

Solar Powered Automatic Soil Irrigation System with Electric Fencing for Agriculture

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Abstract-

Most of the Indian people depends on the agriculture and due to that economy of our country mainly depend on the agriculture, so proper irrigation is must for efficient agriculture and accordingly we can improve the economy of our country. We can achieve this with the help of various electronic devices and by using this we can achieve proper irrigation on the field in automatic manner. The project irrigation and fencing control using AT89S52 is designed to tackle the problems of agricultural sector regarding irrigation and wild animal security system with available water resources. Prolonged times of dry climatic conditions due to fluctuation in annual precipitation, may appreciably reduce the yield of the cultivation. The expenses in establishing many of these crops and their relative intolerance to drought make an effective irrigation system a necessity for profitable enterprises. when any object is sensed by IR sensor, immediately controller active at the same time buzzer will on, in control room message will show on LCD display, fencing wire gets sever dc shock. In this way we can protect the farm. In this project we are using AT89S52 (8051 microcontroller), Moisture sensors, IR sensor, dc water pump, relay driver. IOT Module, solar panel, battery etc. A sprinkler will get switched ON /OFF depending on the soil moisture condition and status of motor can be displayed on 16X2 LCD model.

Keywords: Soil Sensor, Irrigation, Fencing, IOT Module 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. This is a way of producing green energy that provides energy for free when the initial investment is made. The irrigation system is a misleading water supply experimental method to the area or soil that is the main base of our crop system. Water must be supplied mainly to fields or through ditches. This system should reduce the workload of the farmer and contribute to maintaining adequate soil quality for better growth. From then on the development of innovation was conceivable that they killed the cadres outlined the immediate insertion of peasant farmers irrigation in their fields. These machined frames of the

entire engine irrigation system that flooded the fields. The increasing news articles in television and newspaper on wild animals raiding agricultural crops during harvestseasonshows that these animals can destroy a farmer’s livelihood. In such areas Electric fencing system can be employed in which the animals experience a normal voltage low current shock for a very short time. Its only normal shock so that, no one can harm.

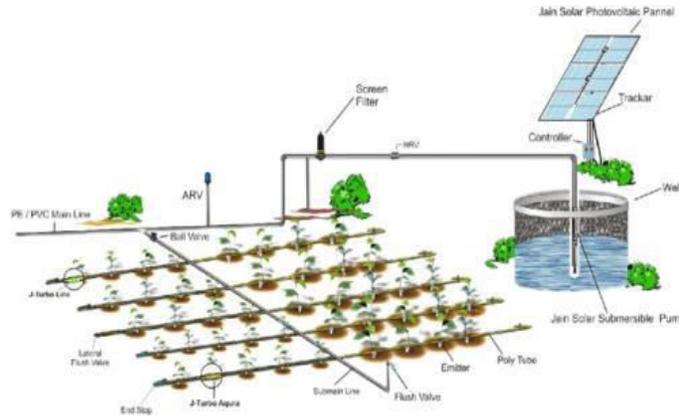


Fig1. Solar based Irrigation system

II. PROBLEM STATEMENT

The main aim of this project is to combine the crop water requirement based solar pumping system with automated irrigation and smart fencing system to controlling farm. The intelligent irrigation circuitry will incorporate all the important features of a typical irrigation control device, which include soil moisture testing, monitoring, timely irrigation procedure and message-based feedback facility. Smart fencing system, protect the farm from wild animal and suspicious human being. As many crops is farm are destroyed by such things. It’s necessary to protect it smartly.

III. OBJECTIVE

The main objective of this project was to design a small-scale irrigated system that would use water in more well-organized way in order to prevent excess water loss and minimize the cost of labour. The following aspects were considered in the choice of design solution.

- Installation cost
- Water saving

- Protection from wild animal
- Human intervention
- Reliability
- Power consumption
- Maintenance
- Expandability
- Smart Farming System to Farmer
- Use of Renewable Energy Source.

IV. NEED FOR SMART FARMING

- In term of populations India is the second largest country after China. So it is necessary to increase the production of food to feedstuff millions of people.
- There is uneven and indeterminate distribution of rainfall which cause drought.
- For different water necessities of crops can only be met through irrigation amenities.
- Being tropical country there is quick increase in the high temperature and evaporation. So, for abundant cause of water artificial irrigation is essential.
- It is very important to protect the farm and crops from wild animal for unnecessary damage.

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 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.

- *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.*

This paper is intended to cultivate an automatic irrigation system which controls the pump motor ON/OFF on sensing the moisture content of the soil In the field of 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.

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

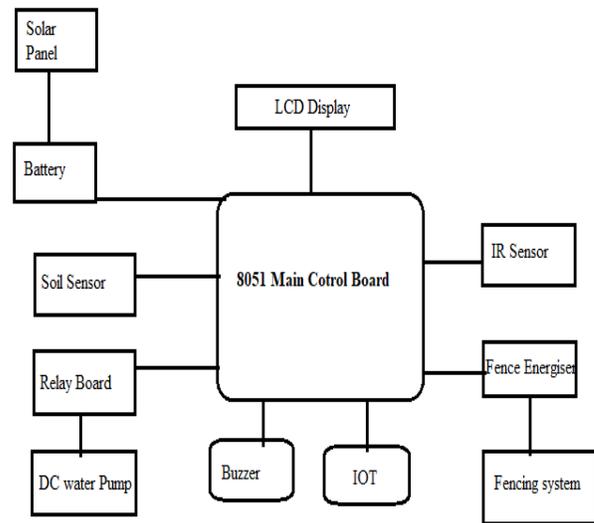
In this paper, the ability to conserve natural resources and give impetus to superb agricultural production is one of the main goals of setting up this technology in the country's agricultural sector. To save the farmer's fatigue, water and time were the most important consideration. Therefore, systems must be

designed to provide this efficient functionality by using sensor networks, sprinklers, GSM, SMS technology. The operation of the paper above basically depends on the output of the humidity sensors. Whenever you need excess water in the desired field (paddles), then you will not be able to use sensors technology. To do this they have to take DTMF technology. Using this they can irrigate the desired field and the desired quantity.

Summary of literature review

After going through the literature review it can be summarized that more of the work has been done in developing suitable pumping system, automated circuitry for irrigation controlling purpose separately. Many researches work on bringing the wireless technologies in automation circuits are carried out. These techniques are absolutely reliable and minimize general field monitoring. There is a lot of research work available on crop counting methods.

VI. BLOCK DIAGRAM



VII. WORKING PRINCIPLE

Here in this paper an experimental scale within rural areas where there is an enormous disposition of irrigation system which is executed using arm controller and wireless communication. The main of this implementation was to demonstrate that the automatic irrigation system can be used to optimize /reduce water usage. It can also be a photovoltaic

irrigation system which consists of a solar powered that is the soil moisture sensor and temperature sensor placed under the soil where plants roots are reached which is a distributed network.

- 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.
- Now, moisture sensor is inserted into water in soil. As the result, sensor sense the moisturise of water also the temperature of water. Values shown on LCD display. Also, it sends information through IOT to your mobile phone.
- When sensors sense the water or it moisturise, pump is OFF condition. But when sensor is in dry state, the pump starts pumping the water.
- IR sensor is used to detect the object, Sensor sends signals to the controller. And it passes to relay driver. Through relay driver the buzzer will ON and IOT module active at same time.
- The authorized person gets information from LCD display in control room, when any object is detected by IR sensor. At same time fence energizer is also active.
- This is the solution to the protection of agriculture areas or any other sensitive areas from robberies, interruption and creatures.

VIII. COMPONENTS DETAILS

▪ 8051 Microcontroller



There is a large family of microcontrollers and 8051 is one of those families. The device which we used in our work was the 'AT89S52' which is a typical 8051 microcontroller and it is

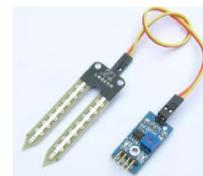
manufactured by Atmel™. 89S52 has 4 different ports, with 8 input / output lines in each port providing a total of 32 I / O lines. Those ports can be used to output data and commands to read other devices, or to position sensors or switches. Most ports of 89S52 can be used for two different functions and they are called dual functions.

• Solar Panel



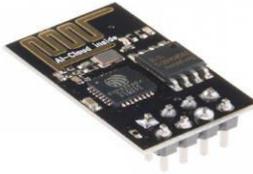
Solar energy is the conversion of energy from sunlight directly by photovoltaic (PV) or indirectly by intense solar energy. The most abundant energy source in the world is solar energy. Photovoltaic is an effective way to use solar energy. In the current situation of an energy disaster automatic system 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.

▪ Soil Moisture



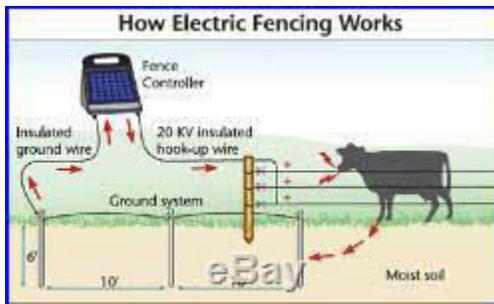
Soil moisture is an important component of the atmospheric water cycle, on a small farm scale and on a large-scale modeling of the weather interface. Vegetation and crops always be contingent more on. It is the moisture that is available at the base level compared to the rainfall events. The water budget requires actual preparation of the irrigation action along with local soil moisture data. Knowledge of soil wetting gives an advantage in estimating the risk of flash floods or fog.

▪ **IOT Module**



IoT, or Internet of Things, refers to connected machines and devices that can communicate remotely via one or more, wireless communication media. IDC defines it as "endpoints of specific identities (or" content "networks) that communicate without human interaction using ID connectivity - so "locally" or globally" The increases of communication between devices and volume of data that is created allows for devices to become "smart"; working around the users' needs and preferences and improving efficiency, while the user can make use of the data themselves, something which is valuable when it comes to applications such as health monitoring.

▪ **Fence Energizer**



The energizer that powers the fence releases a high voltage pulse every 1.2 seconds, giving any animal in contact with the fence a painful but safe shock while trying to enter the area. Solar Fence is not only a physical barrier but also a psychological barrier preventing animal intrusion. Solar fencing not only guarantees the safety of one's property, but also uses renewable solar energy for its performance. The solar fence acts like an electric fence, giving a brief but terrible shock when humans or animals come in contact with the fence. The shock enables a deterrent Effect on preventing loss of life.

IX. ADVANTAGES

- The system is inexpensive in terms of hardware components and power consumption.
- The system helps in saving of water and electricity. It can be applied in large agricultural areas.
- The system helps the labor problem when there are no workers to work with and eliminate manpower.
- The system can be switched to manual mode if required.
- It is convenient to all climatic conditions and all sorts of irrigation.
- Prohibit the entry of animal into the farm to design a security system for farm protection.

X. APPLICATIONS

Irrigation can be completed on farms, orchards, farms etc. It is effective for a variety of crops. This application is useful for monitoring the patient. Software applications developed for this system can be used for domestic tasks such as tank storage. The system is operated automatically and manually

XI. RESULTS

The partnership trust facilitates irrigation, is accurate and practical and can be implemented in agricultural areas to take agriculture to the next level in the future. The output from moisture sensor and fencing system plays wide role in producing the output. Various experimental tests have shown that the system can operate as expected and it has been observed that the sensitivity of the sensor is affected by temperature when investigating soil moisture levels to determine water. It differs from the set humidity values in that it induces water in any way due to the variation in set humidity values. 80% out of 10 trials were successful in responding correctly. Also, smart fencing system, check the animal presence through IR sensor and resulted out in form of DC shock in fence. The system was however, able to send info to the user through IOT and LCD system upon starting and completing a scheduled task as well as the occurrence of events at all the 10 trials.

XII. CONCLUSION

There are various benefits to the government and farmers by implementing the proposed policy. A solution to the energy crisis has been proposed for the government. Optimizes water use by using automatic irrigation system, minimizing water waste and human intervention by farmers

In this smart farming project automatic controlling of solar pump sets and message alert has been discussed fruitfully on LCD display, IOT module. At same time we can protect the farm with electric fencing system. To demonstrate the functionality and performance of the controller system, the prototype will be implemented and tested in coming days. This will surely result possible for users to use display monitor directly the conditions of their farmland.

XIII. REFERENCES

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