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# A REVIEW ON UNIVERSAL SOLAR PUMP CONTROLLER

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## ABSTRACT

Farming system is changing instantly. Farming machinery, farming building and production facilities are constantly being improved. Farming Uses suitable for panel solutions are numerous. These systems are a mix of separate installations and systems installed by utility Companies when they have found that a solar solution is the best solution for remote farming need Such as water pumping for Harvesting. A solar powered submersible pumping system is made up of three basic components. These are solar panels and pumps. The smallest element of a solar panel is the Solar cell. Each solar cell has two or more specially prepared layers of semiconductor material that Produce direct current power when exposed to light. This dc current is collected by the Wiring in the PV. It is then forwarded ac either to a dc pump, which in turn pumps water whenever the Sun brightness, or stored in batteries for later use by the power appliances. The Target of this topic is to explain how solar water pumping system works and what the differences with the other energy sources are.

**Key words:** farming, water, solar cell, pumps.

## INTRODUCTION

Energy is the basic requirement for the growing economic development of a country.

Many electrical functions requirement to present day stop when the power supply is interrupted. It is practically impossible to estimate the actual magnitude of power supplied played its part in the building of present-day development. The availability of big amount of power energy is due to the consumption of person effort and getting higher farming, industrial production. The huge the per capita consumption of energy in a country, the higher is the standard of living of its human-kind. Energy exists in the various form in nature and behavior but the most important form of energy is power energy. The current days are more dependent and reliable on the use of power energy which is almost becomes a part of our human life.

Solar energy is the most abundant source of energy in the all over world. Solar energy is not only an answer to today's energy crisis but also an environmental friendly form of energy source. Photovoltaic generation is an efficiency approach for using the solar energy. PV module is now great area used for running street lights, for powering water heaters and to meet domestic loads. The cost of solar panels has been constantly decreasing which encourages and supporting its usage in various sectors. One of the applications of this technology is used in irrigation systems for Agriculture. Solar irrigation system can be a suitable alternative for farmers in the present state of energy crisis in India. This is green grow way for energy production which provides free energy once an initial. (Harishankar, 2014).

Solar systems, commonly referred to as solar systems, convert sunlight directly into Power system. This is different to the PV thermal collectors for solar water heaters. A solar photovoltaic system can help reduce carbon emissions and your electricity bill by producing electricity from the sun instead of burning fossil fuels. Wiktinary offers a range of solar products to help you harness the power of the sun for commercial, industrial and residential electricity applications of all types.

Most power is distributed through an electrical utility provider, the company that produces and/or distributes power to consumers. The power from a variety of sources is distributed along the power grid and can span 100 of miles from the power plants to homes and businesses. This Power system is not always reliable due to overloaded, severe weather and maintenance or updates. Fitting a power system allows you to create your own power to supply your entire home or business and can potentially cancel the problems associated.

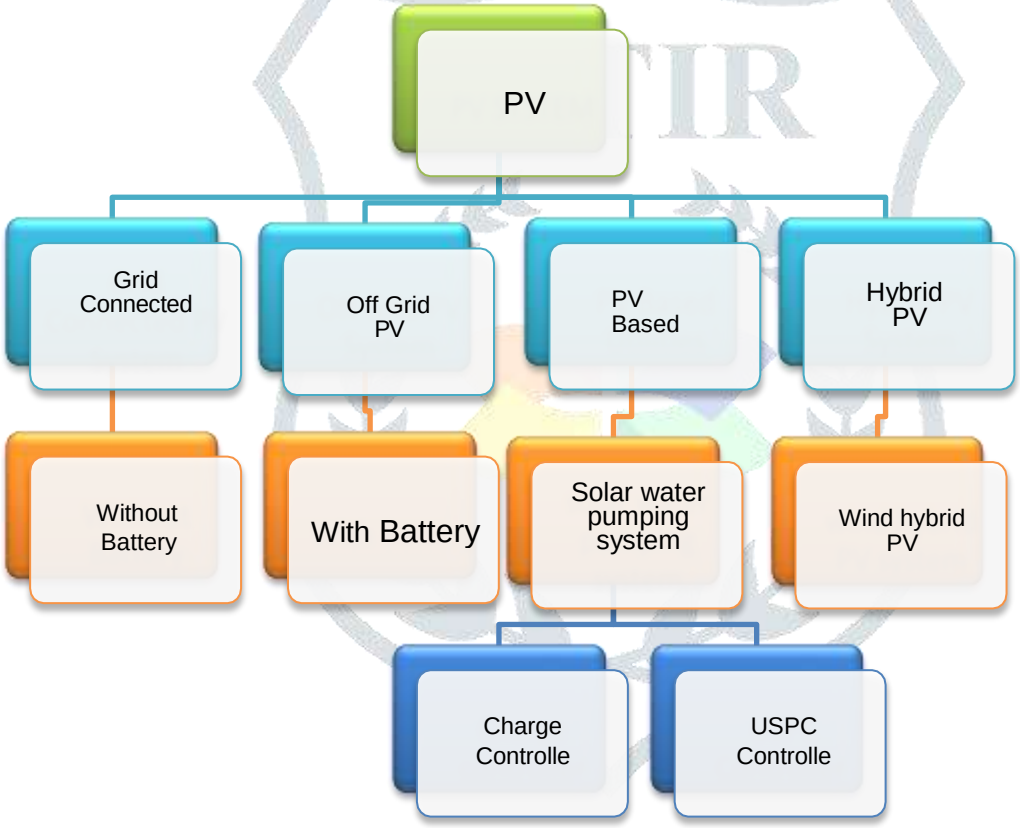
With large utility supply. The amount of power generated is dependent on several factors: the size and settlement of the power system, the module type, the available sunlight, and the efficiency of the electrical components used to covert solar energy into power usable by your home.

## OBJECTIVES

The main Objective of working on this model is a part of "Aatma Nirbhar Bharat" under which the farmers can be facilitated in many ways & they can independently carry out many activities through single device i.e. "USPC".

As the major income of our country comes from agrarian sector it is to be considered & developed in many aspects. The farmers are the foundation pillar of our Indian economy perhaps there is no doubt that they are huge assets for all of us & it's our moral & social responsibility to uplift them.

This project will definitely be a game changer for our farmers & very soon it will revolutionize the agriculture sector



Also By using this system we can use both pumps and rooftop system. This will be the money saver as well as economy booster system. In India 90% of farmer are still have their homes in their farm and with this system they can continue their farming as well as household appliances at the same timing

## PHOTOVOLTAIC CELLS

Photovoltaic cells are devices which 'collect the light and convert it into power system. The cells are wired in series, sealed between sheets of glass or plastic, and finded inside a metal frame. These peoples are called solar modules or panels. They are used to power various of applications ranging from calculations and wrist-watches to complete home systems and big power plants. Cells are made of thin silicon wafers; a semi-conductor material similar to that used in computer slides. When solar light is absorbed by these cells, the solar energy knocks electrons lost from their atoms, allowing the electrons to flow through the material to produce electric system. This process of converting light to power system is called the "solar effect".

## TECHANICAL OVERVIEW OF SOLAR PUMP 1.0 HP

- Sr. No. 1 (1.0 HP)
- TYPE V3 SUBMERSIBLE 6 STAGE
- HP/KW 1.0 HP/ 0.75 KW
- Stage 6 stages
- BODY JACKET SS
- Voltage 72VDC (30 ~100VDC)
- CURRENT / AMP 8 A Max
- Shut Off Head (in meters) 60 Meter
- Watt 1000 + 5% Variation ,Discharge Size 1 INCH
- Size of cable 1*3 *2.5 SQ.MM
- RPM 2850 RPM

## TECHNICAL DETAIL FOR 1.0 KW SOLAR PUMP CONTROLLER

- Sr. No. 1 ( 1.0 KW)
- Model 1.0 HP / 0.75 KW
- MAX INPUT VOC 96 V
- MIN INPUT VMP 24 V
- Current / AMP 8 A
- MPPT Inbuilt
- Display Inbuilt
- PROTECTION Dry Run Overload
- Low Load Voltage Cloudy Weather Safety
- Reverse Polarity Short Circuit Open Circuit

## TECHNICAL DETAIL FOR SOLAR PV MODULE

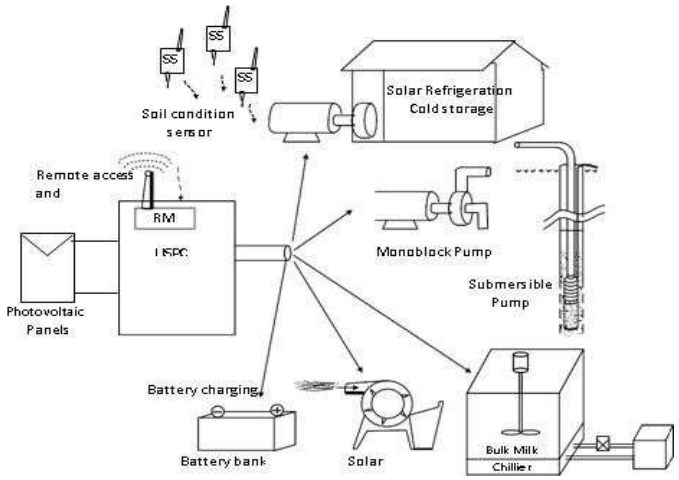
- Sr. No. 1
- Model (310 Watt)x3
- Total Watt 930 Watt
- Each Panel 310 Watt
- VOC 45 V
- VMP 30 V
- Current / AMP 8.33 A
- Total Panel No 3 Nos.
- Cell 72 Cell

## CIRCUIT OF USPC


## WORKING OF USPC

This system converts high voltage, direct current from a solar array into highly controlled, single or three-phase pulse width modulated. Alternative current to run standard AC water pump motors. The USPC is capable of controlling 110, 220 or 230 VAC single or three-phase motors. Automatic shutdown protects the pump and motor from damage during neglected operation. In the morning, the USPC begins supervising power from the

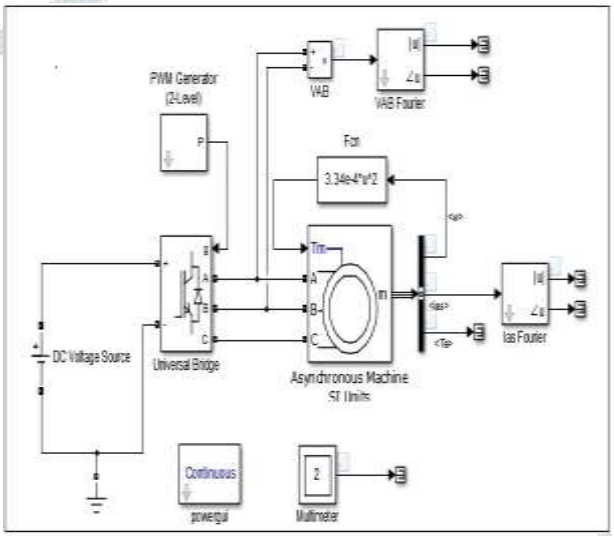
Solar array. When there is enough power to operate the system, the USPC delivers power supply to the pump motor while monitoring the motor power requirements. If the motor requirements are not dry well or locked rotor, the system continues to provide power to the pump throughout the day in proportion to the amount of power received from the solar array.




Power is always limited to the maximum power specified for the pump motor. Ratio power delivered from the photovoltaic array allows the system to run at variable speed. Variable speed an object is said to be in variable speed when the object covers a different places at equal intervals of times.

One of the main stages of pump motor problems is the stress applied to motors during a full voltage start-up. The USPC variable speed operation ramps up the speed easily, which lost starting stress. There is no junction box or motor starter to purchase. Maintain to system.

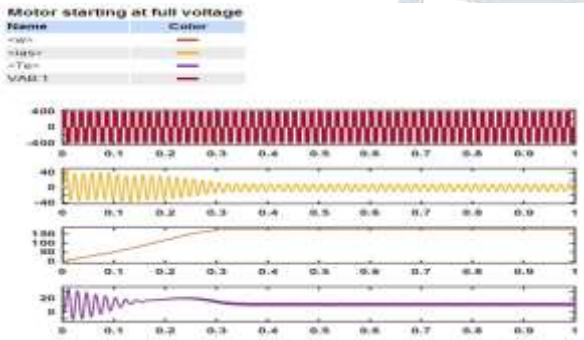
## SIMULATIC CIRCUIT



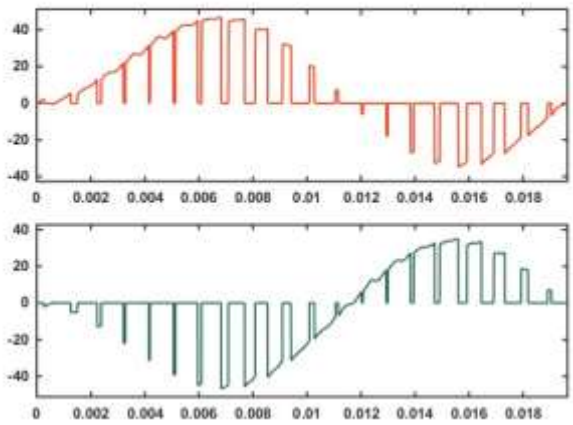

The start winding is controlled by the USPC system and the USPC system provides motor overloading

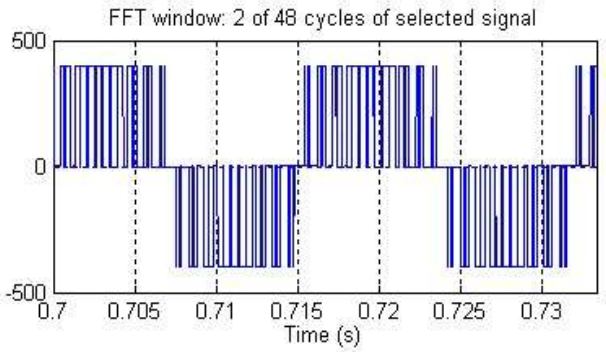
protection. The microprocessor-controlled converter has assembled settings of minimum motor speed, allowing the motor to run more efficiently and maximize the rate of water pumping during a day. Power motor speed settings make sure each pump site will obtain the maximum rate of water possible during marginal solar intensity system, like hazy days. Power motor speed settings make sure each pump site will obtain the maximum rate of water possible during marginal solar intensity system, like hazy days.

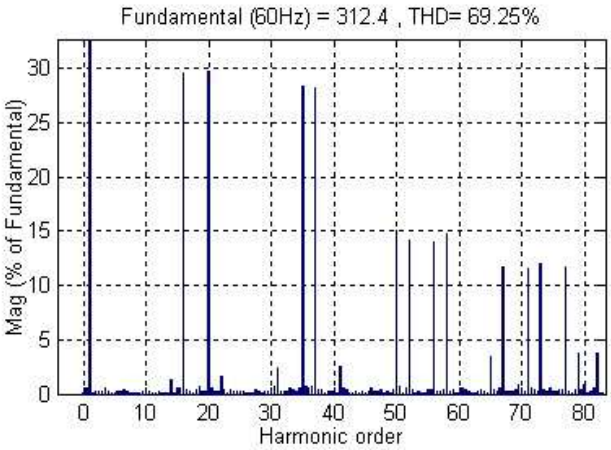
## SIMULATIC RESULTS










## ADVANTAGES OF USPC

The USPC system should therefore be such that when farming is not required, the farmer can clean his required with Winnower/Thresher, cut chaff for milk animals, and operate cold storage to preserve his deep freezer to store agrarian/dairy produce. This will save the farmers diesel/petrol cost, get higher market value for his generate and raise income many fold. In order to increase the utilization of solar PV system, the controller supplied for installation of solar pumping system should perform several other system for farming and other needs of a farmer to increase the generated of farming sector and income of farmer. Normally charge controllers are used 120 to 140 days in a year. With the use of USPC the solar system could be used more than 320 days in a year.

## DISADVANTAGES OF USPC

First of all USPC system is very costly compare to normal charge controller. This system is very complicated for understanding to farmers. USPC circuit design & programming are very complicated, so need highly skilled engineers for any services and maintenance.

## CONCLUSION

A review of current status of solar photovoltaic water pumping system technology research and applications is displayed. The quarries target on update on solar water pumping system, performance analysis studies carried out worldwide, optimum sizing systems, Degradation of solar generator supplying power to pump, economic evaluation, environmental aspects and recent advances in materials and efficiency improvement of PV system and experience of using solar PV pumps worldwide. Based on the study main conclusions are as follows: solar water pumping system is reliable and economically viable alternative to power and diesel water pumps for irrigation of farming crops. Solar water pumping for urban, rural and community water supplies and institutions, is another useful feasible sector but is not still widely usefully. The remote inaccessible locations with no grid power also need special focus. These sectors still depend on conventional power or diesel based pumping system resulting in increased costs to the users.

Keeping in view the high fitting costs of solar water pumps especially for big irrigation and water supplies, more incentives are required to be provided by governments to make the system further attractive alternative to diesel and electrical water pumping. Factors affecting the working and efficiency improving systems, use of highly efficient solar modules including bifacial modules and degradation of solar generator are areas for further research for lowering the cost, improving the working and pumping system life time. Solar pumping is an alternative for irrigation and rural, urban drinking water pumping using in developing countries especially India, China, other Asian and African countries, keeping in view big solar users and the reality that significant rural population lives in the important areas which requires water for drinking and irrigation of crops.

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