

**SOLAR AND FUEL CELL HYBRID SPRAYER**Chandar Ketan M.¹, Gage Mayuresh S.², Nilkanth Sushant S³DEPARTMENT OF ELECTRICAL ENGINEERING,
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1. ABSTRACT: “Energy demand” is one the major thread for our country. Finding solutions, to meet the “Energy - demand” is the great challenge for Social Scientist, Engineers, Entrepreneurs and Industrialist of our Country. According to them, Applications of Non-conventional energy is the only alternate solution for conventional energy demand. Now-a-days the Concept and Technology employing this Non-conventional energy becomes very popular for all kinds of development activities. One of the major area, which finds number of applications are in Agriculture Sectors. Solar energy plays an important role in drying agriculture products and for irrigation purpose for pumping the well water in remote villages without electricity. This Technology on solar energy can be extended for spraying pesticides, Fungicides and Fertilizers etc., using Solar Sprayers. This Project deals how a ‘Power Sprayer’ which is already in use and works with hand operated pump and fossil fuel operated pump can be converted into solar sprayers.

It can be most often used at various locations such as farms, gardens although it can become more popular in rural areas as well. The additional advantage of this project is that in absence of sun rays the battery can be charge through external supply simply by connecting a charging cord.

Key words: Energy alternate device, Solar Sprayer, Agriculture Implements, hybride power sprayer.

2. INTRODUCTION

Spraying of pesticides is an important task in agriculture for protecting the crops from insects. Farmers mainly use hand operated or fuel operated spray pump for this task. This conventional sprayer causes user fatigue due to excessive bulky and heavy construction. This motivated us to design and fabricate a model that is basically trolley based solar sprayer. In our design, here we can eliminate the back mounting of sprayer ergonomically it is not good for farmers health point of view during spraying in this way here we can reduce the users fatigue level. There will be elimination of engine of fuel operated spray pump by which there will be reduction in vibrations and noise. The elimination of fuel will make our spraying system eco-friendly. So with this background, we are trying to design and construct a solar powered spray pump system. Now days there are non-conventional energy sources are widely used. The energy which is available from the sun is in nature at free of cost. In India solar Energy is available around 8 months in year .so it can be used in spraying operation. Solar pesticide sprayer can give less tariff or price in effective spraying. Solar energy is absorbed by the solar panel which contains photovoltaic cells. The conversion of the solar energy into electrical energy is done by these cells. This converted energy utilizes to store the voltage in the DC battery and that battery further used for driving the spray pump. A sprayer is a device used to spray a liquid. In agriculture, a sprayer is a piece of equipment that is used to apply herbicides, pesticides, and fertilizers on agricultural crops. Sprayers range in size from man portable units (typically backpacks with spray guns) to trailed sprayers that are connected to a tractor, to self-propelled units similar to tractors, with boom mounts of 60–151 feet in length. Timely application of herbicides pesticides and fungicides at peak periods plays a vital role in ensuring better yields from a crop.

The scope of the project is to develop a new mechanism for spraying of pesticides. The mechanism is designed such that the potential energy of the pesticide stored in the tank and additional spring force is used for generating the required velocity during spraying so that to remove the pest and get a better yield. Most of the increase in the area of irrigated land in the world has been through the increasing use of engine-driven pumps. However, the increasing price of oil-based fuel has reduced the margin to be gained by farmers from irrigation, since food prices have generally been prevented from rising in line with energy costs.

3. CONSTRUCTION**3.1 Solar panel:**

A solar panel(also solar module, photovoltaic module or photovoltaic panel) is a packaged, connected assembly of photovoltaic cells. The solar panel can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. Each panel is rated by its DC output power under standard test conditions, and typically ranges from 100 to 320 watts. The efficiency of a panel determines the area of a panel given the same rated output - an 8% efficient 230 watt panel will have twice the area of a 16% efficient 230 watt panel. Because a

single solar panel can produce only a limited amount of power, most installations contain multiple panels. A photovoltaic system typically includes an array of solar panels, an inverter, and sometimes a battery and or solar tracker and interconnection wiring.



3.2 Pump:

For people living in remote areas, solar water pumps are usually the only solution as there is no access to diesel. If there is diesel, Solar Water Pumps are the only solution or an excellent alternative for diesel as the cost of running power lines or diesel pumping may be too great. A solar powered water pump differs from a regular water pump only in that it uses the sun's energy to supply electricity for the pump. The solar panels absorb the sun's energy and convert it to electrical energy for the pump to operate. All the pumped water is stored in a water tank so that there is constant supply even in bad weather conditions and during night time where there is insufficient power to generate the solar water pumps. Solar powered water pumps represent a higher initial investment, however, over a period of 5 years they represent a cost benefit due to minimal maintenance costs compared to AC pumps run with a generator.



3.3 DC motor:

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills.

3.4 Battery:

An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smart phones, and electric cars. When a battery is supplying electric power, its positive

terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that when connected to an external circuit will flow and deliver energy to an external device. When a battery is connected to an external circuit, electrolytes are able to move as ions within, allowing the chemical reactions to be completed at the separate terminals and so deliver energy to the external circuit. It is the movement of those ions within the battery which allows current to flow out of the battery to perform work.

3.5 Tank:

Storage tanks are containers that hold liquids, compressed gases or mediums used for the short or long-term storage of fluids or gases. The term can be used for reservoirs. Storage tanks are available in many shapes: vertical and horizontal cylindrical open top and closed top flat bottom, cone bottom, slope bottom and dish bottom. Large tanks tend to be vertical cylindrical, or to have rounded corners transition from vertical side wall to bottom profile, to easier withstand hydraulic hydrostatically induced pressure of contained liquid. Most containertanks for handling liquids during transportation are designed to handle varying degrees of pressure.

3.6 Nozzle :

A nozzle is a device designed to control the direction or characteristics of a fluid flow (especially to increase velocity) as it exits (or enters) an enclosed chamber or pipe. A nozzle is often a pipe or tube of varying cross sectional area and it can be used to direct or modify the flow of a fluid (liquid or gas). Nozzles are frequently used to control the rate of flow, speed, direction, mass, shape, and/or the pressure of the stream that emerges from them. In a nozzle, the velocity of fluid increases at the expense of its pressure energy.

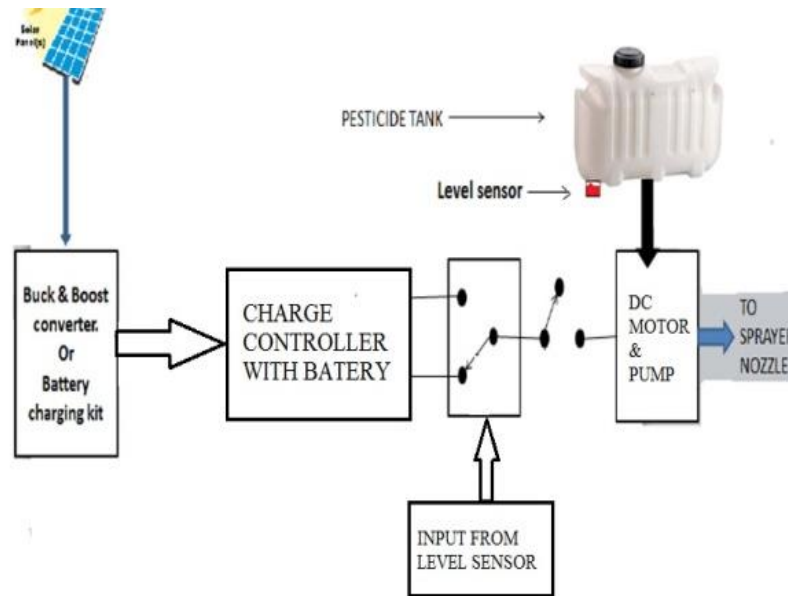
3.7 Bevel gear:

Bevel gears are gears where the axes of the two shafts intersect and the tooth-bearing faces of the gears themselves are conically shaped. Bevel gears are most often mounted on shafts that are 90 degrees apart, but can be designed to work at other angles as well. The pitch surface of bevel gears is a cone. Two important concepts in gearing are pitch surface and pitch angle. The pitch surface of a gear is the imaginary toothless surface that you would have by averaging out the peaks and valleys of the individual teeth. The pitch surface of an ordinary gear is the shape of a cylinder. The pitch angle of a gear is the angle between the face of the pitch surface and the axis. The most familiar kinds of bevel gears have pitch angles of less than 90 degrees and therefore are cone-shaped. This type of bevel gear is called external because the gear teeth point outward. The pitch surfaces of meshed external bevel gears are coaxial with the gear shafts the apexes of the two surfaces are at the point of intersection of the shaft axes. Bevel gears that have pitch angles of greater than ninety degrees have teeth that point inward and are called internal bevel gears.

4. Working principle:

This works on solar energy. The concoction is accomplished by the use of solar panel, a centrifugal pump which runs on dc supply is attached to the solar panel the solar panel generates the power that power is dc power its positive and negative charges are connected to a batter in order to save the power and use it when the sun raise are not present by using this device we can spray pest ices to the herbs and plants and any agriculture spraying it is economical as compared to the other means used like petrol/diesel pesticides sprayers. There is no much maintenance cost and no operating cost as it is using solar energy it is free of cost and there is no pollution its working principal is very simple and the it is economical of the farmers which has one more advantage that it can also generate power that power is saved in the battery and it can be used for both for spraying and well as to light in the house when there is no current supply.

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5. RESULT

The method used here to build solar powered pesticide pumping system is cost effective comparatively to an electrically operated hydraulic pump. Since here non-conventional energy is used to achieve the required head. Discharge obtained from the observations is .5liters per minute. The reciprocating pump built by us is built with the help of simple and easily available materials still we have successful to demonstrate the worth of a reciprocating pump. This device serves its purpose to some extent, but with proper course of actions, it can perform still better

6. CONCLUSION

The output of a solar pumping system is very dependent on good system design derived from accurate site and demand data. It is therefore essential that accurate assumptions are made regarding water demand/pattern of use and water availability including well yield and expected drawdown. With a solar pump, energy is not available on demand, and the daily variation in solar power generation necessitates the storage of a surplus of water pumped on sunny days for use on cloudy days, solar energy needs to be reserved in the form of either electricity in batteries or lifted water in a storage tank. The suitability of solar power for lifting water to irrigate plants is undeniable because of the complementary between solar irradiance and water requirements of crops.

7. REFERENCE:

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