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Smart Irrigation System using Bluetooth Module and Arduino

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Abstract - *Agribusiness is the foundation of Indian economy. It positions among top five nations universally in the generation of agrarian items. Around 50% of Indian populace relies upon farming division to meet their everyday costs. the ebb and flow water system framework rehearsed in India are sprinkler water system ,tank water system, immersion water system and so on these water system strategies are less proficient as they don't disperse to the necessity of the dampness level of soil and don't utilize water asset In future, as populace builds, interest for nourishment crops expands which in the end brings about relying upon water asset on a huge scale. At present, India requires mechanical up degree to fulfill the need for water system reason. The brilliant water system framework empowers proficient usage of water as soil is always observed with the assistance of dampness sensor and dependent on the readings crop is flooded with the assistance of engine. This is finished utilizing the IOT innovation. Principle philosophy behind this venture is to decrease human intercession and effectively utilize water. This is made conceivable by sending the got information to the android gadget utilizing Bluetooth innovation utilizing Bluetooth module. The whole System is controlled and executed by Arduino Uno Board microcontroller.*

Key Words: economy, sprinkler water system, Smart Irrigation framework, Moisture Sensor, Arduino Uno Board, Bluetooth module, microcontroller, android gadget, IOT.

1. INTRODUCTION

India's significant wellspring of salary is from farming division as it adds to 14.6% of GDP and about 55% of employment.Agriculture is the spine for India's Economy. Since the greater part of the cultivable land in India gets extremely moderate measure of precipitation, it is absurd to expect to rely upon the precipitation for flooding the harvests. Henceforth Irrigation assumes an imperative job in keeping up the dampness substance of the dirt for harvests to develop. Different strategies, for example, sprinkler water system, surface water system, restricted water system, trickle water system is as of now used to flood the fields. Be that as it may, in ebb and flow situation water shortage demonstrates to be a significant obstacle in utilizing these techniques. In addition, Power supply in different pieces of India is unpredictable i.e; control cuts are frequently and can exist for a considerable length of time. At the point when the engine is turned on and sooner or later if the engine isn't turned off, it brings about colossal measure of loss of water and furthermore there is probability of loss of harvest yield. Henceforth to avoid such circumstances and to satisfy the future need trend setting innovation must be furnished alongside the momentum strategies to effectively use the water asset and increment the harvest yield. Additionally with less human mediation we can guarantee that work is diminished too. The venture for the most part centers around productive utilization of water and to help the development so as to build the economy.

The Internet of things has at present increased enormous prevalence as it has demonstrated to be profoundly effective in taking care of everyday issues. IoT permits trade of information without human intercession as this guarantees information is profoundly verified. This empowers productive correspondence and quicker access to tremendous measure of information. Today, Internet of things is centering fundamentally towards horticulture part to guarantee that ranchers comprehend their issues they face. This empowers ranchers to use the innovation to satisfy the expanding need and to proficiently utilize satisfactory assets accessible.

The System is an IOT empowered Technology, where the dampness sensor continually screens the dampness level. The Arduino board assumes the job of a microcontroller where it is coded to acknowledge the readings of the sensor as info. In view of the limitations in the coding indicated, the engine is either turned on or off. In the interim, the readings are ceaselessly moved to the advanced mobile phone utilizing Bluetooth module connected to the arduino.

1.1 Literature Survey

1) This framework is utilized to screen the dampness substance of the dirt utilizing soil dampness sensor. The information gathered from the sensor are sent the client's portable utilizing the Bluetooth association between the arduino board and the versatile. The Bluetooth association is made conceivable utilizing the Bluetooth module.

2) Nikesh Gondchawar et al., [1] proposed chip away at IoT based savvy horticulture. In this framework the sensors are puts in the rural field. The information from the sensors are gathered through web.

3) Rajalakshmi P.et.al., [2] portrayed to screen the harvest field utilizing soil dampness sensors, temperature and moistness sensor, light sensor and computerized the water system framework. The water system is robotized if the dampness and

temperature of the field falls beneath the edge. In nurseries light power control can likewise be mechanized notwithstanding water system. The warnings are sent to ranchers' portable occasionally.

4) Tanmay Baranwal et al., [3] this task concentrates security and insurance of horticultural items from assaults of rodents or creepy crawlies in the fields or grain stores.

5) M. N. Umeh et al., [4] this paper focuses on controlling the water system framework utilizing the microcontrollers. The microcontrollers models are arduino board.

6) B. N. Getu et al., [5] this paper recommended that how the DTMF procedure can be utilized to control the agribusiness siphon framework remotely.

2. PROPOSED SYSTEM

The proposed system consist of moisture sensor, Arduino board, smart phone, Bluetooth module, d.c. motor, laptop. The soil is irrigated as and when required by constantly monitoring the moisture level.

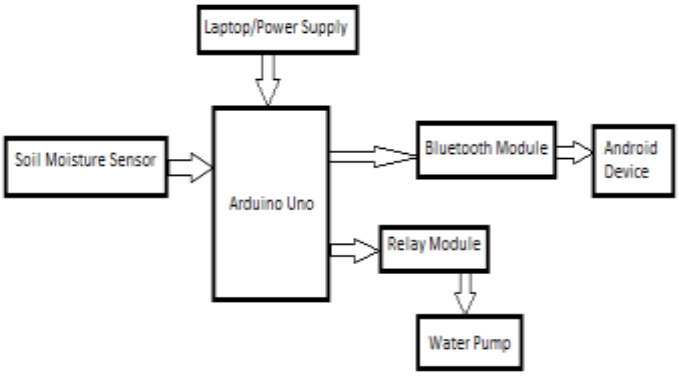

Fig-1: Proposed System Design

2.1 Component Description

Arduino Uno Board: The Arduino is an open source PC equipment and programming and client network. It is a solitary board microcontroller. It has 14 computerized input/yield pins, 6 simple information sources, 16 MHz quartz precious stone, USB association, a power jack, an ICSP header and a reset catch. Interface the board to the framework utilizing USB. Arduino Software(IDE) is utilized to code the microcontroller.

Fig -2: Arduino Uno Board

Soil Moisture Sensor: Moisture sensor appraises the degree of water content in the dirt by estimating the dielectric permittivity of the dirt. The sensor contains on board LM393 comparator, control marker LED and advanced exchanging pointer.

Fig -3: Soil Moisture Sensor Module

Bluetooth Module: The Bluetooth module HC-05 is an ace/slave module. The information gathered by the dampness sensor is moved to the android application in the PDA by means of Bluetooth innovation utilizing this module. It takes a shot at sequential correspondence.

Fig -4:Bluetooth Module

3. IMPLEMENTATION AND WORKING

The moisture content from soil is taken with the help of soil moisture sensor. Moisture sensor estimates the level of water content in the soil by measuring the dielectric permittivity of the soil. The sensor contains on board LM393 comparator, power indicator LED and digital switching indicator. This sensor has a digital output and an analog output. The digital output is permanent and analog output threshold can be varied. It works on principle of open and short circuit concept.

When the soil is dried up, the current will not flow through it so it works like an open circuit. Hence, output will be maximized. When soil is wet/soaked, the flow of current passes from one terminal to the other. So, it works like a closed circuit. Therefore, the output will be zero.

The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value.

When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly, so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance. Therefore, the moisture level will be lower.

The soil moisture sensor delivers this analog value to Arduino Uno board. The Arduino Uno is connected to the laptop to upload code and power supply.

When the condition of soil is dried, its output is high, taking the reference voltage 5V. Therefore, current value is more than the threshold value. Similarly, the converse is valid for the condition when soil is wet.

We have connected the soil moisture sensor to Arduino analog pin A0 and from here, Arduino compares this value with the preset threshold value (800).

(Threshold value varies with different soil types)

Now, this value that we obtain from the sensor is constrained between 10 and 1023 and mapped from range (10, 150) to range (1023, 0).

Now, to operate the water pump we use a relay module, for switching. This module has 3 terminals: NO (Normally Open), NC (Normally Closed), Common. The common terminal is connected to 5V and the NO terminal to a terminal to water pump. The other terminal of water pump is connected to GND to complete the circuit.

Bluetooth module (HC05) is connected to Arduino with Tx. pin of Arduino to Rx. pin of Relay and vice versa. This module is connected to Android device via Bluetooth and moisture level is displayed on Serial Monitor at 9600 baud rate and Bluetooth application software on phone.

1. **Dry Soil**: For instance, if we put the soil moisture sensor in dry soil, current passes through the soil as resistance, between 2 probes. Conduction is poor, hence, the resistance value is high. Therefore, output value maximizes and the current value becomes more than the threshold value. Therefore, the motor pin becomes high and relay activates and turns on the pump.
2. **Wet Soil**: If we put the soil moisture sensor in wet soil, current passes through the soil as resistance, between 2 probes. Conduction is good, hence, the resistance value is low. Therefore, output value minimizes and the current value becomes less than the threshold value. Therefore, the motor pin becomes low and relay deactivates and turns off the pump.

OBSERVATIONS

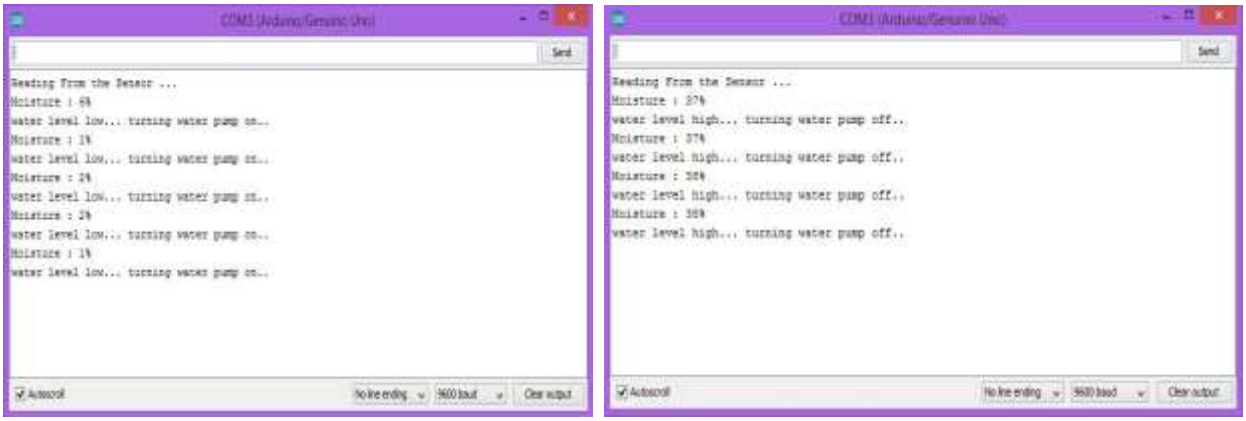

Fig -6: Screenshot of Serial Monitor

Fig -7: Screenshot of Application software

RESULT

The moisture readings were observed on the Arduino serial monitor at 9600 baud rate with a 3s delay per observations and on the Android device using Bluetooth connection.

4. CONCLUSIONS

In this work, we have effectively executed the savvy water system framework to proficiently inundate the yields with less human intercession and productively utilize water asset. The venture principally centers around individuals occupied with the field of horticulture, where the framework computerizes and controls the watering to the yields.

The dampness sensor detects the dampness level and on the off chance that the dampness level is underneath the ideal level, at that point naturally the engine is turned on. After the dampness level arrives at the ideal level the engine is turned off. The essential use of the undertaking is for the ranchers and nursery workers who need more time to water the plants .The proposed framework is planned so that it is exceptionally productive in utilization of intensity, savvy and is easy to understand. The

System is created to suit the adjustments in future and to cook the necessities of future utilization. Afterward, the framework can be broadened and tested for utilizing it in fields.

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