PHY121
Applied Physics for Engineers

Lab Project Report

Solar Pump System

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BS Software Engineering (2022-2026)

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Project: "Solar Pump System"

Introduction:

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. as opposed to grid electricity- or diesel-run water pumps.

Objective:

1. To design a water pumping system for irrigation that uses solar energy for its operation.
2. To design a pumping system that minimizes human interventions.
3. To design a water supply system that makes irrigation more efficient.

Advantages of Solar Pump:

1. No fuel cost - as it uses available free sun light.
2. No electricity required.
3. Long operating life.
4. Highly reliable and durable.
5. Easy to operate and maintain.
6. Eco-friendly

Components (Apparatus) for Project:

We will use followings components

Solar Cell 6V, Water pump 3-6V, Battery (Power Development), Water Storage tank, Tray for Ground water Storage, Beard board, 2 On/Off switches, Straws (as a pipes), Cardboard, Artificial Plants, Wires

Procedure:

1. First, we take a tray with water pump in it of 6V for a storage of ground water.
2. Connect the positive and negative wires of a water pump with positive and negative terminal of solar panel of 6V and use an On/Off switch (S_1) with wire of solar cell for controlling the electricity to pump.
3. Give a good light source to solar panel it will generate an electricity in wires by photoelectric effect. Now, just ON the switch (S_1) the electric currents will start flowing from solar to water pump and water pump will start drawing water from underground water. So, in this way we are able to run a water pump with a solar panel without any external source.
4. Give the output flow of water pump to the water tank for water storage after pumping.
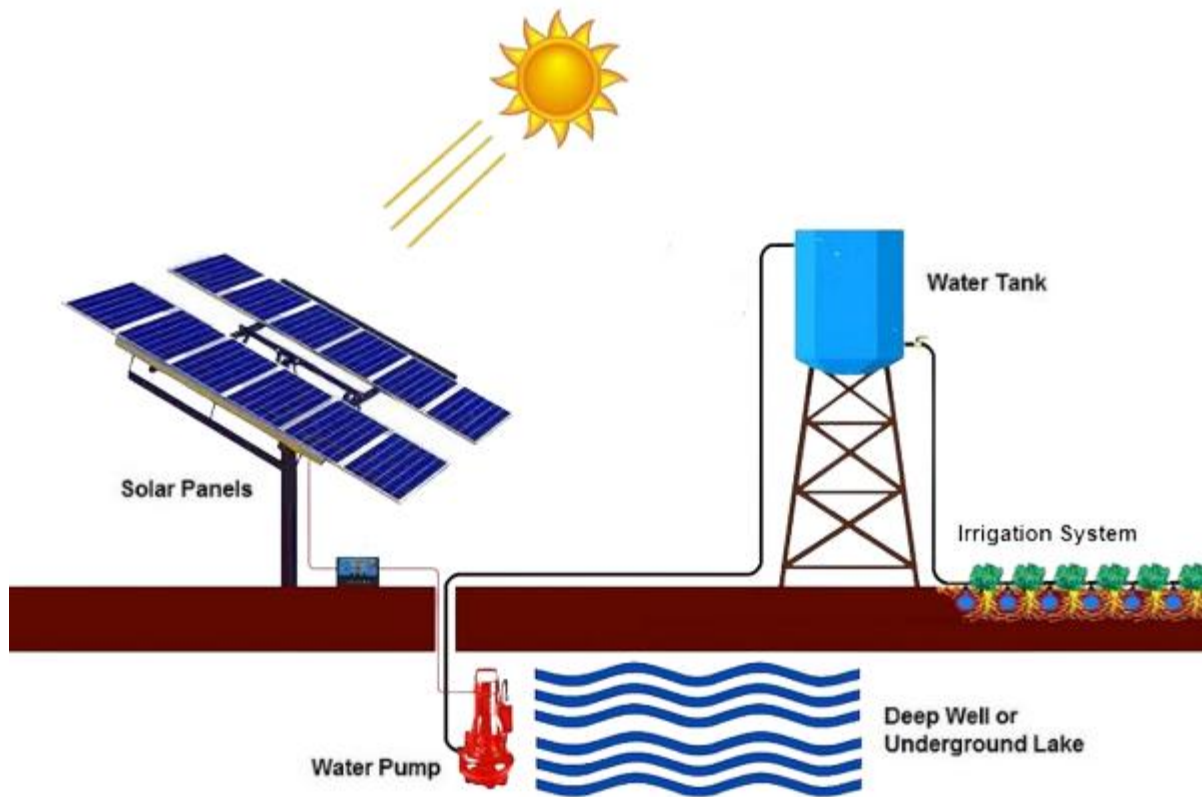
External Source:

5. Suppose if the weather was Cloudily then we will not be able to run a water pump with solar energy so, for this purpose, we will also connect the positive and negative wires of a water pump with an external battery or any other external source with an On/Off switch (S_2) for controlling the electricity from external battery.

6. Now, if we ON only a switch (S_1) which is connected with pump and give a good light source to solar, then there is a flow of current in the wires and because of this current water pump will start drawing water from the ground and it will fill the tank.

7. In cloudily weather there will be no current in wires because solar panel have not enough light source to generate electricity. So, now for this purpose first OFF the switch (S_1) and ON the switch (S_2) which is connected in a way of battery. So, in this way electric current from battery start moving from battery to water pump and water pump will again start drawing water from underground water storage.

8. Now, give the output of water tank to Garden.

9. After filling a tank with water pump we will use this water for watering the garden.
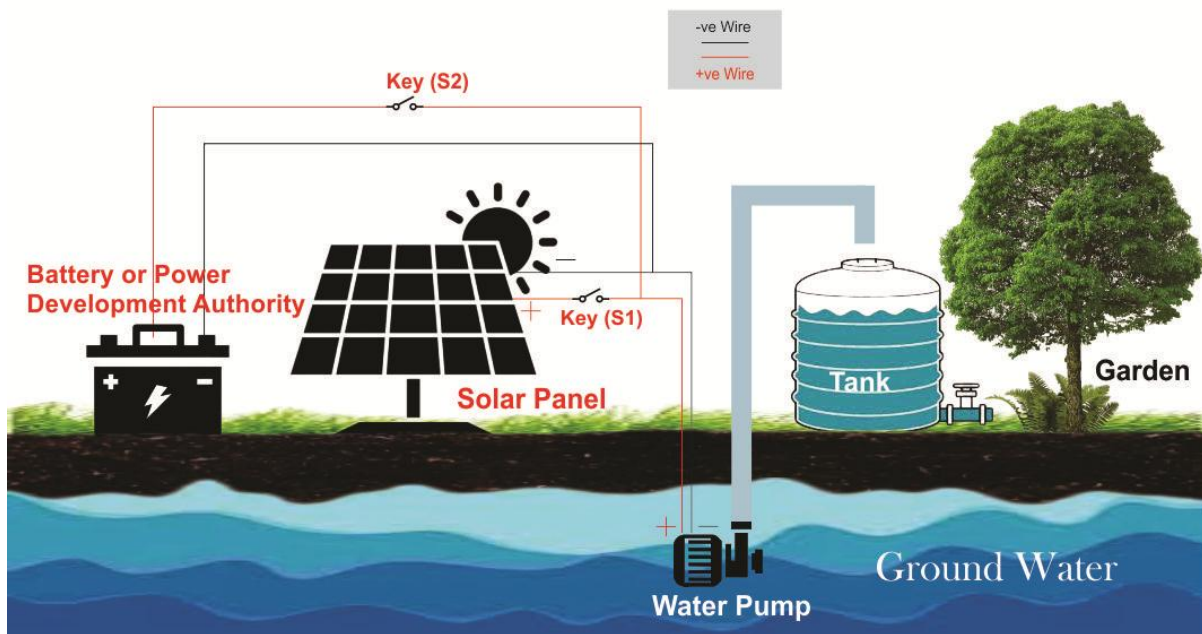
Working of Solar panel:

A solar cell is a sandwich of n-type silicon (blue) and p-type silicon (red). It generates electricity by using sunlight to make electrons hop across the junction between the different flavors of silicon:

1. When sunlight shines on the cell, photons (light particles) bombard the upper surface.
2. The photons (yellow blobs) carry their energy down through the cell.
3. The photons give up their energy to electrons (green blobs) in the lower, p-type layer.
4. The electrons use this energy to jump across the barrier into the upper, n-type layer and escape out into the circuit.
5. Flowing around the circuit, the electrons make the lamp light up.

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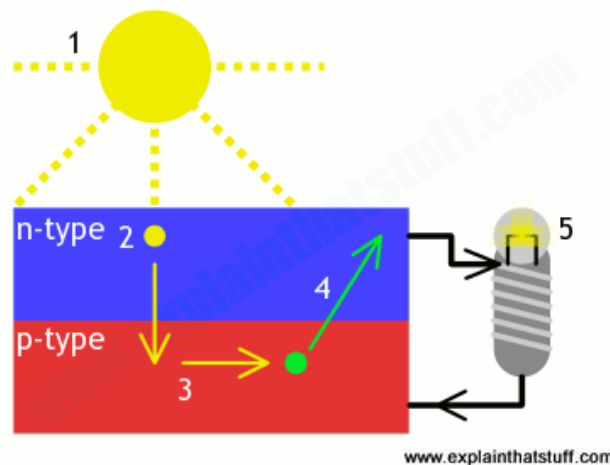
Applications of Solar Pump System:

1. Solar Powered Water Pumps use generated electricity to pump water. Solar water pump installations are versatile and can be used for various applications: It enables people to manage their drinking water supply, livestock watering, and other residential applications. Usually, the need for water is greatest during the hot sunny days.
2. The solar water pumping system is the promising solution for irrigation. It is a clean, environmentally friendly and reliable source of supplying water that requires low maintenance. It has no running cost and long life as compared to a diesel generator. It used to provide high irrigation efficiency by supplying proper amount of water to every area of the agricultural field to gain speed in cultivation.
3. A water pump can drain water from a basement or shallow flooded areas, drain and fill a swimming pool or dam.
4. It is also be used to provide water supply to cities.
5. Solar-powered water pump solutions help transform farmers' lives by providing sustainable power and timely water availability, thereby increasing their yield and income

Conclusion:

Solar pumping system offers an alternate means to meet the electricity demand for irrigation and livestock watering. Under the circumstances of inadequate supply of electrical energy, the solar water pump can play a significant role. Among various renewable resources, solar energy has great deal for utilization in electricity generation. Therefore solar water pumping system has great prospect of utilization in this country.

Note:

This report is **submitted** by a group of four students (as mentioned above) for a final lab project for the first semester of PHY121.

<u>Thank You</u>