaic) system. The photovoltaic array converts the solar energy into electricity, which is used for running the motor pump set. The pumping system draws water from the open well, bore well, stream, pond, canal etc. The system requires a shadow-free area for installation of the Solar panel. As the sun rays fall on the PV Array panel, the cells in panel trap the energy and produces the DC voltage. DC voltage obtained from solar PV array is boosted up using a boost converter. The boosted voltage is fed into inverter through solar charge controller where the excess is sent to battery and make it alternating in nature and this voltage is fed to AC motor. The voltage which is fed to AC motor draws the water and sends to storage tank if required.
8. CONCLUSION

Since the expansion in cost per increment in unit control yield of a photovoltaic framework is more noteworthy than that for a diesel, gas, or electric framework, photovoltaic power is more cost aggressive when the water system framework with which it works has a low complete unique head. Hence, photovoltaic power is more cost-aggressive when used to control a miniaturized scale water system framework when contrasted with an overhead sprinkler framework. Photovoltaic power for water system is cost-focused with customary vitality hotspots for little, remote applications, if the all out framework structure and usage timing is cautiously considered and sorted out to utilize the sun oriented vitality as productively as could be allowed. Later on, when the costs of non-renewable energy sources rise and the monetary favourable circumstances of large scale manufacturing decrease the pinnacle watt cost of the photovoltaic cell, photovoltaic power will turn out to be more cost-focused and increasingly normal.

9. FUTURE PERSPECTIVES

This venture can be stretched out by including different others electronic sensors, for example, Water-level Indicator, where in you interface a water level sensor to the your connected burden with the end goal that it distinguishes the water level and draws additional dimension of water if necessary. Vitality put away can be known by interfacing a computerized peruser at the battery end.

10. REFERENCES

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