

# Development of Automatic Solar Water Sprinkler

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## ABSTRACT

India is a vast country where water is very scarce in availability in some regions. Conservation of water is very much important in agriculture due to the various climatic phenomena's. The various alternative modes of irrigation techniques should be adopted to tackle this problem. The developed countries are using several methods to conserve and reuse the water. If we check the fact of water availability, two- third of earth is filled by water but only less than one percent of water can be used for the normal use. This is the point where the conservation of water's importance is arriving. The alternative mode of irrigation technique involves mist and drip type of irrigation. These type of irrigation reduces water wastage to a greater extent. In our project we are adopting the sprinkler mechanism for irrigation. The sprinkler is powered by the double acting pneumatic cylinder, in which on the forward and backward stroke of the cylinder pushes air to the water tank. This air from the cylinder moves the water out of the tank, through the sprinkler. This way ensures proper watering of the crop.

**Keywords:-** Solar Power, Irrigation, Solar panel, Sprinkler

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## I. INTRODUCTION

The sun provides sustainable amount of the energy used for various purposes on earth for atmospheric system. Every minute the sun radiates about  $5.68 \times 10^{26}$  calories of energy and the earth intercepts only  $2.55 \times 10^{18}$  calories (NRF, 2010). This represents only 2000 millionth of the total solar energy sent into the space. The total solar energy is estimated to be 30,000 times greater than the total annual energy of the world. If we able to convert a very few percent of this much solar energy into the benefit of common man, it will directly ensure the sustainability of our future generation. Solar energy is a time dependent and intermittent energy source. There is need for the storage of energy for later use when there is no further supply of the sun energy. An optimally designed solar electric system will collect and convert when the isolation is available during the day. Photovoltaic is the direct conversion of light into electricity at atomic level. When free electrons are captured, an electric current is produced and can be used as electricity. The series and parallel electrical arrangements to produce any required voltage. Photovoltaic modules and arrays produce direct-current (DC) electricity and current

combination. The chain drive used in the mechanism able to power the vehicle as well as the sprinkler to sprinkle the water to plants. This combined mechanism can deliver effectively better result in irrigation and give mobility to the mechanism to reach places where a permanent sprinkler system is too costly.

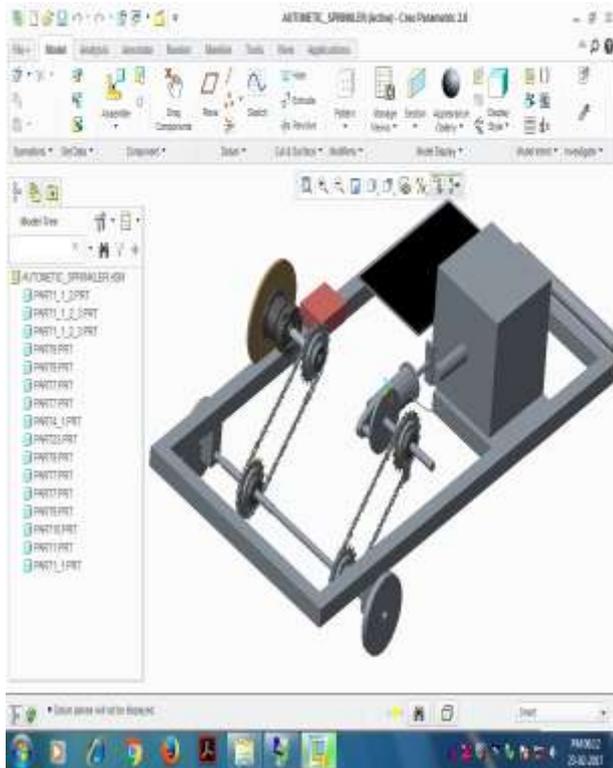
### Method

Water is scarcely available in some months of the year, water conservation is very much essential for the sustainability. The permanent installation of sprinkler and piping is too costly and it will result in few lakh rupees. The permanent sprinkler system needs lot of primary investment so there is a need of practical solution in between the higher cost and conservation of the water.

Solar energy giving alternative to the existing fossil fuel power production. According to world energy report, we get around 80% of our energy from conventional fossil fuels like oil (36%), natural gas (21%) and coal (23%). It is well known that the time is not so far when all these sources will

be completely exhausted. So, alternative sources should be used to avoid energy crisis in the nearby future. So introduce solar energy for the machine process to work.

## II. CONCEPTUAL MODEL



### Discussion

To design the system to sprinkle the water powered by the solar energy.  
To fabricate the automatic travelling sprinkler system.

## III. WORKING PRINCIPLE

Automatic travelling water sprinkler is powered by solar energy. The solar energy is absorbed by the solar panel and the energy is stored as electricity in the battery. This battery gives power to the DC motor. The DC motor is connected with the chain sprocket assembly. The chain and sprocket is connected with the rear shaft which helps the machine to propel forward. At the rear shaft another set of chain and sprocket is also there. The fourth sprocket of second chain is connected with the crank plate via shaft. The crank plate is connected to the piston rod of the cylinder, where the rotary motion of crank plate is converted to the reciprocatory motion in the pneumatic cylinder. The double acting cylinder is connected with the water tank by a non-return valve. The air goes to the water tank pushes water out of the tank. This pushed out water is sprayed through the sprinkler to the plants.

### IRRIGATION:

#### Types of Irrigation techniques

#### Surface Irrigation

In surface irrigation, water moves over and across the land by simple gravity flow in order to wet and infiltrate the soil. Surface irrigation can be divided into furrow, border strip or basin irrigation. It is often called flood irrigation when it results in flooding or near flood of the cultivated land.

#### Sprinkler Irrigation

Sprinkler irrigation is another popular method, which pipes a set amount of water to the fields, and then sprays this directly over the crops with high pressure sprinklers. The amount of water can be closely controlled, which is a huge benefit.



#### Drip Irrigation

Drip irrigation, also known as trickle irrigation, functions as its name suggests. Water is delivered at or near the root zone of plants, drop by drop. This method can be the most water-efficient method of irrigation, if managed properly, since evaporation and runoff are minimized. In modern agriculture, drip irrigation is often combined with plastic mulch, further reducing evaporation, and is also a means of delivery of fertilizer. The process is known as fertilisation.

#### Centre-Pivot Irrigation

Centre-pivot irrigation involves a self-propelled system in which a single pipeline supported by a row of mobile towers is suspended 2 to 4 meters above ground. Water is pumped into the central pipe and as the towers rotate slowly around the pivot point, a large circular area is irrigated. Sprinkler nozzles mounted on or suspended from the pipeline distribute water under pressure as the pipeline rotates. The nozzles are graduated small to large so that the faster moving outer circle receives the same amount of water as the slower moving ones on the inside.

### Response of sprinkler System in water saving and yield increase

Crops	Water Saving, %	Yield increase, %
Bajra	56	19
	56	16
Bhindi	28	23
Cabbage	40	3
Cauliflower	35	12
Chillies	33	24
Cotton	36	50
Cowpea	19	3
Fenugreek	29	35
Garlic	28	6
Gram	69	57
Groundnut	20	40
Jowar	55	34
Lucerne	16	27
Maize	41	36
Onion	33	23
Potato	46	4
Sunflower	33	20

### IV. CONCLUSION

Solar energy is easily available in India. In rural area electricity is not available easily but solar energy is easily and freely available for the irrigation purpose to sprinkle the water.

So by using Automatic solar water sprinkler we will be able to conserve the water and electricity and hence reduce the human work and money.

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