

GSM and Solar Panel based Automatic Irrigation System

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Abstract— Agriculture plays a key role in the life of farmers. So a proper amount of water and power supply is required for efficient plant growth. So here we have automatic plant irrigation system which consists of solar modules, various sensors etc. Solar modules are devices that cleanly convert sunlight into electricity and offer a practical solution to the problem of power generation in remote areas. Solar power is used as only the source of power to control the overall system. Sensors are placed on the paddy field and these sensors continuously sense the water level and give the message to the farmer informing the water level. Without visiting the paddy fields, farmers can get the information about the water level. Using an automatic system helps the farmer to ON/OFF the motor without his physical presence in the field. This system has real time sensing and control of an irrigation system. When the condition of water in the agricultural farm is abnormal then the system automatically switches OFF. Based on the soil moisture, through relay the pumping motor will be automatically switch on or off which saves the water and on the other hand the plant can get most appropriate water level which increases the productivity of the crop. GSM (Global System for Mobile communication) technology is used to inform the user about the exact condition of the field.

Key words: GSM, Rain Sensor, Soil Moisture Sensor, Pump, Relay

I. INTRODUCTION

Agriculture is the backbone of Indian Economy. Because without agriculture life is impossible since it is the main source of food for us. The farmer has to toil himself to produce the crop which brings him little revenue, so he has to try some other options for his sustenance, also today the availability of labor for carrying out agricultural activities is less, therefore the automation in agricultural process is needed. Thus this paper has proposed a system so that even after devoting less time to the field, the farmer can carry out his agricultural activities efficiently from remote places.

In this system all the devices work on their own with the help of inputs received from the sensors which are monitoring the agricultural land round the clock and farmer can monitor whether everything is going normal or some action is needed to be taken. The entire process is controlled and monitored by programmable controller. There are many regions which suffer from inadequate rainfall. For such regions automation plays a key role in the world economy therefore, engineers struggle to come out with combined automatic devices in order to help humans in its activities so that the system automatically processes itself without any human intervention. So we would like to develop an automatic irrigation system.

Basically, the project consists of electrical part and mechanical part. The electrical part consists of photovoltaic, which is used to generate electrical power and the power is stored in the rechargeable battery. The mechanical part consists of pump, which is used to pump out the water from

the water source. The parameters in the project are soil humidity condition, water level condition, the position of the Sun. The solar system is used to generate the power and it provides the power to the entire system as the solar system is much cheaper than the electrical system.

It is suitable to the rural area that is why the solar system is used as a power supplier to replace DC motor electricity source. It is a versatile source of renewable energy that can be used in any application. The system consists of hardware and software and, finally, the integration of the two parts to provide the results. The hardware system consists of the sensors, and drivers. In hardware design, we need all the components that are necessary to accomplish the project, and these components are solar panel, DC water pump motor, sensors.

II. LITERATURE SURVEY

KritiSisodia et.al[1] In this author proposed the automated control to avoid damage of crops due to surplus usage of water. In manual control we simply using a water pump to supply water to crops. Here, system uses a automatic control by continuous monitoring. We uses various microcontrollers with GSM to develop continuous monitoring. By incorporating this method, water and electricity was used efficiently. It gives better performance by avoiding problems in a very efficient and innovative manner by using wireless technology.

By this technique we can reduce water consumption by setting lower and upper threshold to maintain optimum soil moisture saturation and minimize plant wilting. This provide deeper plant root growth, less favorable conditions for insect and fungal disease. It lower nutrition costs by controlling the nutrition levels. Controlled system prevents from environmental nutrition pollution.

RichaYadav et.al [2] In this author proposed an Irrigation Control System Using Android and GSM for Efficient Use of Water and Power. Automatic microcontroller based rain gun irrigation system in which the irrigation will take place only when there will be a need of water as a result it saves a large amount of water as it is avoiding wastage of water. Android is used for mobile devices that include an operating system. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. This application makes use of the GPRS feature of mobile phone as a solution for irrigation control system. These systems covered lower range of agriculture land and not economically affordable. The system supports water management decision, used for monitoring the whole system with GSM (RS-232) module. The system continuously monitors the water level and provide accurate amount of water required to the fields. The system continuously checks the temperature and humidity of soil in order to retain the nutrient composition of the soil so that. The system uses sensors for remote

monitoring and controlling devices which are controlled via SMS using a GSM using android mobile.

Nilesh S. Bhaltadak et.al [3] In this the author proposed a closed loop automatic irrigation system monitoring the temperature and water usage. The system can be used in greenhouse as well as open fields. A flow sensor is connected to the main water supply which tracks the water applied to the field continuously. All the information i.e. temperature, current soil moisture level in field, upper and lower moisture levels maintained in field set by the user. The motor status, water uses and flow rate are displayed on LCD. This system provides a automatic irrigation with the use of low cost sensors and the simple circuitry thereby it makes a low cost product, which can be brought even by poor farmer. The soil moisture level is one of the important parameter of agriculture, which controls the quality of crops grown in any type of field. The system monitors soil moisture and perform automated irrigation management. The temperature of greenhouse and water usage in Irrigation is monitored by system. In this paper we introduce design of embedded web server by using GSM technology. In this system web server and node are connected wirelessly. The system is cheaper and more flexibility of the network topology. The separate GSM trans-receiver is used for every node to transmit the details to server node. Irrigation control based on internet and microcontroller, in the farm we use water irrigation it is monitored by using sensor i.e. temperature, humidity. The sensor sense environmental condition and send this data to controller through the PC using GSM technology.

III. PROBLEM IDENTIFICATION

Agriculture plays a major role in economics and survival of people in India. Nowadays Indian agriculture faces two major problems. They are as follows; know government has promoted a free supply of electricity for farmers to run their motors and pumps for irrigation purpose. But it is found that the farmers misusing the electricity to run their home appliances such as radio, TV, fans, etc. This misuse of electricity has brought a considerable problem for government to supply free electricity.

IV. DESIGN IMPLEMENTATION



Fig. 1: Pic of Proposed Model.

A. Working

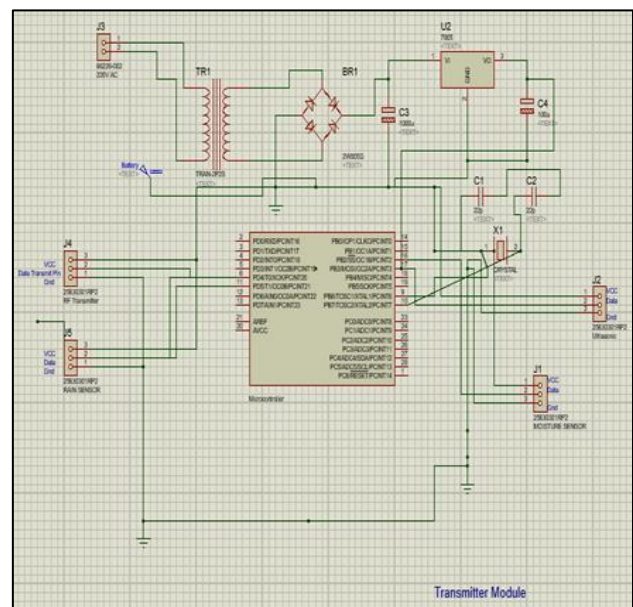
The working of this project is complete in two parts one is transmitter part which is node2 and other is receiver part which is node1, we are starting with node2 when moisture sensors are dip into the clay or into the soil of plants in our field they sense the moisture content present in the soils and compare with the threshold level of moisture and then a signal send to microcontroller if the soil is dry then the water pump is ON and start irrigation to the crop when all the moisture sensors get wet by watering the water pump will be OFF also the data of moisture sensor send to node1 by RF transmitter.

The rain sensor senses the rain drop falling from sky if rain drops fall on the rain sensor panel the water pump is OFF this is because why we waste our resources if we have irrigation by nature also the data of rain sensor send to node1 by RF transmitter.

Now the ultrasonic transreceiver is use to set the level of water according to the specific crops, some crops need less water to grow some need more water so we can define a level that how much water we want in our field, ultrasonic waves speed and time is used to calculate the distance travel so we can set a level of water this has another benefit it also prevent the overflow wastage of water.

At the node1 according to the sensors from node2 the water pump is working which is at node1 also the owner of the field can communicate with the system he can ON and OFF the water pump by sending the SMS to the system this is done with the help of a GSM module and also the data of sensors of node2 send to the owner by GSM. A display is used to show all the messages and data at node1 and at the end the major part which is solar panel and 12 volt battery is used to provide the power supply to the system, 12 volt is use to start the water pump and to operate other modules 5 volt dc power is needed so there is a regulated power supply is used.

V. DESIGN AND IMPLEMENTATION OF PROPOSED SYSTEM



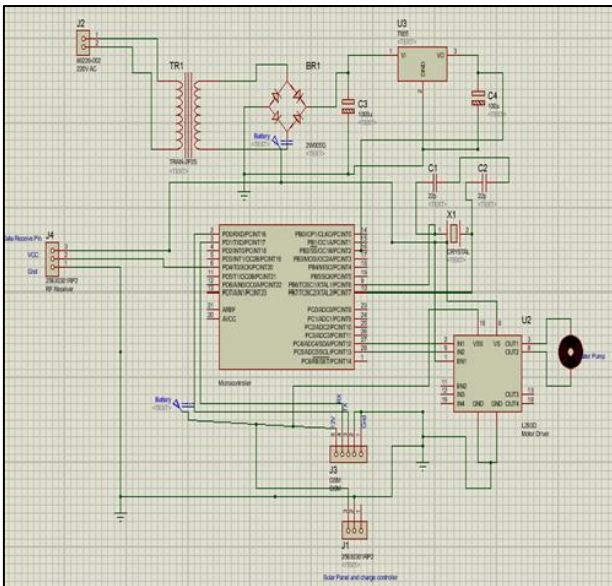


Fig. 2: Transmitter and Receiver Circuit Diagram

VI. RESULT AND DISCUSSION

The transmitter side of the proposed model is totally for sensing the conditions of fields where we have to do irrigation. There are some moisture sensors are available to sense the moisture content in the soil of plants and sense two conditions wet or dry and corresponding to this the condition read by microcontroller and displayed, if the soil is dry the water pump turn ON and when the soil is wet the water pump is turn OFF.

The rain sensor sense the water drops fall in rain, if it is raining, the system will turn OFF the water pump because the water is already coming from nature so why we waste our resource. If there is no rain fall the water pump is turn ON and provide watering to the plants.

Now the ultrasonic transceiver control the water level in the field which we pour in the field and prevent the overflow of water and wastage of resources. All the results are displayed by a LCD display.

VII. CONCLUSION

Irrigation in agricultural areas is extremely important. Increasing the demand for water resources, usage of water resources is optimal which has been provided with greater extent by automation technology. Since earlier days farmer had to visit his fields and check the moisture content of soil manually. To avoid more human efforts this technology is used. It allows the user to monitor and also maintain the moisture remotely regardless of time. It is really effective and economic way to reduce human effort and water wastage in agriculture lands. This project entitled "Solar panel and GSM based wireless irrigation system" helps the farmer to irrigate his farmlands without his physical presence in the field. This project has real time sensing of control of an irrigation system. The automated control is implemented here to avoid damage of crops due to surplus and deficit amount of water.

With the help of this project the user gets freedom from the need of manual work and manually discontinuous monitoring of irrigation. The continuous monitoring of the agriculture was designed by using GSM. In existing methods,

only discontinuous was obtained by not including such device which led to inefficient use of water and electricity. Hence by incorporating this method, the water and electricity was used efficiently.

It will help the farmer to irrigate the field at any time during the day or night times. However, both day and night times watering have their advantages and disadvantages. The midway watering can serve to cool the turf and reduce heat stress on hot summer days.

VIII. FUTURE SCOPE

The scope of this project is immense. The future implications of the project are very great considering the amount of time, money and resources it saves. The project we have undertaken can be used as a reference or as a base for realizing a scheme to be implemented in other projects of great level such as GSM pump controller, weather updates using mobile phones, pest control, control farming vehicles, using mobiles and many devices. The project itself can be modified to achieve a complete automatic irrigation system which will then create a platform for the user to interface between him and the agricultural field.

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