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Solar Powered Smart Irrigation System with GSM for Agriculture

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Abstract: ***Most of the Indian people are dependent on agriculture and for this reason our country's economy is mainly dependent on agriculture, so efficient agriculture requires proper irrigation and can improve our country's economy accordingly. We can achieve this with the help of various electronic devices and through its use we can get proper irrigation in this field in an automated manner.***

Project Irrigation and Water Level Control using AT89S52 designed to address agricultural sector issues related to irrigation and water monitoring systems with available water resources. Prolonged periods of dry weather conditions due to fluctuations in annual rainfall can significantly reduce agricultural yields. Profiteering companies need an efficient irrigation system as their intolerance to the cost and drought of establishing these crops.

On this project we're the usage of AT89s52 (8051 microcontroller), humidity sensor, dc water pump, relay driving force, level sensor, gsm modem, sun panel, battery etc.

A sprinkler turns on / off depending on soil moisture condition and condition. The motor can be displayed in text messages via the GSM model on a 16X2 LCD. Also, the water level can be monitored by level sensors. It helps to know the availability of water at the input source

Keywords: Soil Sensor, Irrigation, Water level, GSM Module, Smart Farming etc.

I. INTRODUCTION

The process of artificially supplying water to the land where the crops are cultivated is known as irrigation. Traditionally in dry regions where the rainfall is negligible then another way of providing water to the crops is through canals, pumps etc. But it increases the work- load on the farmer and thus reduces the effective yield of field. Thus, there was a need of testing the soil condition before supplying water to the crops which helps in increasing the effective yield of agricultural field. In other hand Smart fencing system will also implemented in this.

With the help of advancement in the field of technology, it is possible to design systems which eliminate the direct involvement of farmer with respect to the irrigation of their fields.

Technologies are developed to that extent that entire irrigation and fencing systems can be automated by the use of systems which can control the motors that irrigate the fields. The solar energy automatic irrigation system can be a viable alternative for farmers in the current state of the energy crisis in India. It is a method of generating green energy that provides energy for free when making an initial investment. Irrigation system is an experimental method of water supply that is confusing for the main area or soil for our crop system.

Water supply should be done mainly in fields or through ditches. This system should help to reduce the farmer workload and maintain adequate soil quality for good growth. Since then, the development of innovations could have led to farmers killing farmers and designing access to irrigation water into their fields. These machine frames of the entire engine irrigation system filled the fields.

There are two important advances behind the GSM-based irrigation framework, the "GSM" controller and the processor being optional and required. GSM (Global System for Mobile Communications) is a standard used to refer to computerized cellular conference systems. Sends the results with coded signals to the agricultural irrigation system and the cell phone to the agricultural producer, which indirectly controls the entire irrigation system irrigation system. The water level is monitored and it also sends a message to the user. After the GSM is released, the processor or controller serves as the focal point for the robot work process and ultimately highlights the progress of the gadget.

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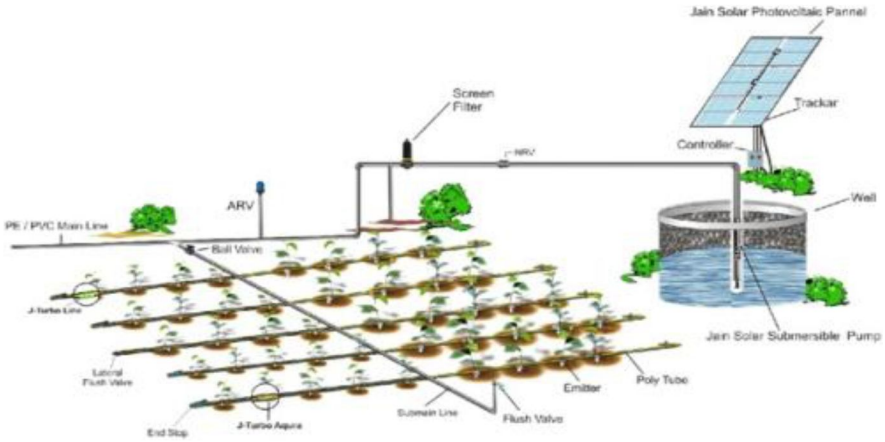

Fig. Solar based Irrigation system

II. LITERATURE REVIEW

As we know, the Indian economy is one of the largest emerging economies in the world. The agricultural sector is the largest contributor to the Indian economy. In order to make the most of manpower and achieve maximum benefits within a given set, the various engineering methods used today need to be upgraded. The development of these new technologies is not only to reach the minimum level of greenhouse gas emissions but also to reach our goal of sustainable development. As our project is named, solar powered irrigation system is a step towards utilizing some new engineering techniques. This technology is a very good choice for small and medium farmers who suffer every year due to crop failure. Implementation of this technology has vast potential in the near future.

A. *Solar Powered Smart Irrigation System, S. Harishankar, Department of Electrical and Electronics Engineering, Amrita University Ettimadai, Coimbatore, India, ISSN 2231-1297, Volume 4, Number 4 (2014).*

In this paper we propose an automatic irrigation system using solar energy to pump water from a bore well to a tank and to control the flow rate of water from the tank. Irrigation area that optimizes water use. This system was found to be successful when applied to the borehole when pumped throughout the day. Solar pumps also provide clean solutions to the risk of borehole contamination. Systems require short-start and minimal maintenance. Tracking ranges can be implemented to further increase daily pumping rates. The system demonstrates the feasibility and application of using solar PV to provide power to pump pumping requirements for sprinkler irrigation.

B. *Solar Powered Automatic Irrigation System, Mr. M. A. Murtaza, Mechanical and Automation Department, Amity University (Lucknow Campus), India, International Journal of Engineering Science and Computing, April 2017.*

The purpose of this paper is to cultivate an automatic irrigation system that turns the pump motor on / off when soil moisture is absorbed. In agriculture, it is necessary to use appropriate methods of irrigation. The advantage of using this method is that it minimizes human intervention and ensures proper irrigation. The software application is developed by pre-determining the range values of soil moisture, temperature and water level programmed as a hand controller. This paper provides for controlling and monitoring water levels and determining soil moisture.

C. *Solar Powered Automatic Irrigation System on Sensing Moisture Content Using Arduino and GSM, SaurabhSuman, Dept. of Electronics and Communication Engineering, Institute of Engineering & Management, Kolkata, IJARECE Volume 6, Issue 6, June 2017.*

In this paper, the ability to conserve natural resources and give impetus to superb agricultural production is one of the main goals of setting up this technology in the country's agricultural sector. Water and time are very important to overcome farmer fatigue. Therefore, the system must be designed to provide this efficient functionality using sensor network, sprinkler, GSM, SMS technology. The operation of the pie paper depends primarily on the moisture sensor product. You cannot use sensor technology when you need extra water where you want. To do this they have to take DTMF technology. Using this they can irrigate the desired field and the desired quantity.

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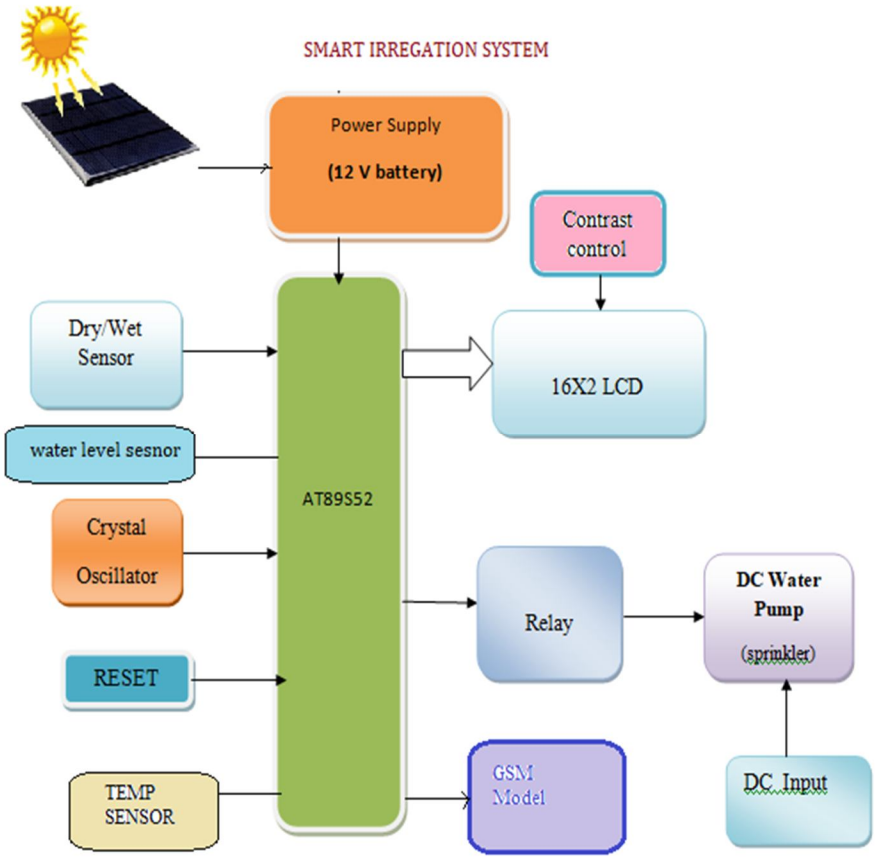
III. BLOCK DIAGRAM



IV. WORKING

A. First power ON the circuit board. Power is transferred from the 12v battery source. This battery is charged by solar panel or adapter. When any cloudy conditions occur, visibility of light is low then adapter will provide the power to main circuit board functioning.

B. Now, moisture sensor is inserted into soil. As the result, sensor sense the moisturise of soil also the temperature of soil. At same time level sensor sense the availability of water from source.

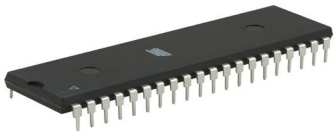
C. All Values shown on LCD display. Also, it sends through messages to your mobile number with the help of GSM modem.

D. When sensors sense the soil or it moisturise, pump is OFF condition. But when sensor is in dry state, the pump starts pumping the water.

E. In this way, the total project model of solar powered smart irrigation system works automatically. Shows the particular status to LCD display and text messages. So, farmers at remote place easily know each and everything of irrigation happened in his farm.

V. COMPONENT DETAILS

A. 8051 Microcontroller



There is a large family of microcontrollers and 8051 is one of those families. The device we used in our work was 'AT89S52', a simple 8051 microcontroller and manufactured by Atmel by. 89S52 has 4 different ports, each with 8 input / output lines, providing a total of 32 I / O lines. Those ports can be used to read data and commands to other devices or to output the location of sensors or switches. Most ports of 89S52 can be used for two different functions and they are called dual functions.

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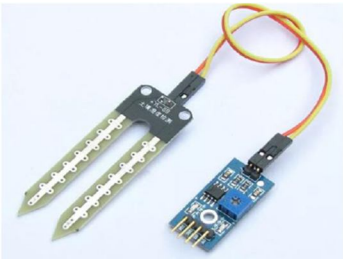
B. Solar Panel

Solar energy is the conversion of energy from sunlight directly into photovoltaic (PV) or indirectly through intense solar energy. Solar electricity is the most ample electricity supply within the global. Photovoltaic is an effective way to use solar energy. In the current situation of an energy disaster automated system using solar energy, a solar powered irrigation system is an appropriate choice for farmers. The main objective of this project is to advance the irrigation system in the agricultural sector using solar energy.

C. Soil Moisture

Soil farming is the small-scale modeling of climate farming cycle and large-scale modeling of climate interfaces. Vegetation and crops are always highly dependent. This is the moisture available at the base level compared to rainfall events. The water budget requires actual preparation of the irrigation action with local soil moisture data. Knowledge of soil wetting gives an advantage in predicting the risk of flash flood or fog.



D. GSM Modem

Included in the GSM module unit to complete the task of sending SMS to the user's mobile phone in case of any error in the irrigation process. Used GSM module SIM 900.

E. DC Water Pump

Operating on a 12 V supply, the 10 meter head, brushless DC pump uses the principle of a permanent magnetic brushless DC motor, combined with an impeller in the rotor, designed to create a chamber to maintain fluid flow.

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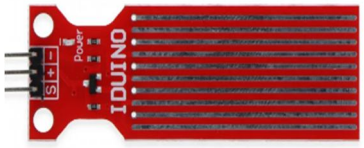
F. Water Level Sensor

The water level is one of the four parameters that adhere to the proposed system evaluation. To reach the target, we built a water level sensor using 3 level connector wire, water depth. It can measure from 2 cm to 400 cm with an accuracy of up to 3 mm. There are 4 pins to connect in different positions.



VI. NEED FOR SMART FARMING

A. India is the second one largest country in terms of populace after china. Consequently, with the intention to provide meals for tens of millions of human beings, it is important to increase the production of meals grains.
B. Uneven and uncertain distribution of rainfall causes drought.
C. Different water needs of crops can be met only through irrigation facilities.
D. Being a tropical country, there is a rapid increase in high temperature and evaporation. Therefore, artificial irrigation is necessary for water to be abundant.
E. Smart Saving water from smart farming is very important.

VII. OBJECTIVE

The main objective of the project is to develop a small-scale irrigation system that uses water more systematically to prevent water loss and reduce labour costs. The following factors were considered in the design solution selection.

A. Installation cost
B. Water saving
C. Resources Monitor water resources
D. Human intervention
E. Reliability
F. Power consumption
G. Maintenance
H. For smart farming approach to the farmer
I. Use of Renew Renewable Energy Source.

VIII. RESULTS

Various experimental tests showed that the system was able to function as expected and observed that the sensitivity of sensor was affected by temperature during checking of soil moisture level to determine watering. This somehow resulted in variations in the measured moisture values at different times from the set moisture values totrigger watering. 80% out of10 trials were successful in responding correctly. The system was however, able to send SMS to theuser and LCD system upon starting and completing a scheduled task as well as the occurrence of events at all the 10 trials. Similarly, the system was able to respond to the SMS command to turn the irrigation pump on and off for watering at all the trials.

IX. CONCLUSIONS

This project discusses the automatic control of solar pump sets and the useful use of SMS alerts. The whole idea is that consumers should take advantage of the GSM network deployed globally with their low SMS service cost to use mobile phones and simple SMS commands to manage their low irrigation system. To demonstrate the functionality and performance of the controller system, future models will be implemented. The results show that consumers can use SMS to directly monitor their farm status, determine water requirements for crops, control water automatically and control activities that meet crop water requirements. This great crop helps reduce excess water in production costs. In addition, it helps to influence the prevailing GSM network to provide value-added services to customers.

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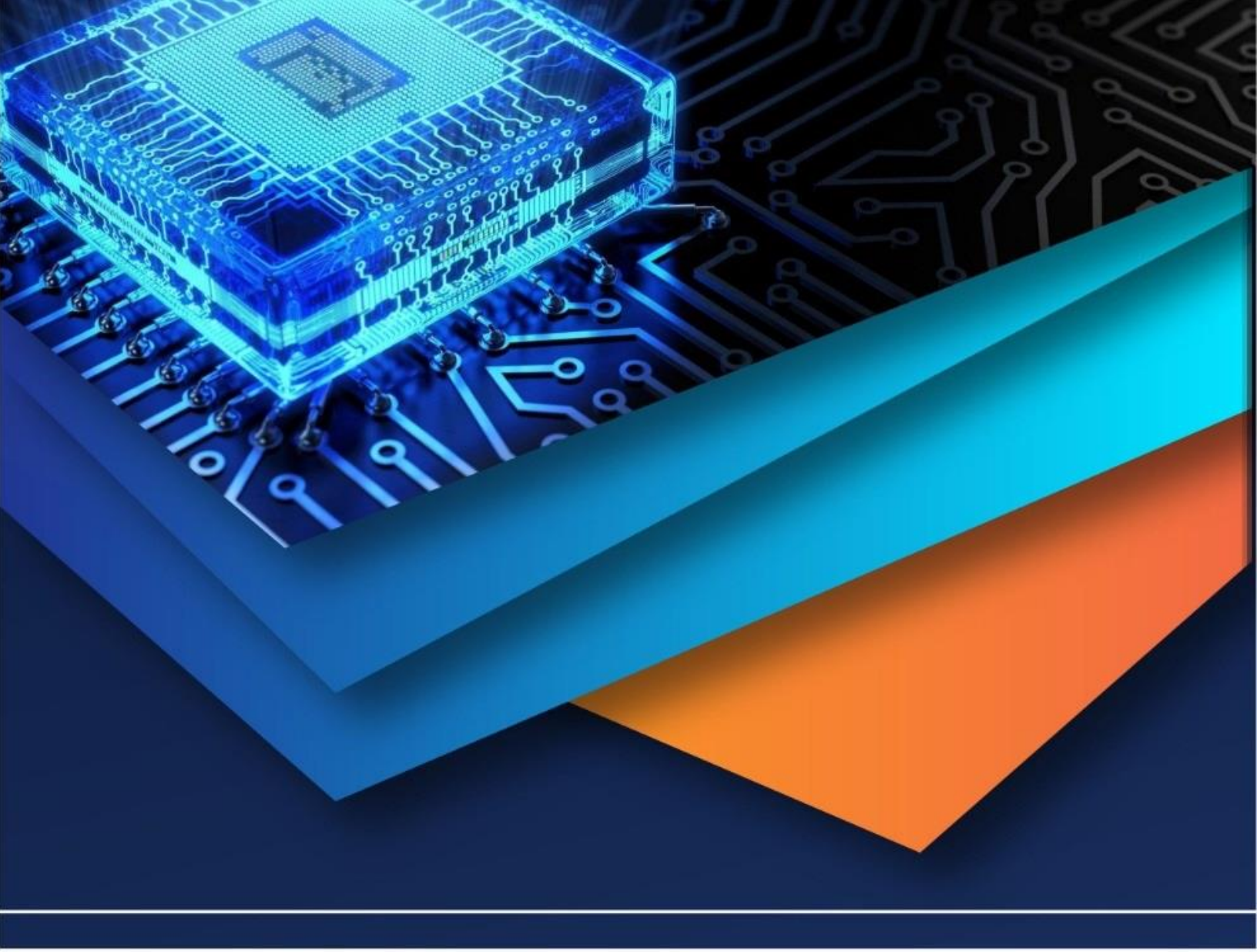

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