

# Smart Solar Irrigation

K.K.Ghume<sup>1</sup>, P.B.Jadhav<sup>2</sup>, S.G.Samal<sup>3</sup>, K.S.Todkar<sup>4</sup>, D.K.Joshi<sup>5</sup>

<sup>1,2,3,4</sup>Dept of Electrical Engineering

<sup>5</sup>Assistant Professor, Dept of Electrical Engineering

<sup>1,2,3,4,5</sup> P.E.S.'s Modern College Of Engineering, Pune

**Abstract-** Solar energy is the most ecological friendly and abundant source of energy which is a solution to current energy crisis. Farmer don't have idea about the power availability and have to wait until the watering of pitch is properly done. Nowadays, they are facing hurdles in irrigating their fields mainly during summer season. In this project, we propose smart irrigation system using solar power which operates the water pump and the pump operation is regulated using PIC16F877A. Soil sensor controls the water flow rate to the field, which optimizes the use of water. An automatic changeover of supply from the solar circuit to AC main, in absence of solar energy using relays is also carried out. LCD is interfaced with PIC16F877A to display the pump status.

**Keywords-** LCD, LDR, LED, Moisture, PIC16F877A, Relays, Smart irrigation, Soil, Soil Sensor, Solar panel, Solar power, Water pump.

## I. INTRODUCTION

The majority of Indian population is dependent on agriculture, thus agriculture has got a prime role in Indian economy. On basis of recent survey, it is seen that the Indian population is increasing at a higher rate as compared to the production rate of wheat, rice or any other agriculture product. The solution is to increase the production per area. But majority of Indian farmers still stick to the same old agricultural practices which will not help in increasing the production rate. It is of immense importance to mechanize the agricultural operations like irrigation, weeding etc. One of the important factor for the agriculture is timely and sufficient water supply. But due to irregular rainfall and water scarcity we are unable to use agricultural resource to its fullest. Due to electricity shortage and mismanagement in the traditional irrigation system sometimes crops are dry or flooded with water. In order to avoid this problem sensor base irrigation system is used. Renewable energy resources, mainly solar energy helps in sustainable development through reduction in pollution and increase in economy.

## II. LITERATURE SURVEY

The Bureau of Electrical Energy in India conducted a survey in 2011. According to survey there was installation of about 18 million agricultural pump sets and 0.5 million new connections per year with average capacity of 5 HP. The annual agricultural consumption was 131.96 billion KWh. This is about 19% of total consumption of electricity in all sectors. So solar powered smart irrigation technique is the future for the farmers and a solution for energy crisis.

## III. BLOCK DIAGRAM DESCRIPTION

Figure shows the block diagram of the project. In solar pumping module, a solar panel is connected to battery. The DC power supply from battery is given to the PIC16F877A. In automatic irrigation module, the soil sensors are placed in the farm where the cultivation of crops is done. PIC16F877A is interfaced with DC Submersible Pump, Soil sensors, LCD, LDR and LEDs. The controller is the brain of the proposed system as it controls all the vital functions of all components as per the program fed in it. The PIC16F877A is programmed as per the requirement and thus it controls the operation of pump on basis of signals received from sensors. LCD displays the current status of submersible pump, power supply available and total light intensity on LDR. Relay driver circuit for automatic switch is used to transfer the supply source of whole circuit to AC mains from utility when the solar power fails.

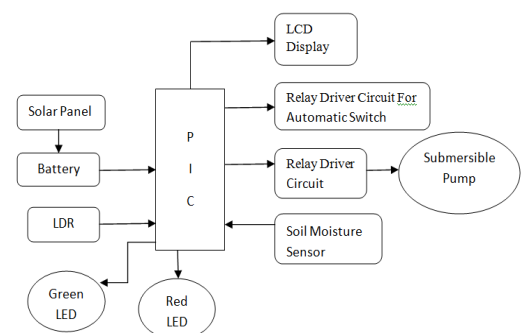
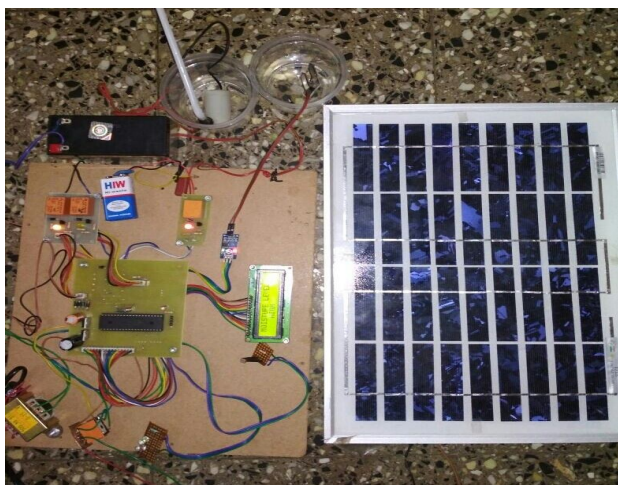


Fig No-1: Block Diagram

## IV. RELATED WORK

The solar panel gives power to the water pump. PV modules use sun's light energy to generate electricity by

photovoltaic effect. This energy is stored in battery, which provides DC supply to PIC16F877A. Light Dependent Resistor (LDR) technique, is a system that detect the brightness according to weather condition it gives signal to PIC. If the light intensity is more than prescribed limit then red LED glows and when the intensity is below predetermined level then green LED glows. The soil sensor sense the moisture content in soil and send signals to PIC16F877A as per the change in voltage level in it. The PIC16F877A sends control signal to water pump to turn it on when water content in soil is less and pump is off when the water content in soil is decreased than defined value in sensor. When solar power output is less than prescribed value supply to circuit is taken from AC mains using automatic transfer switch relay drive circuit.



**Fig No-2:** Project Model

## V. CONCLUSION

The implementation of proposed system is beneficial for the government and the farmers. For the government a solution for energy crisis is generated. For farmers optimum usage of water can be achieved by use of the automatic irrigation system. This is done by reducing water wastage and reduction of human intervention. The surplus energy produced using solar panels can also be given to the smart grid by doing some modifications in the system circuit and thus can be a revenue source for the farmer. Proposed system is environment friendly solution for irrigating fields. The system is self-starting, hence it requires minimal maintenance and attention.

## VI. FUTURE SCOPE

The solar powered automatic irrigation system is going to be very useful in the future. In future, the advancements in nano technology, smart grid and power

electronics will have vital role in implementing solar energy policies and making smart solar pump set, user and agriculture friendly. The proposed model can be interfaced with GSM so that the farmers can receive solar pump SMS alerts .It can be used to provide solar energy for the pumping requirements for sprinkler irrigation.

## REFERENCES

- [1] Harishankar S, Kumar R, Sudharsan K P, Vignesh U and Viveknath T, 'Solar Powered Smart Irrigation System', Advance in Electronic and Electric Engineering, Volume 4, Number 4: 341-346, 2014.
- [2] Mr. Deepak Kumar Roy and Mr.Murtaza Hassan Ansari, 'Smart Irrigation Control System', International Journal of Environmental Research and Development ISSN 2249-3131 Volume 4, Number 4(2014), pp. 371-374.
- [3] Er.Upendra Singh, Mohit Vyas, Gaurav Sharma, Surender Pal Singh, Suleman Khan, 'Solar Based Smart Irrigation System', International Journal of Recent Research Aspects ISSN: 2349-7688, Vol.3, Issue 1, March 2016, pp.105-108.
- [4] "The Microcontroller and embedded systems" by Muhammad Ali Mazidi and Janice Gillispie Mazidi, Person Education.