Solar Powered Smart Irrigation System with GSM for Agriculture

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Abstract: *A large portion of the Indian public are reliant upon farming and consequently our country's economy is fundamentally subject to agribusiness, so proficient horticulture requires appropriate water system and can further develop our country's economy in like manner. We can accomplish this with the assistance of different electronic gadgets and through its utilization we can get legitimate water system in this field in a mechanized way. Project Irrigation and Water Level Control utilizing Atmega 328p regulator intended to address farming area issues identified with water system and water observing frameworks with accessible water assets. Drawn out times of dry climate conditions because of changes in yearly precipitation can fundamentally diminish farming yields. Exploitative organizations need a productive water system framework as their bigotry to the expense and dry season of building up these yields. On this task we're the utilization of Atmega 328p regulator, soil sensor , temperature sensor, dc water siphon, transfer main thrust, level sensor, GSM modem, Solar board, battery and so forth A sprinkler turns on/off contingent upon soil dampness condition and condition. The engine can be shown in instant messages by means of the GSM model on a 16X2 LCD. Likewise, the water level can be checked by level sensors. It assists with knowing the accessibility of water at the info source.*

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

I. INTRODUCTION

Irrigation is the process of artificially supplying water to arable land. In dry areas where there is traditionally less rainfall, another way of supplying water to crops is through canals, pumps, etc. However this increases the workload on the farmer and thereby reduces the effective yield on the farm. Therefore, it is necessary to check the soil condition before supplying water to the crops which will help in increasing the effective yield in the agricultural sector. At the same time, smart fencing will also be implemented. With the help of advances in technology, it is possible to design systems that eliminate direct farmer involvement in irrigation for their farms.

Technologies have been developed to the extent that the entire irrigation and fencing systems can be automatically modified using systems that control the motors that irrigate the fields.

A solar powered automatic irrigation system is a viable option for farmers in the current context of 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 confuses the main area or soil to our crop system.

Water should be supplied mainly to the fields or through ditches. This system helps in reducing the workload of the farmer and maintaining adequate soil quality for good growth. Since then, the development of innovations has allowed farmers to kill farmers and access irrigation water in their fields. The frame of these machines was used to fill the entire engine irrigation system in the fields.

The two most important advances behind the GSM-based irrigation infrastructure are the optional and required "GSM" controller and processor. GSM (Global System for Mobile Communications) is the standard used to refer to computerized cellular conference systems. Agriculture sends results with coded signals to the irrigation system and to the cell phone to the agricultural producer who indirectly controls the entire irrigation system. The water level is monitored and it also sends a message to the user. After the GSM release, the processor or controller serves as the focal point for the robot

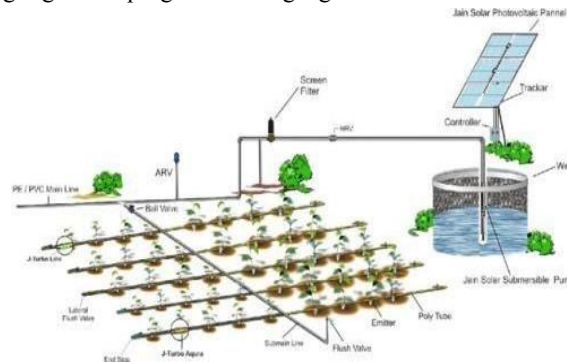work process and ultimately highlights the progress of the gadget.

Fig.1. Solar based Irrigation system

II. PROBLEM STATEMENT

The project is to control agriculture by combining crop water requirements based solar pumping system with automatic irrigation and smart fencing system. The Intelligent Irrigation Circuit has all the important features of a simple irrigation control device including soil moisture testing, monitoring, timely irrigation process and message- based feedback facility. The smart water monitoring system helps in monitoring the water level from the source. Such crops will be destroyed and farms will be destroyed. Watering should be done wisely.

III. 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 labor costs. The following factors were considered in the design solution selection.

- Installation cost
- Water saving
- Monitoring of water resources
- Human intervention
- Reliability
- Power consumption
- Management
- Answer extension
- For Smart Farming Approach for Farmer
- Consumption of renewable energy sources.

IV. NEED FOR SMART FARMING

- India is the second largest country in terms of population after China. As a result, it is important to increase the production of food grains in order to provide food for millions of human beings.
- Uneven and irregular distribution of rainfall causes drought.
- Different water requirements of crops can be met only through irrigation facilities.
- Being a tropical country, high temperature and evaporation are increasing rapidly. Therefore, artificial irrigation is essential for water abundance.
- Water conservation through smart farming is very important.

V. 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.

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 automated irrigation system using solar energy to pump water from the borewell to the tank and control the flow rate of water from the tank. Irrigation area that optimizes water use. The system was successful after pumping all day and installing in the borehole. Solar pumps also provide a clean solution to the risk of borehole contamination. The system requires minimal-start-up 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 supply power to the pumping needs for sprinkler irrigation.

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

Communication Engineering, Institute of Engineering & Management, Kolkata, IJARECE Volume 6, Issue 6, June 2017.
In this paper, one of the main objectives of establishing this technology in the agricultural sector of the country is to conserve natural resources and accelerate excellent agricultural production. Water and time are very important for the farmer to get rid of fatigue. Therefore, the system must be designed to provide this efficient functionality using sensor network, sprinkler, GSM, water to the desired farm and the desired amount.
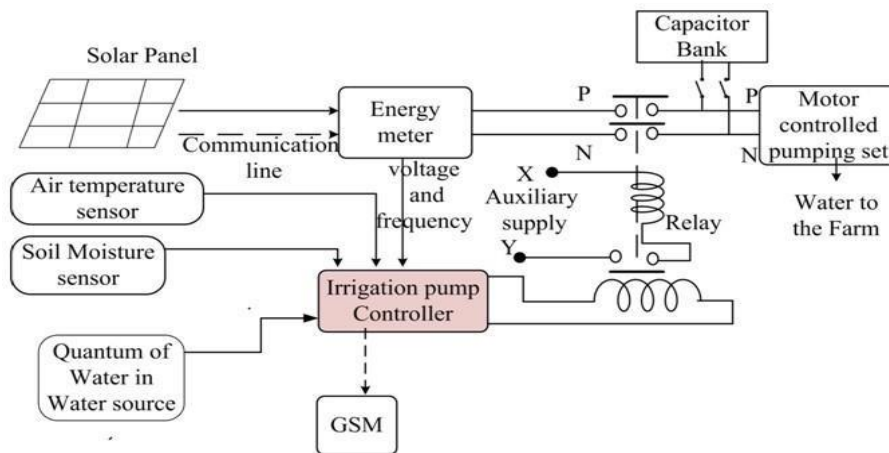
VI. BLOCK DIAGRAM

Fig. 2. Block Diagram of system

VII. WORKING

- The first power on the circuit board. Power is transferred from the 12v battery source. This battery can be charged with a solar panel or adapter. When in cloudy conditions, the visibility of the light is low so the adapter energizes the performance of the main circuit board.

- Now, the moisture sensor is inserted into the soil. As a result, the sensor absorbs soil moisture as well as soil temperature. Also the level sensor senses the availability of water from the source.
- All values are shown on the LCD display. Also, it sends messages to your mobile number with the help of GSM modem.
- When the sensor senses that soil or moisture has entered it, the pump is turned off. But when they cannot use sensor technology when you need extra water. For this they need to take DTMF technology.
- With this they can put sensor is in the dry state, the pump starts pumping water.
- Total project model of solar powered smart irrigation system works automatically this way. LCD display and text messages show special status. Therefore, it is easy for farmers coming from distant places to know that their fields have everything they need for irrigation.

VIII. COMPONENTS DETAILS

A. Atmega 328p controller

One of the most important components of an automatic irrigation system is the irrigation controller, also known as the Atmega 328p controller. The controller is used as the brain of the control circuit due to its functional properties in mono study mode. Those ports can be used to read data and commands to other devices or to output the location of sensors or switches. Most ports on the Atmega 328p are used for two different functions and are called dual functions.

B. Solar Panel

Solar energy is the conversion of energy from sunlight by direct photovoltaics (PV) or indirectly by intense solar energy. Solar power is the largest power supply in the world. Photovoltaics are an effective way to harness solar energy. Energy Disaster Automated System Using Solar Energy Under the current circumstances, a solar powered irrigation system is the right choice for farmers. The main objective of the project is to develop the irrigation system in the agricultural sector through the use of solar energy.

C. Soil Moisture

Soil farming is a small-scale model of the climate farming cycle and a large-scale model of climate interfaces. Vegetation and crops are always highly dependent. This is the moisture available at the base level compared to the rainfall events. The water budget requires actual preparation of the irrigation action with local soil moisture data. Knowledge of soil wetting provides an advantage in predicting the risk of flash floods 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
The 12 V supply, 10 m head, uses a permanent magnetic brushless DC motor that works on a brushless DC pump in conjunction with an impeller in the rotor, designed to create a chamber to handle fluid flow.

F. Water level sensor
The water level is one of the four parameters that the proposed system assessment will follow. To reach the target, we built a water level sensor using 3 level connector wire, water depth. It can measure from 2cm to 400cm with an accuracy of up to 3mm. There are 4 pins to connect in different positions.
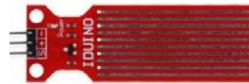
IX. ADVANTAGES
- The system is cheap in terms of hardware components and power consumption.
- This system helps in saving water and electricity.
- It can be applied in large agricultural areas.
- The system helps in the problem of workers when there are no laborers to work and manpower is eliminated.
- The system can be switched to manual mode as and when required.
- It is suitable for all weather conditions and all types of irrigation.

X. APPLICATIONS
- Irrigation can be achieved in fields, orchards, farms etc. It is effective for a variety of crops.
- This application can be used for crop health monitoring.
- Software developed for this system can be used for domestic tasks such as application tank storage.
- The system can be operated automatically as well as manually.

XI. RESULTS
Various experimental tests have shown that the system can operate as expected and have observed that the sensitivity of the sensor is affected by temperature when testing soil moisture levels to detect water.

This induces irrigation in some way, resulting in variations in the moisture values measured at different times from the set humidity values. 80% of the 10 tests were successful in giving the correct answer. However, the system was able to send SMS to the user and the LCD system on the occurrence of events in all 10 trials, as well as starting and completing the scheduled task. Similarly, the system was able to respond to SMS commands to turn the irrigation pump on and off for irrigation in all tests.

XII. CONCLUSION

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 GSM networks implemented worldwide with their low SMS service cost to use mobile phones and simple SMS commands to manage their irrigation systems. To demonstrate the functionality and performance of the controller system, future models will be implemented. Results show that consumers can use SMS to directly monitor the condition of their farm, determine water requirements for crops, control irrigation automatically, and control activities that meet crop water requirements. Can. This great crop helps reduce excess water in production costs. In addition, it helps to influence existing GSM networks to provide value- added services to customers.

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