COMPUTERIZED IRRIGATION SYSTEM USING ARDUINO UNO

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Abstract : Now a day's it's a challenge to improve development of plant in respect of its growth and to reduce costs which leads to an innovative idea of using an automated irrigation system which will further help in better management of water and human resources. An automated irrigation system has been developed using sensors technology with Arduino to efficiently utilize water for irrigation purpose. The system has soil moisture sensor inserted into the soil of the plants and a water level sensor placed in a water container from where water will be pumped to plants for irrigation. An algorithm has been build out with threshold values of soil moisture sensor to control the water quantity in soil and also a water level sensor has been implemented to measure the water level in tank. This project requires Arduino board having inbuilt ATMega328 microcontroller. This project is need of the hour to convert manual irrigation into an automated irrigation which with the help of soil moisture sensor will detect dankness content of soil leading to turn ON/OFF of pumping motor. Human efforts can be reduced using this technique and increase saving of water by efficiently irrigating the plants. The design has been made with better resource management and low power consumption. This project brings into play a micro-controller which is of 8051 family, this programmable micro-controller collects the input signals converted into values of moisture in the soil via soil moisture sensors. As the microcontroller starts obtaining the signals, it creates an output that forces a relay for running the water pumping motor. An LCD screen is also linked to the micro controller to show moisture conditions of the soil and water pump. The water level sensor is used to detect the level of tank so that tank contains efficient water to transfer into crops.

IndexTerms - Arduino UNO, soil moisture sensors, water level sensors, microcontroller.

I. INTRODUCTION

Eighty five% of global to be had water sources are utilized in agriculture and this percentage will no longer lower keeping in thoughts the fee of populace growth and as a result main to high call for of food [12]. It's high time to create and put in force new methodologies the usage of smart technology for sustainable agriculture . In this electronics generation, a smarter technique o leading an existence has to be completed and therefore we've got made "Automated Plant Irrigation System" for smarter irrigation. Automated Irrigation System will regulate water drift in soil without a lot human intervention, while maintaining moisture of the flowers. This project automatically turns ON or OFF through detecting the water content material within the soil. A computerized irrigation gadget wills no longer simplest limit the extra wastage of water but additionally mean reduction of hard work and other overheads. This undertaking is a mini version for gardening reason at domestic which includes modules- one for measuring soil moisture content material in soil and the opposite for detecting water degree in tank. This paper highlights the working of the existing technology such as Arduino, Sensors and so on. This paper is prepared as follows - Section II summarizes the literature evaluate on the prevailing systems describes the framework applied in this assignment. Finally, Section III describes the operating/methodology of the undertaking, Section IV represents implementation info of this project, in Section IV effects of an experiment have been mentioned, and offers end and future scope and at final are the reference papers.

II. LITERATURE REVIEW

Researchers inside the subject of Agriculture have been seeking to lessen the water wastage amount used for irrigation of vegetation, therefore one-of-a-kind technology can be used to make this possible which has been highlighted by way of many researchers. Some of such researches in agriculture field are summarized below.
In [1] author has mentioned the blessings of the usage of wireless sensor technology and standards for Wi-Fi communications applied on wireless sensors in agriculture area over traditional mechanisms of irrigation with the aid of reading the market boom. In [2] author has defined a Wi-Fi sensor community implementation for low information price applications in agriculture through the use of wireless stations that work on solar energy and the moisture is sensed the usage of twin-probe heat-pulse approach. In [5] author has designed an irrigation device that is website particular wherein irrigation device is electronically managed via a application which updates the geographic place of sprinklers from a GPS and speak that wirelessly to base station. In [10] writer has developed a venture Carnegie Mellon University for plant nursery with the aid of growing a sensor/actuator network and a web primarily based GUI to view the actual-time records amassed. In [11] creator has stated far flung tracking systems which makes use of various Wi-Fi protocols delivered with the aid of one-of-a-kind researchers to improve agricultural yield and, additionally, creator has proposed a version for agricultural monitoring with Wi-Fi protocol implemented using field programmable gate array which helps the gadget with re-configurability and reprogram capability consistent with distinctive environmental conditions. Proper environmental conditions are needed for ultimate plant boom, improved crop yields, and

efficient use of water and different resources. In latest years, the growth inside the productiveness has been Stagnant. Automating the continual want for food is the cause for the requirement of development of era in agriculture. The existing system has proposed the significance to reveal the soil moisture, humidity and temperature. This gadget has proposed price green methods to measure the moisture of soil and have made it less costly to the farmers. The maximum degree of the water content material within the soil is a crucial factor for the harvest to growth. Conditions of restrained water assets had been impaired because of weather change caused the want of water for agricultural purposes growing unexpectedly. This condition can result in an imbalance between supplies and call for of water for plant. The trouble of scarcity or excess of water will motive the plant shunt growth and bring its choicest. Overcoming the shortage of water to improve the productivity and performance of irrigation water use, want a green generation implementation for irrigation control. Thus, the lifestyles of an automatic irrigation device the use of Arduino Uno based totally on micro-controller is predicted to be beneficial to facilitate irrigation in agriculture . The soil moisture module used here has output pins (Digital output and Analog output). The output from the probe of the moisture sensor is as compared with a reference price the use of a comparator. The reference price may be modified via turning the potentiometer of the module. The digital pin suggests a lively low output when the soil is wet. Here we use the analog output from the module by connecting it to one of the analog pins of Arduino. While using the analog output the moist detection value can be adjusted inside the program itself. A transfer is hooked up to one of the analog pins of Arduino and a resistor is used to pull up the line. Analog pins of Arduino can be used as digital inputs. The status of the tank is diagnosed by checking the output of the transfer. Arduino reads the voltage dropped across the resistor for sensing the extent of water within the tank. The two LEDs are linked to the pins of Arduino to reveal the moisture fame and tank fame. And the pin links to the bottom of a BC547 transistor which in flip drives the 12 V DC motor. Working of the prevailing Automatic Plant Irrigation System is straightforward.

First of all, it's far a Completely Automated System and there is no need of manual labor to govern the machine. Arduino is used for controlling the complete manner and GSM module is used for sending messages to person's Cell phone.

If moisture is found in soil then there's conduction among the two probes of Soil Moisture sensor and due to this conduction, transistor stays in on kingdom and Arduino Pin D7 remains Low. When Arduino reads LOW sign at D7, then it sends SMS to consumer about Soil Moisture after detecting using soil moisture sensor is Normal. Motor is become OFF and water pump remains in off state while it's far wet. Now if there may be no Moisture in soil then Transistor turns off and Pin D7 turns into excessive. Then Arduino reads the Pin D7 and activates the water motor and additionally sends message to person about the Low Soil Moisture which is detected. Motor grew to become ON". Motor will robotically turn off when there may be enough water/ moisture inside the soil.

III. PROPOSED SYSTEM

Constant plant monitoring could be very critical for his or her rapid increase. In this busy world, human beings generally overlook to water their vegetation which results in shunt growth and ruins the health of the plants. We have carried out a plant monitoring and watering machine the usage of Particle Photon which constantly video display units the moisture content inside the vegetation. When the moisture stage within the soil goes down to a sure limit, it automatically starts watering the plant. The notification and the moisture degree are shared to user via Wife. In step one, the Arduino UNO board is connected to a device and the software program Arduino IDE is downloaded and the code is finished and sent through USB to the Arduino UNO. Arduino is used for controlling the entire system of this Automated Plant Watering System. The output of soil sensor is at once linked to virtual pin D7 of Arduino. A LED is used at the sensor circuit, now if the fed is on then it refers that the moisture is gift in the soil, and if the fed is off it refers that there is no moisture present within the soil. In the second one step, the relay and motor is linked to the Arduino UNO.A Relay issued to control the small water pump. The relay is driven by a Transistor which is further linked to digital pin eleven of Arduino. Relay is connected to the small water pump. It wishes about 5v to 12v energy deliver for the motor to paintings such that it pumps water. In the 3rd step, the Arduino UNO is connected to the bread board. The bread board consists of the particle photon. Particle photon is a totally-incorporated IoT platform that gives the whole thing you need to installation an IoT product. In this step the important element to be done is to area the soil moisture sensor within the soil, and joins the photon to a power deliver and its appropriate to go. In the following step, we created a soil moisture sensor that sends me emails every time my plant wishes water, and we even added a reminder electronic mail every 30 minutes until the plant receives it. In order to setup the e-mail notifications whenever the plant wishes water, it needs to be related to IFTTT.After you join your photon to IFTTT you have to create a code. We created two recipes for this task, one to inform me when my photon is offline or lost the Wife connection, and one to inform me while my plant wishes water. Before we pass to mount the soil moisture sensor, the precept of soil moisture sensor.

There are four pins inside the sensor: Pin1: VCC (5V DC), Pin2: Ground (0V) Digital Output, Analog Output.

The sensor offers both virtual and analog output which can be used for diverse purposes. The threshold can be modified the use of the potentiometer. So if we use digital outputs then we are able to have most effective moisture degrees. Therefore there is one moisture stage as pump 'TURN OFF' and the alternative level as pump 'TURN ON'. But we've got a primary drawback right here the usage of the virtual output. Whenever the motor starts, and the moisture level will increase close to sensor and crosses the threshold, as a result the pump could be switched off. Thus, watering might be for terribly brief time frame and the water will not attain deep into the roots. Other choice is to apply the analog output. Sensor returns analog value between 0-1023, in which zero is for the moist soil and 1023 for the dry soil. Here we can set two thresholds, one for beginning the watering and one for stopping the watering for the health of the plant.

To summaries, in steps one, the sensor information need to be examined. A soil moisture sensor must be inserted into the soil and the readings ought to be checked.

The code is very simple, the records are study from the A1 pin and the humidity is calculated. Then the values are stored in Arduino. In the next step, Particle Photon is used to monitor continuously the moisture content material of the soil. Then the notification and the moisture level are shared to the user thru WiFi.Monitoring the IoT sensor information. The subsequent step is to reveal the information. Usually, in an IoT gadget, acquiring information from the sensor isn't simplest important however also such information's should be monitored to take respective movements when the values are out of a particular c programming language. In this several actions can be taken expertise the consumer. Even if Carrots has a built-in e mail gadget, every other useful and exciting platform referred to as IFFT may be preferred. This platform gives numerous integration offerings .

In order to alert the consumer additives are wanted:

- a tracking data gadget
- alerting system

The alerting gadget is built on IFFT. As stated before, a brief message must be dispatched when the humidity hits a threshold level. In order to acquire it, a brief message provider in IFFT has to be configured. To finish, in a nutshell, agricultural lands with severe scarcity of rainfall, this version may be correctly carried out to gain super outcomes with most styles of soil.

IV. CONCLUSION AND FUTURE SCOPE

A computerized irrigation device is developed which is effective sufficient to optimize usage of water and other sources. This machine helps in irrigation in areas with low water stage and ends in sustainability. This machine could be very risky and coffee preservation and could be adjusted in accordance to numerous kinds of crops without a great deal human efforts. Different modules in terms of software of project this is inexperienced residence or open field may be developed and applied using similar strategies. Other than price discount this project helps to save the vital element of lifestyles this is water. In future this assignment can be extended to larger stage of agriculture as this mission is only limited to farming at home. GSM/GPRS module may be extended in this mission to send text messages to the owner of its lawn approximately water motor pump fame.

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