iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** VI **Month of publication:** June 2019

DOI: http://doi.org/10.22214/ijraset.2019.6287

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue VI, June 2019- Available at www.ijraset.com

Fabrication of Solar Powered Smart Cultivation System

M. Habeeb[1], K. Sagar Kumar[2], G. Mallikarjuna[3], S. M. Girish Kumar[4], J. Ramesh[5]
[1]*UG Student,* [2,3,4,5]*Assistant Professor, Department of Mechanical Engineering, Dr. KV Subbareddy Institute of Technology, Kurnool, AP, India*

Abstract: ***India is a set to be and agriculture base country directly and indirectly 75 % people are depending on forming in this sector there is a lot of field work such as weeding raping and sowing etc. A part from this operations Spraying cutting and digging these are important operations to be by former. Formers are facing enormous problem while spraying, cutting and digging like tank capacity spraying time take more on the other hand electric supply is major concern in areas formers are not getting regular supply of electricity for agricultures. To solve these difficulties a new equipment that is solar powered smart cultivation systems it is portable device and does not need any fuel to operate This equipment operated pesticide spray equipment consumes less time The main aim of this project is to be develop low cost mechanically operated sprayer, cutting digging for Indian middle scale formers.***

Keywords: Agriculture, cultivation, solar powered, cutting, digging.

I. INTRODUCTION

The objective of this paper aims to reduce the rural poverty and improving and increasing agricultural production through community based approach in designing and implementing components which directly impacts the lives of poor in participating provinces and districts. Increasing productivity is a major factor in each and every step of human effort; this has positive reflections in the form of new technological inventions; however on the dark-side this has ruined the agriculture sector. Due to increase in domestic consumables, the wages of daily labour have increased tremendously with no change in the cost per bag of paddy .This situation if left unanswered would lead to food scarcity in India. Our project on solar cultivation equipment s a revolutionary machine which answers all the difficulties of today‘s poor farmers such as Multipurpose plogging, spraying and cutting of crop can be performed in a single machine Less capital required: Machine cost can easily be earned in two crops that is one year Reliability: Life of solar panels is about 15 years which is the costliest components Eco friendly works on solar power

The formers who use these types of conventional backpack of cutting, digging and sprayer faces many types of problems like fatigue, tiredness, pain in spiral cord and muscles etc. solar energy represents one of those source that are constantly replenished and at the same time it is a ” clean” source. Farmers are at the centre of the problem regarding climate change and electricity problems so that’s why solar technology can be used for electricity, water pumping, cutting and digging (or) plogging operations

A. Heavy in weight causes difficulty in lifting manually.
B. Fatigue to the operator due to heavy weight.
C. Due to heavy weight during spraying, Operator Feel very tiredness and fatigue which reduces his efficiency.
D. Big size of pump cause inconvenience to the operator.
E. Poor selection and quality of equipment.
F. These problems combined with a lack of awareness and technical knowledge and inadequate maintenance and poor field use of equipment has led to unacceptable risks to environment and human health.

II. METHODOLOGY

This irrigation system has two main modules-Solar pumping module and automatic irrigation module. Solar pumping module: Solar pumping module has the following components solar panel, control circuit, battery and a water pump powered by solar energy. Solar panels of required capacity are used to generate electrical energy that is used to drive the water pump. Convertor circuit is used to convert the direct current produced from the solar panel into alternating current. Battery is used to store the direct current produced from the solar panel. Automatic irrigation module: An automatic irrigation module has the following components stepper motor, moisture sensor and a control circuit for stepper motor. stepper motor controls the outlet of the water tank. stepper motor is driven by the control circuit which gets signal form the moisture sensor according to the moisture level in the field. if moisture level

©IJRASET: All Rights are Reserved

is low on the field the signal received by the control circuit actuates the stepper motor to open outlet of the water tank. If the moisture level in the field is sufficient by using the signal from the moisture sensor the driver circuit controls the stepper motor to close the outlet of the water tank. Our project model consists of a four wheeled body with cranking mechanism with pump crank being pushed and pulled to result in pumping, building the pressure in the tank for pesticide spraying. The wheels are fixed on the main axle and cranking is on the other axle which pushes the piston rod in and out of the cylinder pumping the air pressure into the tank. There is a tank fitted on the frame through there is a main suction tank which consists of pesticide which the sprayer is connected on the protruded rod and jet is set for the required pitch. When the handle is pushed the wheels rotate and move and simultaneously pump the air is affected.

Spray deposit efficiency is greatly influenced by local meteorological conditions at crop height. Wind velocity and direction, temperature, relative humidity and the frequency of rain all influence spray deposit. The distance that a spray droplet travels depends on the droplets downward velocity, the height of release and the wind speed. The larger the drop the less it is effected by wind and the faster it falls thus reducing drift, but the distribution efficiency will also be reduced, which may in turn lessen the performance of a non-systemic product.

III. CONSTRUCTION

The main components of the Solar powered smart cultivation system are Frame, solar panel, Battery, DC motor, Microcontroller, sprockets and chain, pesticide tank, Extension rod and sprayers, cutter and digger.

A. Frame

The main function of frame is to carry whole assembly on it so it has to be strong enough to hold it. The frame is made of square pipe and it is formed out of mild steel.

B. Solar Panels

Solar panels are devices that allow for the input of sunlight, and convert this sunlight into electricity. The shape of solar panels can vary in different rectangular shape and accombination of these rectangular shaped panels are installed and used to produce the electricity.

C. Battery

Battery is used for store the solar energy which can be further converted into electrical energy.

D. DC Motor

The speed control of dc motor is achieved easily hence we are using dc motor for mowing the grass cutter and cutting the grass. Here we are using separate motor for mowing and cutting the grass. The speed of motor used for blades is greater than motor used for mowing the cutter.

E. Microcontroller

It is used to control the overall functions of the grass cutter .In this proposed system we utilize the solar energy from solar panels to automatically pump water from bore well directly into a ground level storage tank depending on the intensity of sunlight.

F. Sprockets And Chain

The two different diameter sprockets connected by a chain are used to transmit the energy. The larger diameter sprocket is at the wheel hub and another smaller diameter sprocket along with the hub and connecting rod is at the pump handle.

G. Pesticide Tank

16 Litre Knapsack Sprayers are conventional and most popular equipment used worldwide. They are ideal for spraying insecticides, pesticides, fungicides, herbicides etc. in field areas to protect the crop from pest attack.

H. Cutter

A new type of grass cutter which runs on solar energy is build and this model is also economical.

I. Digging

Digging is actually the combination of two processes, the first being the breaking or cutting of the surface, and the second being the removal and relocation of the material found there.

©IJRASET: All Rights are Reserved

IV. WORKING PRINCIPLE

The proposed system having two working units: one is solar other is smart irrigation unit. The solar pumping unit is utilizing the solar energy to operate the pump. The solar energy is converted into electric energy with photovoltaic cells which are installed near the pump set. A r controlling the batteries. On the other hand smart irrigation unit is equipped with electronically controlled solenoid valve. This valve regulated by soil moisture sensing unit and used to control the flow of water. s of voltage. This voltage signal is send to sensing unit and is compared to the reference voltage which can be set by the farmer according to the crop requirement.
The difference of these voltages is directly proportional to the water requirement. Then the sensing unit is given signal to the motor whose revolving angle is dependent to the difference in voltage. The motor controls the flow rate of water through solenoid valves. Hence, the moisture difference is proportional to the amount of water flowing microcontroller is further connected to Global System for Mobile Communication (GSMC) which is used to send SMS to the user for real time monitoring from remote location If the moisture value is less than the preset value then the system will automatically open the solenoid valves. The solenoid valves in the pipe will open for prescribed time and then automatically closed.



As the entire system will be triggered for every 1 hour, it is more sufficient for a plant to maintain the moisture required for it. Likewise the water level sensor in the tank will screen the water level inside the tank and in the event that it is lower than the fundamental parameter, the system will begin the motor to pump the water from the well. For every one of the data about the status of the water level, motor on/off, moisture level is communicated to the client through SMS. Since all the nodes are powered by solar energy from the solar panel, the system will reduce the energy supply problem also. The flowchart will explain the complete process of the system. The system is designed in such a way to minimize the cost of communication between sensors.

V. APPLICATIONS

Irrigation can be completed in fields, gardens, farms etc. It is effective for diversities of crops. This application can be used for patient monitoring. The software application developed for this system can be used for domestic works such as tank storage. This system can be functioned automatically as well as manually

A. Nutrients as foliar spray. For the insecticides application to control insect pests on crops and in stores, houses, kitchen, poultry farms, barns, etc.
B. For the fungicides and bactericides application to control the plant diseases.
C. For the herbicides application, to kill the weeds.
D. For the harmony sprays application to increase the fruit set or to prevent the premature dropping of fruits
E. For the application of plant
F. For applying the powdery formulation of poisonous chemicals on the crops and for any other purposes.
G. Pesticides Sprinkling.
H. Can be used in agriculture field
I. Used to maintain experimental plants

©IJRASET: All Rights are Reserved

VI. CONCLUSION

This innovative smart irrigation system (SIS) is very beneficial for government as well as farmers. This is one of the best solutions for energy crisis and water consumption. The smart irrigation system reduces the human intervention during the irrigation of field and also optimizes the water usages. Once the system is installed, unutilized energy produced by the solar PV can also be linked with grid system which can be revenue source for farmers. Hence, SIS is motivating farming in India and at the same time it is giving solution for the energy crisis. Despite the fact that it required high initial investment for implementation of SIS but in the long run this system is more economical than the conventional irrigation method. Government should also demonstrate this type of innovative system to motivate the farmers for adopting such type of system.

The Proposed solution solves the energy crisis of the farmers as well as the government. by implementation of this project water wastage is reduced and prevents scarcity of water. Eliminates the dependence of farmers on grid power for irrigation. Also human intervention in irrigation is reduced. This project uses renewable source of energy and it is eco friendly and cost effective

The main applications for this project are for farmers and gardeners who do not have abundant time to water their crops plants. It also covers those farmers who are wasteful of water during irrigation. The project can be extended to greenhouses where manual management is far and few in between. The principle can be extended to create completely automated gardens and farmlands. Collective with the principle of rain water harvesting, it could lead to massive water savings if applied in the right way. In agricultural lands with severe shortage of rainfall, this model can been effectively applied to attain great results with most types of soil.

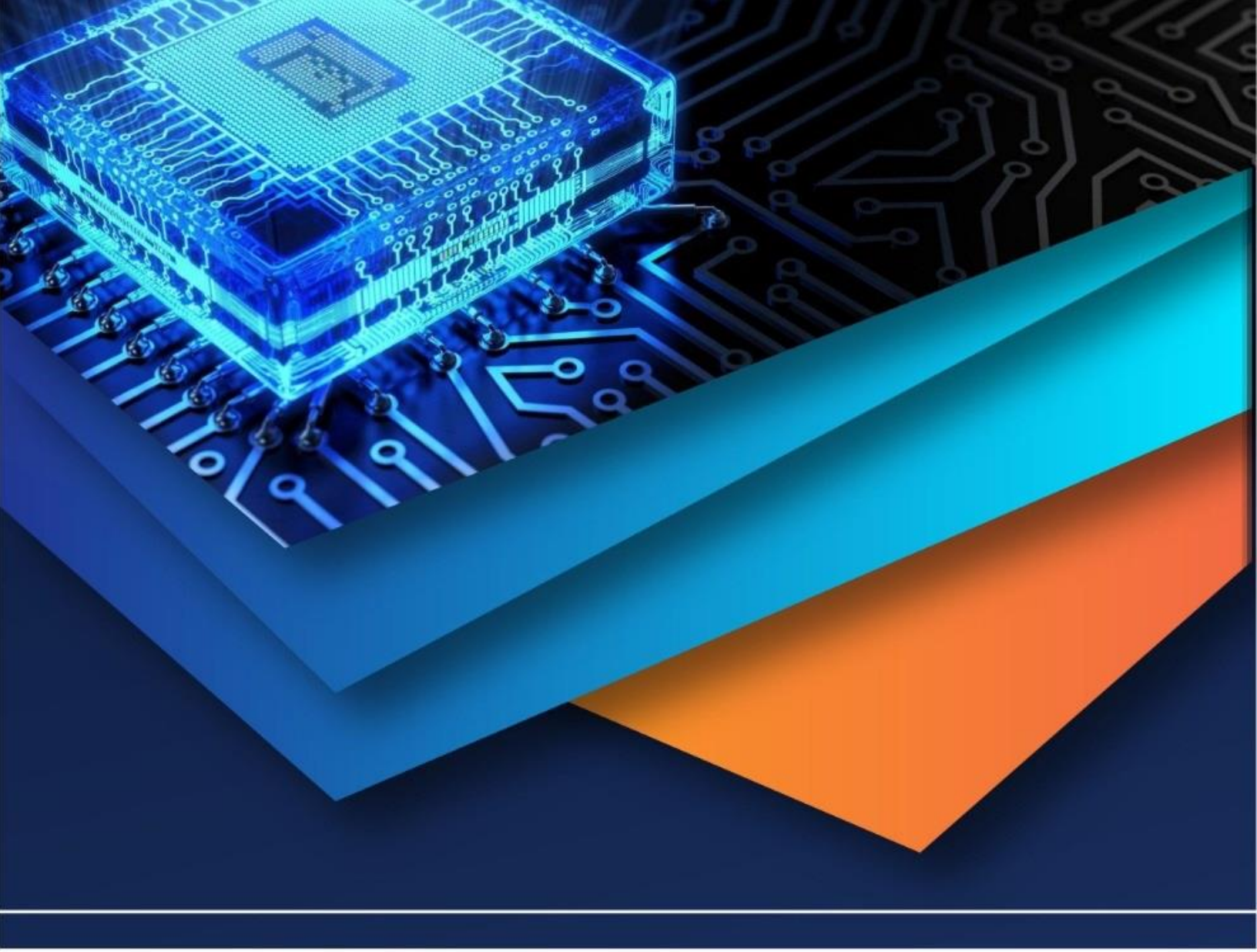
VII. FUTURE SCOPE

Rain gun sensor can be added so that when it rains there won't be floods and this shield the field and evades floods. Rain water harvesting can be done and this harvested water can be used to moisten fields. Hooters can be used so that it gives siren at various occasions such as interruption detection, floods etc. Using IR sensors any object passing into fields can be detected and warned

REFERENCES

[1] Central Statistics Office Ministry of Statistics and Programme Implementation Government of India New Delhi (2016). Energy Statistic. 23, 39-52.
[2] J. Ramesh, J. Kanna Kumar, Dr. E.V. Subbareddy, "Design, Fabrication and Performance Analysis of a Parabolic Trough Solar Collector Water Heater," International Journal of Innovative Research in Science, Engineering and Technology, vol. 4, issue.7, pp. 6038 – 6043, July 2015.
[3] J. Ramesh, J. Kanna Kumar, P. Mallikarjuna Reddy, "A Theoritical Investigation on the analysis of a Thermal Power Plant Working on Rankine Cycle," International Journal of Innovative Research in Science, Engineering and Technology, vol. 5, issue.8, pp. 15369 – 15377, August 2016.
[4] J. Ramesh, J. Kanna Kumar, Dr.E.V. Subbareddy, "Fabrication and Performance Evaluation of a Flat Plate Solar Collector Water Heater," International Journal of Innovative Research in Science, Engineering and Technology, vol. 6, issue.4, pp. 5293 – 5299, April 2017.
[5] J. Ramesh, Dr. E.V. Subbareddy, Dr. B. Durga Prasad, "Water Purification using a fabricated double slope type solar still with external reflecting mirrors", International Journal of Innovative Research in Science, Engineering and Technology, vol. 6, issue.5, pp. 7484 – 7490, May 2017.
[6] Jalakanuru Ramesh, E. Venkata Subbareddy, B. Durga Prasad "DESALINATION OF WATER USING A PASSIVE CONVENTIONAL SOLAR STILL" Internation Journal for Science and Advance Research In Technology, vol. 5, issue. 5, pp. 745-749, May 2019.
[7] B. Melina Queen, J. Ramesh, B. Alankritha, "DESIGN AND THERMAL ANALYSIS OF HEAT EXCHANGER TUBES USING ANSYS", Journal of Emerging Technologies and Innovative Research, vol. 6, issue. 6, pp. 301-303, June 2019.
[8] Chaitali R.F. and Pranjali K.A. (2014). Design and Implementation of Real Time Irrigation System using a Wireless Sensor Network. Proceedings of the International Journal of Advance Research in Computer Science and Management Studies, 2(1), 401-404.
[9] Lincy Luciana M., Ramya B. and Srimathi A. (2013). Automatic Drip Irrigation Unit Using PIC Controller. Proceedings of the International Journal of Latest Trends in Engineering and Technology, 2(3), 108-114
[10] Awati J.S. and Patil V.S. (2012). Automatic Irrigation Control by using wireless sensor networks. Journal of exclusive Management Science, 1(6), 1-7. ISSN 2277– 5684
[11] Kumar A., Kamal K. Arshad M.O., Vadamala T. and Mathavan S. (2014). Smart Irrigation using Low-Cost Moisture Sensors and X Bee based Communication. Global Humanitarian Technology Conference, San Jose, CA, USA, 10th -13th Oct. 2014, 333-3
[12] Halcrow, S.W. and Partners. 1981. Small-scale solar powered irrigation pumping systems: technical and economic review. UNDP Project GLO/78/004.Intermediate Technology Power, London, UK. A.
[13] K. K. Tse, M. T. Ho, H. S.-H. Chung, and S. Y. Hui, "A novel maximum power point tracker for PV panels using switching frequency modulation," IEEE Trans. Power Electron., vol. 17, no. 6, pp. 980–989, Nov.2002.
[14] Haley, M, and M. D. Dukes. 2007. Evaluation of sensor-based residential irrigation water applicatIon
[15] Chaitali R.F. and Pranjali K.A. (2014). Design Implementation of Real Time Irrigation System using Wireless Sensor Network. Proceedings of the International Journal of Advance Research in Computer Science andManagement Studies, 2(1), 401-404.
[16] Lincy Luciana M., Ramya B. and Srimathi A. (2013)Automatic Drip Irrigation Unit Using PIC Controller. Proceedings of the International Journal of Latest Trendsin Engineering and Technology, 2(3), 108-114.

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)