



## Smart Farming Using Solar Energy

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### ABSTRACT

This project has been made to develop automatic smart farming system by using solar energy .The major drawbacks of conventional farms require large effort, more energy and excess amount of water .Therefore, we have fabricated smart farming system to make improve irrigation and protection of farms. In this irrigation system, we are making the use of soil moisture sensor which senses the humidity of soil and supplies the water as per the requirement of the soil through drip to distribute equal amount of water to the whole farm. Also, we have designed a sounding bell we makes sound by the rotating rod. With the help of this sound, we are able to protect the crops from animals and birds who enter into the farms in search of their food.

Keywords : Solar Energy, Smart Farming

### I. INTRODUCTION

The energy used in agriculture has risen in the recent decades .Energy is used directly in farm activities such as fertilization, irrigation and indirectly in different forms. The other forms may be providing protection to the crops from sounding bell which will rotate with the supply of solar energy and terrify animals making them scared of the noise so that they will feel that someone is present in the fields and will leave the field in the fear of sound. Hence, this paper provides the protection to the fields with the help of solar energy which is renewable and environment friendly. It reduces the human effort and also replaces the use of scarecrow. Hence, the optimization of energy use has been achieved through the use of smart farming.

Solar energy is one of the promising alternatives to the fossil fuels based energy source. Solar energy based water pumping system is efficient and cost effective for livestock - watering, irrigation purposes and for supply of water. It has some more advantages like non-polluting, does not emit any greenhouses gases or harmful waste, used for low-power purpose as well as larger ones requires very little maintenance for many year.

### SOLAR POLICY OF INDIA

India is located in northern hemisphere, lying between latitudes 8oC'N and 37o6'N and longitudes 68o7'N and 97o25'E .It enjoy around 250-300 days of sunlight a year. Being in the tropical region, evidently India is bestowed upon by abundant solar

isolation. It is estimated that the total solar potential in India is 748GWp and highest untapped potential of 142.31 GWP is in Rajasthan. The first major initiative by government of India in this direction was the establishment of Jawaharlal Nehru National Solar Mission (JNNSM) in the year 2010 as one of the steps under the national action plan on climate change (NAPCC).

The energy policy of India is largely shaped by its need to ensure energy self sufficiency and energy security. Solar energy policy has following major components which are instrumental in boosting the growth of this resource

- a) JNNSM
- b) Accelerated Depreciation (AD)
- c) Generation Based incentives (GBT)
- d) Renewable Energy obligations (RPOs)
- e) Renewable Energy Certificates (RECs)
- f) Tax holidays
- g) Net metering

## II. IMPORTANCE OF IRRIGATION

In India there are 80% of the total annual rainfall occurs in four months in a year i.e. from mid- June to mid- October. So it is very necessary to irrigate the farm field in the rest eight months of the year.

Most of the states in India give irrigation load during the night time. Considering the conventional method the farmer need to irrigate the farm during the cold weather and it is very difficult to work in the temperature of below 10oC during the night time and requires large amount of water and effort and energy.

While , if the irrigation is made automatic this work contributes not only to save water fertilizers but also ensure uniform watering at right time without manual intervention leading to enhance the quality and quantity of agricultural fields.

Timely irrigation is critical for Indian agriculture. We are yet to have a impact on monsoon over the last one decade monsoon has affected due to climate change factors . The cropping intensity ground water has been depleting and ultimately rain has led to flood. Gravity led irrigation system such as major, medium and minor irrigation has problem with tail end issues.

During sowing and plant growth stages there is need of critical and time irrigation based on crop water requirement.

## III. IMPORTANCE OF PROTECTION

Animals in search of their food enter into the farms and destroy the fields. This leads to loss in the crops and farmers suffer the loss in money and they fail to get the desired output of crops .This is the serious problem faced by the farmers and should be taken into consideration. Here, the farmers use the conventional technique to protect the farms from roaming animals and birds, this old technique used by the farmers was less effective and required more effort and that's why we are introducing the smart technique of farm protection.

In this paper we have provided the sounding bell which will make noise on striking the plate and hence the noise will frighten the animals and they will be made sure that someone is present in the field and hence due to the noise they will get afraid

and won't enter the fields. The sounding bell will rotate with the help of motor connected to it. Hence, we may be able to save the crops from animals, birds. And the farmers will get succeeded in the protection of crops. It also replaces the use of scarecrow. The below figure shows the mechanism of sounding bell which is rotating with the help of motor.

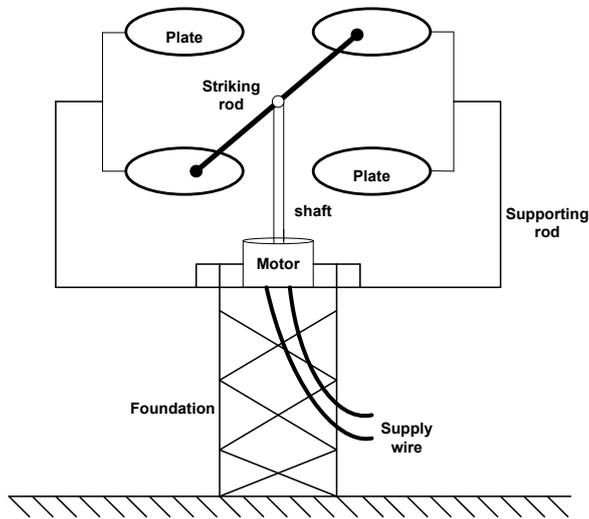


Figure 1. mechanism of sounding bell

#### IV. ENERGY USED IN AGRICULTURE

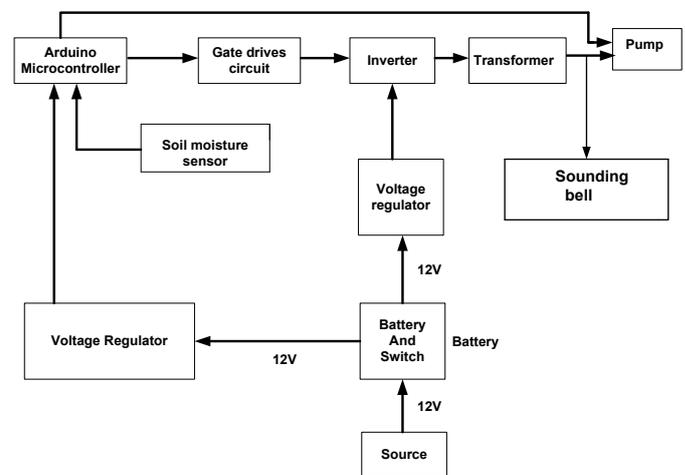
Energy is directly used in activities ranging from filed processes such as irrigation of land. Energy is obtained from the sun used to irrigate the land. We use the irrigation method of drip system. The energy stored in the battery which is then converted from DC to AC with help of inverter connected to the transformer. The transformer step-up the voltage level to 220 V. The solar energy is also used to sounding bell.

#### V. PROPOSED AUTOMATED SYSTEM

The smart farming also includes smart irrigation system which aims at conserving water and energy using drip irrigation method. Soil moisture sensor

are to be used to measure the volumetric water content of the soil. Measuring soil moisture can help in efficient management of irrigation system and can also help in increasing yield and quality of the crops. Soil moisture exceeds a threshold value. The water flow is stopped or decreased depending on the value. Water is made available to the plants when the moisture content in the soil goes below the threshold by initiating water supply using the relay /reed switches through the microcontroller.

#### VI. SYSTEM BLOCK DIAGRAM



#### VII. FEATURES

- a) It is a cost efficient method of irrigation system.
- b) We make the use of solar energy for the irrigation purpose hence using the non-conventional
- c) energy resources.
- d) Water is equally distributed to crops without wasting it, hence, saving water.
- e) This method is effortless and hence saves the, man-work.
- f) It can be easily used to protect the farm from roaming animals and birds by making sound.

- g) It leads to an increase in the desired output of crops.

### VIII. CONCLUSION

In this present investigation, solar panel automatic drip irrigation system was developed for irrigating the farm land by measuring the soil moisture. The subcomponents of this project Arduino microcontroller, solar panel, battery, charge controller, inverter, sounding bell, soil moisture sensor, and other accessories such as submersible pump and drip irrigation. Effective tool for the farmers those who want to conserve water and who also faces power of shortage at their places where sufficient sunlight is available. With the help of this project, the pump can run maximum for 7-9 hours per day with the help of solar panel and battery and 5-7 hours per day without battery taking power directly from solar panel. The automated irrigation system is a feasible and cost effective technique for optimizing water resources for increase in agriculture production.

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