Efficient Irrigation System powered by Solar Panel Setup with Tracking Mechanism

P. A. Harshavardhini
Department of ECE, Vignan Institute of Technology and Science, Hyderabad, India
pahv19@rediffmail.com

Abstract : **Lack of rains causes irrigation a complex task. For proper irrigation, excess or lack of water level present in the moisture should be monitored. Otherwise this may damage the crop, which in turn results in loss to farmers. The proposed system will give a solution where moisture level will be monitored by a sensor and automatically the motor water pump will be ON and OFF so that sufficient amount of water will be given to the plants. This proposed system has a Microcontroller operated motor pump powered by a solar plate is implemented and sends the status of motor to the farmer. Moisture sensor helps to consume water as per requirement of the field based on moisture content present in the soil. The solar powered auto irrigation system is implemented in Express PCB – for designing circuit, PIC C compiler - for compilation part, Proteus 7 (Embedded C) – for simulation.**

IndexTerms **– Irrigation, GSM, moisture sensor, Solar panel.**

I. INTRODUCTION

Irrigation is the process where crops are supplied with proper water quantity. Now-a-days irrigation process needs proper monitoring where the climatic conditions are random. Because of this farmers face a tough task of supplying water to their fields to keep their crops green. In summer season there will be a lot of power issues along with water scarcity, hence the consumption of power for running motors to supply water and the quantity of water to be used in the field will be major task for the farmers. If the power is available also the farmers should wait until the total filed is watered properly which consumes maximum time of a farmer. To overcome these limitations, this work proposes solar powered automation system for power source and moisture sensor for sensing the humidity level in the soil.

II. BLOCK DIAGRAM

Fig.1 depicts the proposed system that consists of solar plate, moisture sensor, LCD display, motor pump, LDR Sensor and PIC microcontroller. The controller monitors the value read by sensor and controls the motor pump and provide sufficient water to the fields.

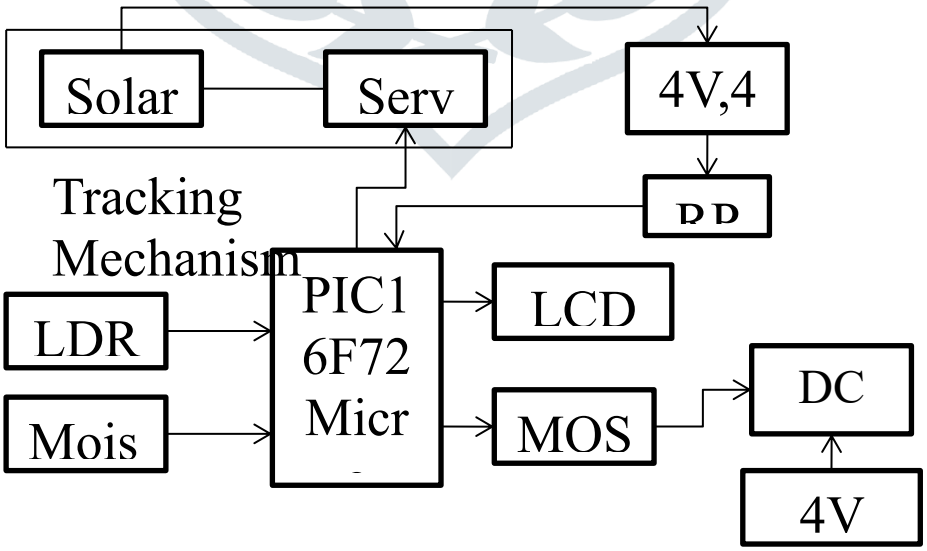

Fig: 1 Block diagram of proposed system

III. SYSTEM ARCHITECTURE

The moisture sensor will sense the soil condition of the irrigation field. The sensor will send the information to the microcontroller and compares with threshold level. If it is wet (exceeds the threshold level) then the controller will switch OFF the motor pump and

if it is dry(below the threshold value) it will ON the motor pump. The LDR sensor will control rotation of solar plate. If the sun light falls on both LDRs then the solar plate will in linear position. If the sun light falls on left LDR then solar plate will tilts backward else if the light falls on right LDR then the plate will move forwards. Thus the solar plate will tilts according to the moment of sun light. The solar plate will generate the voltage and charge the battery. This battery is used as a power source for the total automation system.

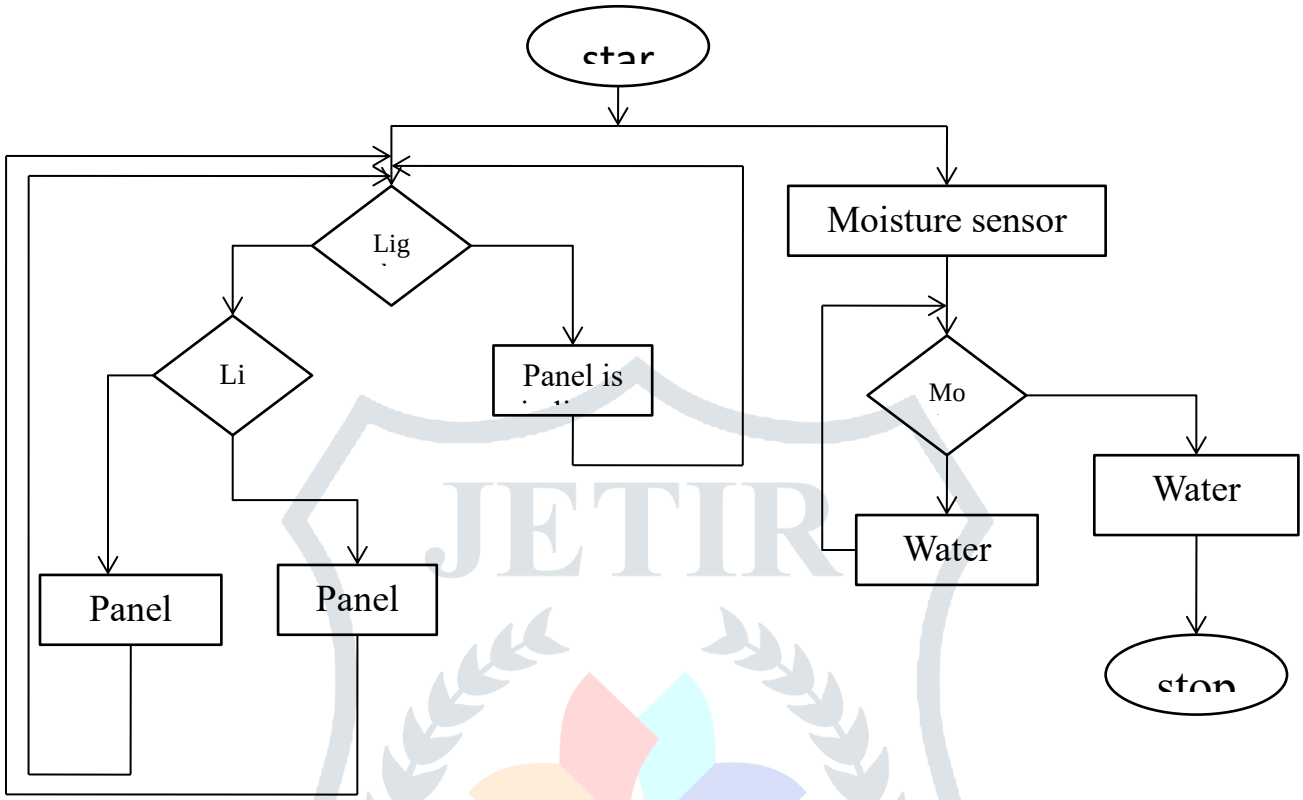

Fig: 2 Flow chart

IV. IMPLEMENTATION AND RESULTS

The solar power auto irrigation system is implemented in Express PCB – for designing circuit, PIC C compiler - for compilation part, Proteus 7 (Embedded C) – for simulation part. The proposed auto irrigation system contains a solar plate which is used to energies the system. Solar power which is obtained by tracking the intensity of the sunlight is used only as the power source to control the servo motor and to provide input to micro controller. Based on the output of the moisture sensor, micro controller controls the water pump to sprinkle the water to crops. The Solar panel position is dependent on light intensity incident on the LDR's present in the circuit. The Fig 3 shows the position of solar panel when light incident on both the LDRs. The solar plate will be in linear position when light incident on both the LDRs.

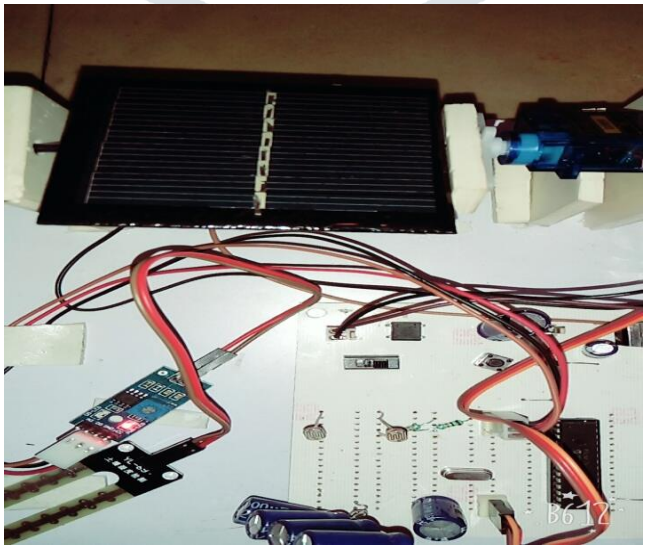

Fig 3 Tilted position of solar panel, when both LDRs are exposed to light.

When the light incident on the right LDR sensor the solar plate tilts forward direction. When the light falls on the left LDR sensor then the solar plate tilts towards the backward direction which is shown in figure 4.

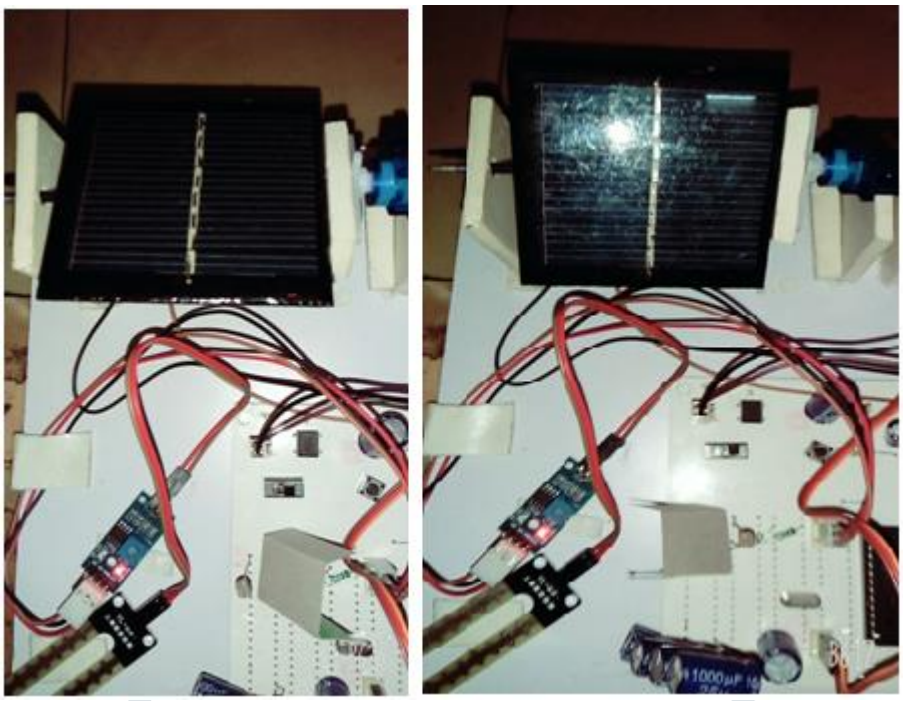

Fig 4 Tilted position of solar panel, when right and left LDR is exposed to light.

When the level of moisture sensor is low only one LED glows on moisture sensor, pump is in ON state displayed on the LCD screen as shown in Fig 5.

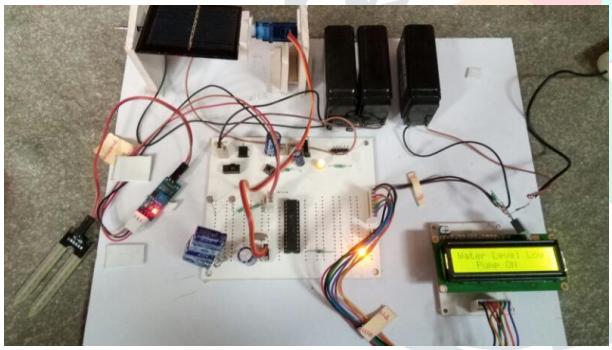

Fig 5 Operation of Moisture sensor when level of moisture sensor is low

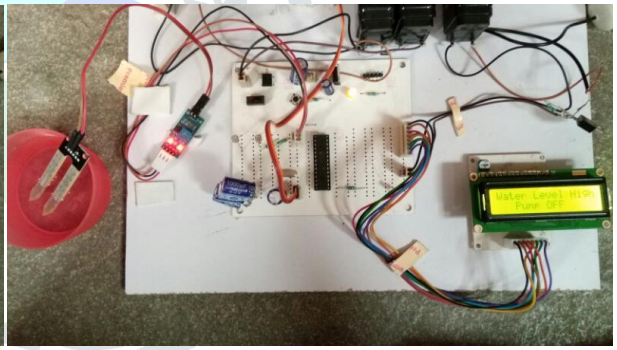

Fig :6 Operation of Moisture sensor when level of moisture sensor is high

When the level of moisture sensor is in a high state, then the two LED's glows on moisture sensor and display the status of pump i.e. OFF state is displayed in LCD as shown in Fig 6. The hardware implementation of the solar power auto irrigation system is shown in fig 7

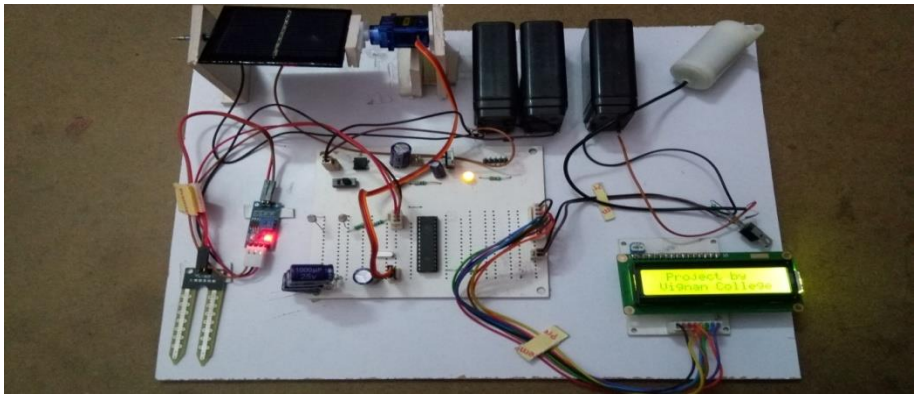

Fig 7 Hardware implementation of the project

V. CONCLUSION

Solar power auto irrigation system is most useful to the farmers. The auto irrigation process is implemented by using solar plate and moisture sensor and LDR sensor. The proposed system is cost effective which can be afford by the farmer. The auto irrigation system optimizes the human intervention and water usage in the irrigation process. In the proposed system GSM can be added for sending SMS to the concerned person in case of any problem as burning of crop, unknown people working in the field, failure in the equipment. Other Parameters such as ambient temperature, light intensity & humidity can be measured. Pesticides & fertilizers can also be added automatically to the water supplied to crops.

REFERENCES

[1] https://en.wikipedia.org/wiki/Irrigation
[2] http://www.ijrat.org/downloads/april-2014/paper%20id-24201498.pdf
[3] https://peer.asee.org/design-and-implementation-of-a-solar-powered-smart-irrigation-system.pdf
[4] http://www.ijmter.com/papers/volume-3/issue-2/soil-moisture-sensor-base-automatic-irrigation-system-powered-by-solar-energy.pdf
[5] http://faculty.kfupm.edu.sa/ee/sbaiyat/events/IEEETEM1999/s4p3.PDF
[6] http://www.ijetcse.com/wp-content/plugins/ijetcse/file/upload/docx/379ICAEECI-171-pdf.pdf