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Solar Power Based AC Water Pumping System for Crop Application

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Abstract: *This concept is actual benefits of our food productivity or plant productivity thought the water supply by using solar power system. Water is supply to required plant area with sensing soil moisture .water level of plant is less than 70% then water provide through the water valve .so it's important role in this project we have use water supply to the required plant and water conserving technique and water is not waste because it's conserve the water it used multiple area gardens ,industry or agriculture .*

Keywords: Solar Photovoltaic, Water Pumping System ,Irrigation ,Sprinkle System And Ac Water Pumping System.

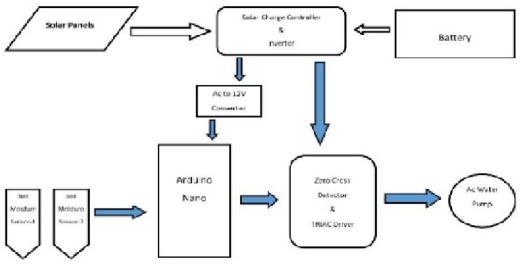
I. INTRODUCTION

This project is done mainly of developing irrigation for useful of gardens ,farm and in rural areas ,and increases productivity of the plant .it is essential to have other alternative water pumping technology. Solar water pumping system it is the situational water to have a soil through the sprinkle system. In this project it reduces dependence on electricity generated from solar energy is the source of energy in the world.

The automatic irrigation is a new model .this system will monitor the soil moisture and environmental temperature using wireless sensors network..the commonly used in soil moisture tester and temperature sensor with the help of sprinkle system to water pumping irrigation.

It is the good system for irrigation. It can updated with varies technology and use of VFD i.e. variable frequency driver it is applicable for variable water speed according to the soil moisture. The most imp for agriculture used to monitoring and controlling water level and soil moisture sensor with the help of sprinkle system to providing water. It is situational condition to provide water to the soil in ON and OFF. It's situational water supplying irrigation system.

1.1 Block Diagram



1.2 Working

The block diagram shows to all over working of this solar power based ac water pumping system for the crop application. Solar power is the light energy from the sun. Solar panel of 180w and next step to the invertor or solar charge controller it works as energy conversion .it is covert the light energy in to electrical energy i.e. AC supply is

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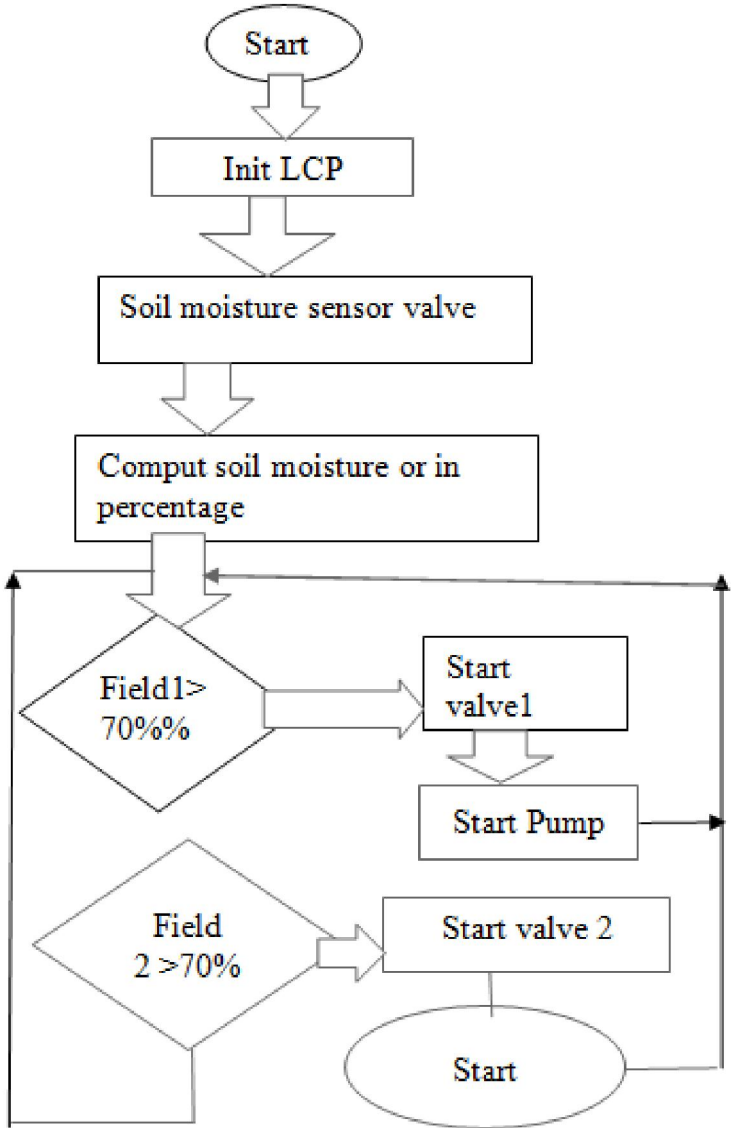
create and ac supply from the battery. Next step of this project is AC to 12v convertor it is fed to the Arduino nano is the one type of microcontroller board and is designed by Arduino. It can be built with microcontroller like ATmegha328. It is used vary the voltage from 7 to 12v. Arduino Nano pinout contains 14 digital pins,8 analog pins ,2 reset pins and 6 power pins. Each of these digital and analog pins are assigned with multiple function but their main function is to be configured as input and output and this output to the zero cross detector its function of voltage comparator it used to detect sine wave from transition from positive and negative that coincides when input crosses the zero voltage condition. It compares soil voltage level and the TRIAC driver it is also known as phototriac coupler it is optically isolated gate drive current to a TRIAC , it main function of used to ac power control application they able to switch high voltage and high level of current and power switching is needed. AC water pump to water to crop application it is sens the soil moisture from soil moisture 1 and 2 . it sens and water from the water pump . the soil moisture is dry in which part that time sprinkle is on and then off.

1.3 System Flow



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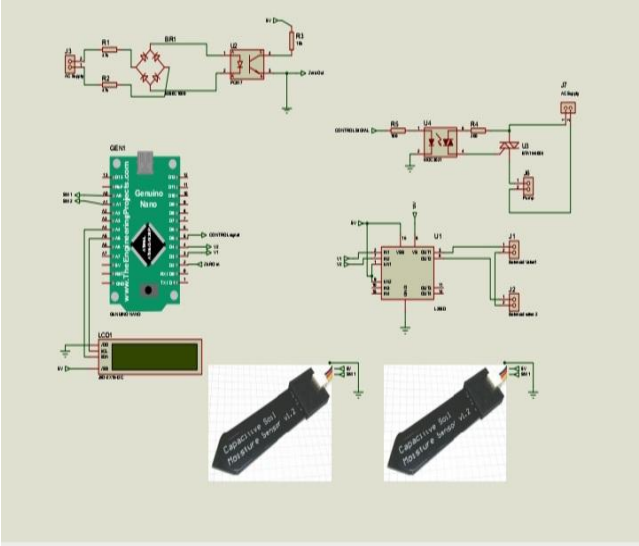

Figure: Circuit Diagram

The ckt diagram shows the all over connection of water valve for water providing to the crop plant oragricultural applications

1.4 Software Components

1. Microcontroller
2. Water level controlling sensor
3. C programming

1.5 Hardware Component

1. Solar Panel
2. Water Pump
3. Sprinkles
4. Inverter
5. Arduino Nano

A. Electric Solenoid Air Valve Switch

The 12v electric solenoi Air valve switch is normally closed . It control the fluid+air and act as a valve between high pressure water of any fluid. The valve work with solenoid Coil which operates electronically with 12vdc supply. As it normally closed .and open in condition the flow of water liquid.stop/block of flow that is valtage of power is removed. Suitable for **liquid ,water ,oil ,**Water heaters ,water purification machine , Energy saving and air conditioning, water cooling equipment and other field use of large numbers.

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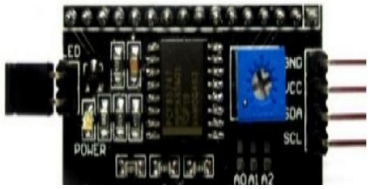

B. 12C Interface for LCD

The LCD2004 is a great interface of 2×16 and 4×20 LCD display. With the limited pin resources. It is 12C LCD module need to Only 2 lines (12C) display .it is compatible with 2×16 and 4×20.Default 12C address with 0×27 and address selectable range is 0 to 20 and 0to 27.The LCD2004 is utilized PCF8574 input/ output expander. The little chip is provide 8 bits parallel I/O address by a 12C bus address. All address is leads to vcc so LCD2004 board is 12C address is permanently fixed at hex 27 and additionally LCD20O4 can be added to the bus .

C. Capacitive Moisture Sensor SKU:SEN0193

Capacitive soil moisture sensor is measure the capacitive moisture level sensing rather than resistive sensing like other sensors on the market. It is made up of corrosion resistant material which gives it an excellent service life .this module includes on board voltage regulator which gives it operating range 3.3 to 5.5V.it is perfect for low voltage MCUs both 3.3V and 5V compatibility with Pi Will it needs ADC convertor .this compatible with 3 pin gravity interface which gravity , Interface ,which directly connected to gravity I/O expansion shield. Operating output voltage is 0 to 3.0 VDC .operating current 5mA,iterface PH2.0- 3P , Weight is 15g.

D. 12C Serial Interface 1602 LCD Module

This 12C interface 16×2 LCD display module ,a high quality 2 line 16 character LCD module with on board contrast control adjustment, backlight and 12C communication Interface for Arduino beginners no more cumbersome and complex LCD driver connection circuit. The real significance advantage of this 12C Serial LCD module will simplify the circuit serial connection .save some I/O Pin Arduino board, simplify firmware development widely used in Arduino library.

- Compatible with bread board or other controller board on 12C bus.
- Display type: negative white and black light
- Supply voltage: 5V
- Contrast adjustment: built in potentiometer
- Interface: 12C to 4 bit LCD data control line
- Backlight control: firmware and jumper wire
- Board size: 80×36mm
- 12C Address : 0×36 to 0×3F

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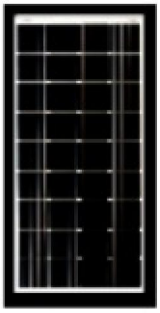
E. Triac as a Switch

The triac is most commonly used in semiconductor device for switching and power control of AC system. Triac as a Switch ON by either a positive or negative gate pulse ,regardless of polarity of the AC supply at that time. The triac is stand for triode for alternating current it is the three terminal switching device it is similar to the SCR(thyristor) but it can conduct in both direction and it constructed by combining two SCR in anti parallel state. The triac is three terminal AC switch that is triggered into the conduction when low energy signal is applied to the gate terminal. It is designed for high performance full wave AC control application where high noise immunity and high commutating drift are required.

- Blocking voltage 800v
- On state current rating of 16A RMS at 25°c
- Uniform gate trigger current in three quadrant
- Internally isolated 2500V rms

F. Photocoupler PC817XNNSZOF

PC817XNNSZOF serias contain an IRED optically coupled with Phototransistor. It is package in 40 pin DIP. input output isolation voltage (rms) 5kv. Collector emitter voltage is 80v . Double transfer mold package (ideal For flow soldering) high isolation between input output voltage is 5kv. It is applicable for Programmable controller, foscimiles and telephones.



G. Loom Solar Panel

180w : Loomp solar 180w is made up of a greed black silicon cells is electricity generated from sun. The cells are made of superior quality silicon which gives higher efficiency up to 20% and also performance RMS better in low light .it is the latest panel in mono crystalline technology that comes with 5 bus bars 36 cells and 25 year performance warranty .IP 67 rated junction with MC4 connectors 1 meter wire is given for outdoor. Solar panel is also called photovoltaic collect energy from sun in the form of sunlight and convert it into electricity.

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H. Loomp Inverter

A solar inverter or PV invertor is a type of electrical convertor which converts the variable direct current output of a photovoltaic solar panel into a utility frequency alternating current that can be fed into a commercial electrical grid or used by a local , off grid electrical network. Inverter convert low frequency main AC power to higher frequency for use in induction heating. AC power is first rectified provide DC power .the inverter then changes to the DC power to high frequency AC power. Solar Inverter efficiency and warranty grid connected inverters have efficiency higher than 97% while off grid inverter. Efficiency ranging between 80% -87%. There is up 5 years warranty.

I. 4pin Dip Phototransistor Photocoupler EL817

The EL817 series of devices each consist of an infrared emitting diodes, optically coupled to a Phototransistor detector. They are packaged in a 4 pin DIP package and available in wide lead spacing and SMD option. It is applicable for programmable controller, system appliances, measuring instruments, Telecommunication equipment, home appliances such as a fan ,heaters and signal transmission between circuit of different potentions and impedances.

Luminous 80ah Tubuller Battery lLst 10036

- 80ah Tubuller battery
- Heavy duty application
- Exp.600-800 cycle
- Warranty of 36 month ILST 10036

Manufacturered using HADI pressure casting machine which helps to Maintain void free uniform gain structure .Highly puncture resistance DARAMIC use separater minimize the possibility of internal short circuit. Balance plate design for improve charge acceptance and excellent deep discharge recovery. Protect the lead part of battery from corrosion even in case of high voltage . Extremely long life and superior performance. Extra long flexible oxidation resistance gauntlet.

II. Literature Survey

In this chapter ,we have discussed various type of Automatic Irrigation mechanism for better irrigation .let us discuss each and every technique of water pumping system with sprinkler system using soil moisture sensor and Arduino S.P Maniraj et al, proposed that the automated irrigation system is done by soil moisture sensor and Arduino. In this system the control is used to on and off the motor without the help of humans which is done by microcontroller .the data which is between the web application and the farmer for the irrigation schedule. The photovoltaic panels are used for the power supply of the system development of software of microcontroller based the drip irrigation system using soil moisture sensor .the land reaches the 70% of moisture the pump will be OFF and below 70% the pump will be ON. The regulating of water pump is done with solenoid valve.

III. Proposed System

The system has three major parts ,humidity sensing part ,control section and the output section ,soil humidity was detected using YL-69 soil sensor .the control unit by achieved using ATmegha 328 microcontroller based on platform. The output irrigation system which is control by the control unit by switching it on and off depending on the soil moisture content.

Working principle of this system is in connecting the soil moisture sensor which was embedded into the plant and automated plant watering system .12v water pump and motor driver to run the water pump.

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IV. Module of the Project

- Language Used: Embede c
- Solar Pannel: For converting light energy into electrical energy.
- Soil moisture sensor
- Sprinkle system
- C water pumping system.

V. Future Scope

This project is used to in small to medium application such as agriculture use of farm ,gardens etc. The future Scope of use VFD in this project thai is variable frequency driver is continuously speed is vary according to the soil moisture sensor

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VI. Applications

- Reduced man power
- Save water and money
- Save your customer money
- Minimize the infrastructure to store and carry the water
- Protect the water resources for future generations.

Conclusion

- The system is based on soil moisture using Arduino has been designed and tasted successfully. It has been developed by integrated features of all the hardware components used.
- he moisture sensor measure level of the different plant if the moisture level goes below the limited level the moisture sensor send to the signal Arduino board which is trigger the water pump to turn ON and supply water to the plant and vice versa OFF condition.
- Photovoltaic power for irrigation is coast competitive with traditional energy for small remote application .
- hus the functionality of the entire system has been tested thoroughly and it is said to function successfully.

Acknowledgement

The acknowledgement of the idea for my project is to create a solar panel system that would be used on farms in. First and foremost I would like to give thank •to Nagpur University and the college of Management and Engineering for the provision of a supportive working environment in which I was able to produce my project entitled **"Puming water using solar energy for irrigation ".**

Furthermore I would like to thank Rohini Pochhi for her assistance and supervision of my work and for her patience and guidance throughout this process. Providing clear instruction and requirements for this capstone project as well as provision of informative lecture session Finally I would like to give my heartfelt thanks to my family and friends for their unwaving support and encouragement that they have given to me.

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