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Solar based automatic irrigation system

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ABSTRACT:

India is mainly an agricultural country. Agriculture is the most important occupation for the most of the Indian families. It plays vital role in the development of agricultural country. In India, agriculture contributes about 16% of total GDP and 10% of total exports. Water is main resource for Agriculture. Irrigation is one method to supply water but in some cases, there will be lot of water wastage. Therefore, in this regard to save water and time we have proposed project titled Arduino based automatic irrigation system . In this proposed system, we are using various sensors like moisture sensors , water level sensor that sense the various parameters of the soil. In addition, based on soil moisture value land is automatically irrigated by ON/OFF of the motor. These sensed parameters and motor status will be displayed on user android application.

Keywords: Arduino, Water level sensor, Humidity sensor and pH.

I. INTRODUCTION

Agriculture is the backbone of Indian Economy. In today's world, as we see rapid growth in global population, agriculture becomes more important to meet the needs of the human race. However, agriculture requires irrigation and with every year we have more water consumption than rainfall, it becomes critical for growers to find ways to conserve water while still achieving the highest yield. But in the present era, the farmers have been using irrigation technique through the manual control in which they irrigate the land at the regular interval. According to statistics, agriculture uses 85% of available freshwater resources worldwide, and this percentage will continue to be dominant in water consumption because of population growth and increased food demand. There is an urgent need to create strategies based on science and technology for sustainable use of water, including technical, agronomic, managerial and institutional improvements. Agricultural irrigation based on Internet technology is based on crop water requirement rules. By using Internet technology and sensor network technology we can control water wastage and to maximize the scientific technologies in irrigation methods. Hence it can greatly improve the utilization of water and can increase water productivity.

The proposed system has been designed to overcome the unnecessary water flow into the agricultural lands.

Temperature, moisture and humidity readings are continuously monitored by using temperature, moisture and humidity sensor and send these values to the assigned IP address. Android application continuously collects the data from that assigned IP address. Once the soil moisture values are exceeded the particular limit then the relay, which is connected to the aurdino microcontroller controls the motor. The android application is a simple menu driven application, with 4 options. This includes motor status , moisture , temperature and humidity values. The motor status indicates the current status of the pump.

II. EXISTING METHODOLOGY

In this paper, soil moisture sensor, temperature and humidity sensors placed in root zone of plant and transmit data to android application. Threshold value of soil moisture sensor that was programmed into a microcontroller to control water quantity.

Temperature, humidity and soil moisture values are displayed on the android application.

This paper on "Automatic Irrigation System on Sensing Soil Moisture Content" is intended to create an automated irrigation mechanism which turns the pumping motor ON and OFF on detecting the dampness content of the earth. In this paper only soil moisture value is considered but proposed project provided extension to this existed project by adding pH and humidity values.

Remote Monitoring in Agricultural Greenhouse Using Wireless Sensor and Short Message Service (SMS).In this paper they are sending data via sms but proposed system sends the values to mobile application.

This proposed paper is arduino based remote irrigation system developed for the agricultural plantation, which is placed at the remote location and required water provides for plantation when the humidity of the soil goes below the set-point value. But in this we did not aware about the soil moisture level so to overcome this drawback proposed system included with extra feature soil moisture value and temperature value which displayed on the farmer mobile application.

Irrigation Control System Using Android and GSM for Efficient Use of Water and Power‖ this system made use of GSM to control the system which may cost more so to overcome that proposed system used arduino UNO board which already consist of in build wifi module.

Microcontroller based Controlled Irrigation System for Plantation‖ In this paper old generation with lesser memory microcontroller is used to control the system but proposed system made use of arduino UNO board which is user friendly and it helps to dump the programs easily.

A wireless application of drip irrigation automation supported by soil moisture sensors‖ in this paper irrigation is carried out using soil moisture values but extend to this proposed system displays temperature and humidity values.

By referring all above papers it is found that no such systems are existed with all integrated features but proposed system includes these all features such as displaying temperature, humidity and soil moisture values and also automatic switching on and off of motor by considering soil moisture values.

III. PROPOSED METHODOLOGY

This below figure is a overall block diagram of arduino based automatic irrigation system which consist of two sensors which are connected to controller and sensed values from these sensors are send to the mobile application .

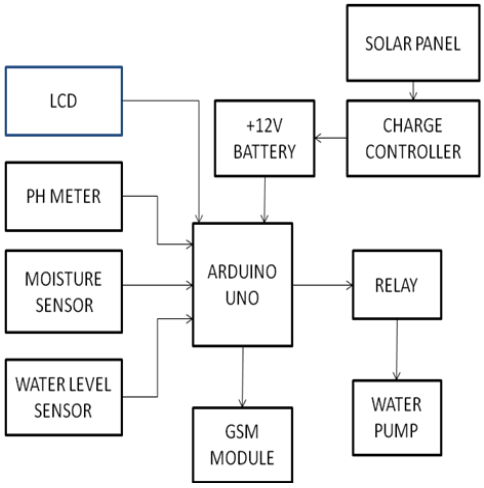

Figure 1: **Block Diagram of Automatic Irrigation System**

Farmers start to utilize various monitoring and controlled system in order to increase the yield with help of automation of an agricultural parameters like temperature, humidity and soil moisture are monitored and control the system which can help the farmers to improve the yield.

This proposed work includes an embedded system for automatic control of irrigation. This project has wireless sensor network for real-time sensing of an irrigation system. This system provides uniform and required level of water for the agricultural farm and it avoids water wastage. When the moisture level in the soil reaches below threshold value then system automatically switch ON the motor. When the water level reaches normal level the motor automatically switch OFF. The sensed parameters and current status of the motor will be displayed on user's android application.

OBJECTIVE OF THE PROJECT

The main objective of this project is to provide an automatic irrigation system thereby saving time, money & power of the farmer. The traditional farm-land irrigation techniques require manual intervention. With the automated technology of irrigation the human intervention can be minimized.

IV. DESIGN

Design of a system explains pH, water level senor and soil moisture values using flow chart.

A. FLOW CHART

This below figure 2 shows the sensed values of pH / humidity.

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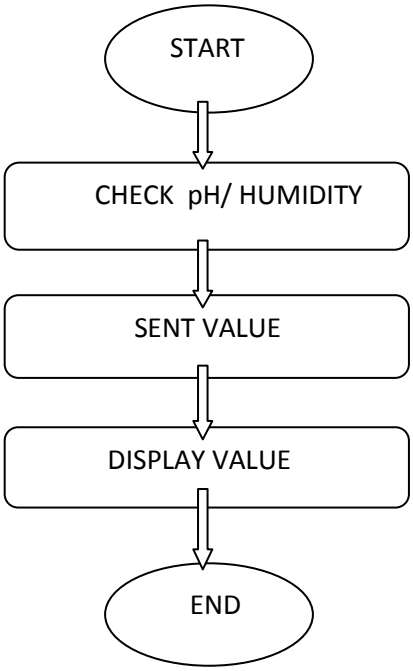
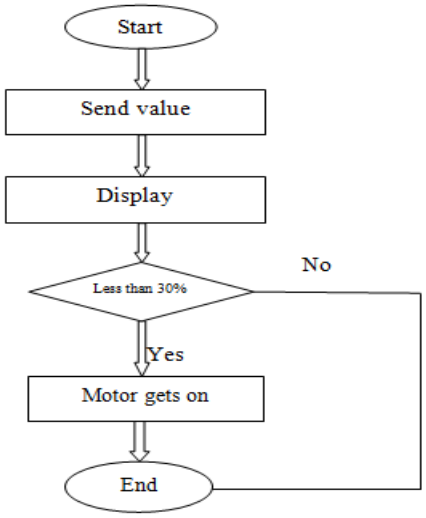


A flowchart is a graphic representation of a logic sequence, work or manufacturing process, organization chart, or similar formalized structure. The flowchart is a means to visually present the flow of data through an information processing systems.

The DHT11 is a basic, digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin(no analog pins needed).It is simple to use, but requires careful timing to grab data. Humidity sensors are used for measuring moisture content in the atmosphere. Then current temperature, humidity values are send to the microcontroller, those values will display in the users android app.

SOIL MOISTURE SENSOR

This below figure 3 shows the procedure of displaying soil moisture value.



Soil moisture sensors measure the water content in soil. Moisture in the soil is an important component in the atmospheric water cycle.Sensor module outputs a high level of resistance when the soil moisture is low. It has both digital and analog outputs. Digital output is simple to use, but it is not as accurate as analog output based on moisture level motor gets turn on/off automatically.

V. IMPLEMENTATION

The proposed agricultural system is designed to solve to find an optimal solution to the water crisis. The design implements arduino using an android device, a main controlling unit (MCU), sensors to measure various parameters and a water pump, which will be used to supply water to the farm.

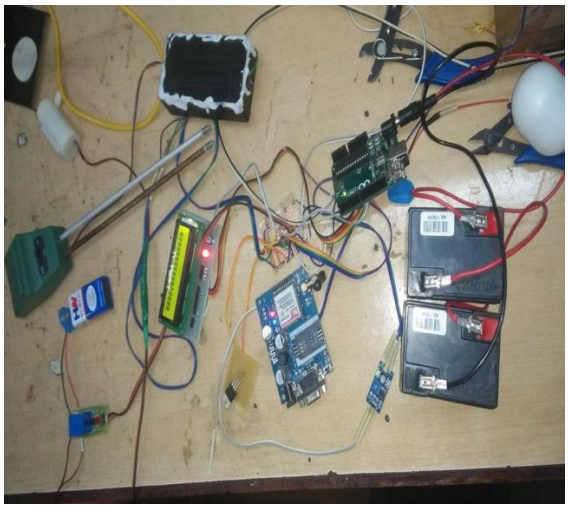
VI. WORKING

This project proposes a model of variable rate automatic microcontroller based irrigation system. 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 sensor, however, if the water level reaches to the low level; the motor will automatically start without confirmation of farmer to ensure the proper water level in the site a complete hardware implementation of this proposed automated irrigation system.

In addition, the system is powered by an intelligent solar system in which solar panel targets the radiation from the sun. Other than that, the solar system has reduced energy cost as well as pollution. The system is equipped with two input sensors soil moisture sensors soil moisture sensors and water level sensor and water level detection sensors. Soil moisture sensor measures the humidity of the soil, whereas the level detection sensors detect the level of water in the tank. The

output sides consist of water pump motor, which are controlled respectively by two sensors.

Additionally, pH sensor measures the pH levels of the soil.



Arduino based Automatic irrigation system

VII. RESULT

Thus we have developed the above mentioned units and successfully coordinated the system. The interfaced sensors and the pump are operated using the arduino.

VIII. CONCLUSION

Thus the "**ARDUINO BASED AUTOMATIC PLANT WATERING SYSTEM"** has been designed and tested successfully. It has been developed by integrated features of all the hardware components used. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Thus, the Arduino Based Automatic Plant Watering System has been designed and tested successfully. The system has been tested to function automatically. The moisture sensors measure the moisture level (water content) of the different plants. If the moisture level is found to be below the desired level , the moisture sensor sends the signal to the Arduino board which triggers the Water Pump to turn ON and supply the water to respective plant using the Rotating Platform/Sprinkler. When the desired moisture level is reached , the system halts on its own and the Water Pump is turned OFF. Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully.

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