SMART IRRIGATION SYSTEM USING IoT

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Abstract

In India, outdoor water usage itself averages to more than 9 billion gallons of water each day, specifically for landscape irrigation. About 50% of this water is wasted due to overwatering caused by inefficiencies in traditional irrigation methods and systems. Smart irrigation technology might just be the answer. Unlike traditional irrigation controllers that operate on a pre-set programmed schedule and timers, smart irrigation controllers monitor weather, soil conditions, evaporation and plant water use to automatically adjust the watering schedule to actual conditions of the site. For example, as outdoor temperatures increase or rainfall decreases, smart irrigation controllers consider on site-specific variables, such as humidity, soil moisture levels, temperature etc. to adjust the watering run times or schedules. In this paper, we propose a system which takes into account conditions like humidity and temperature and uses a two timer shift program where if the temperature is above the threshold value and humidity reading is below a certain level, it postpones the initial irrigation batch to the next shift which might be set to occur after like 10 hours thus saving a lot of resources as if it rained just a few hours after the initial shift, all that water as well as electricity is saved.

Keywords: *Arduino Uno, Soil Moisture sensor, Temperature sensor and Humidity sensor.*

I. INTRODUCTION

In our nation Agriculture is a significant wellspring of sustenance creation to the developing interest of human population. For the most part farmers visit their fields intermittently to check soil dampness and in view of it, necessary water is pumped by engines to inundate particular fields. Agriculturist need to sit tight for certain period before turning off engine so water is permitted to stream in adequate amount in particular fields. This water system strategy takes parcel of time and exertion especially when a farmer needs to inundate various agricultural fields appropriated in various land territories. In any case these days' farmers need to deal with their household activities alongside different occupations. Computerization in water system framework makes their work significantly less stressful. Sensor based mechanized water system framework gives promising answer to this where presence of agriculturist in field isn't mandatory.

The existing soil dampness sensor-based water system controllers utilize one of the few advancements in soil dampness content. At the point when covered in the root zone of turf, trees or bushes, the sensors precisely decide the dampness level in the dirt and transmit this perusing to the controller.

There are two distinctive soil moisture sensor-based frameworks accessible:

Suspended cycle water system frameworks, which are set like conventional clock controllers, with watering plans, begin times and span. The distinction is that the framework will stop the following booked water system when there is sufficient dampness in the dirt.

Water on interest irrigation requires no programming of water system term (just begin times and long stretches of the week to water). It has a client set lower and upper limit, which starts water system when the dirt dampness level neglects to meet those levels.

The major problems faced by these traditional systems are:

Irrigation of plants is a typically and exceptionally tedious action, to be done in a sensible measure of

time it requires a lot of hours. Traditionally, every one of the means were executed by people Nowadays, a few frameworks utilize innovation to diminish the quantity of laborers or the time required to water the plants With such frameworks, the control is very constrained and numerous assets are as yet squandered Water is one of these assets that are utilized too much irrigation is one strategy used to water the plant.

This strategy speaks to gigantic misfortunes since the measure of water given is in abundance of the plant's needs.

The overabundant water is emptied by the openings of the pots in nurseries, or it permeates through the dirt in the fields The contemporary impression of water is that of a charge, sustainable asset that can be utilized in abundance. Water consumption as tested is hence sensible to expect that it will take a long turn into an extremely expensive asset not with-standing the overabundance cost of water labor is becoming more costly an outcome if more effort is invested in streamlining these assets there will be more cash involved in the procedure.

Technology is presumably a solution to reduce costs and resist loss of assets.

Also, the sensor remains dunked in the dirt, observing soil dampness content.

With time it erodes itself and the entire framework goes down. Exchanging sensors over and over is expensive.

This framework considers just a single factor, which is soil moisture levels.

The framework neglects to anticipate conditions like if it were to rain just after the regular moisture level checking timer goes off, the entire water is wasted.

II. PROPOSED SYSTEM

Climate based controllers, which utilize nearby climate information to alter water system plans, is utilized alongside soil moisture sensors.

This framework utilizes three climate parameters: temperature, humidity and soil moisture content. It's the most exact approach to tend to water needs.

The proposed framework considers different parameters like temperature and humidity alongside the conventional soil moisture levels recognition, this guides in forestalling water misfortune in different conditions like, if the clock is set to a particular hour of the day and it is to rain within a couple of hours, the old framework would water the plants however for this situation, the temperature and humidity sensors will send signs to stall the procedure, therefore sparing water-misfortune. The proposed system's irrigation schedules are designed in a two way delivery design. Considering the initial water delivery is timed in 8am in the morning, if the data read by the temperature sensor is less than a certain pre-programmed amount, and the reading from the humidity sensor is more than that of a certain amount, even though the moisture sensor reads less content, the water delivery is put on hold until the next timer clicks in, say 5pm in the evening. By this time, if it rained, then the moisture sensor will read higher than the threshold amount and water supply won't be necessary, else the adequate amount of water will be supplied by default, thus saving water as well as energy.

The proposed system utilizes various modules like Arduino Uno which is a product of the company Arduino, that is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world.

Fig: 1 (Arduino Uno)

Arduino boards use a variety of microprocessors and controllers as shown in fig 1. The boards are equipped with sets of digital and analog I/O pins that may be interfaced to various expansion boards or breadboards and other circuits. The boards feature serial communication interfaces, including USBs on some models, which are also used for loading programs from the user's computer. The microcontrollers are specifically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compilers, Arduino project provides an integrated development environment (IDE).

Soil moisture sensors measures the moisture content in soil. It uses capacitance to measure the water content of soil as shown in fig 2.

Fig: 2 (Soil Moisture Sensor)

Simply insert this rugged sensor into the soil to be tested, and the volumetric water content of the soil is reported in percent.

This makes it ideal for performing experiments in courses such as agricultural science, environmental science, horticulture, botany, and biology.

Temperature and Humidity sensors senses the atmospheric temperature as well as the relative humidity of the surroundings, these data are then reported back to the microcontroller which is then displayed to the user using different display modules in order to keep the temperature and humidity in check, which are programmed to operate according to the user as shown in fig 3.

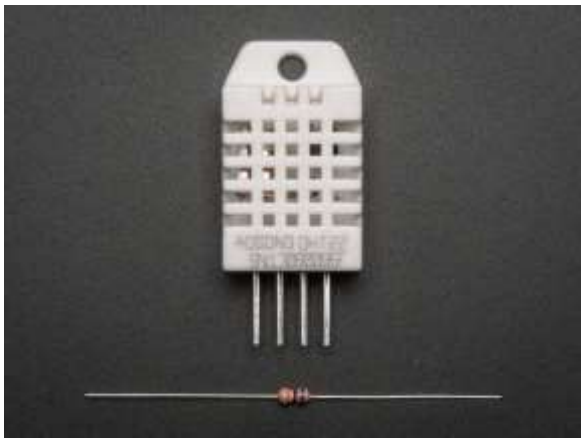

Fig: 3 (Temperature & Humidity Sensor)

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 input pins needed). It's fairly simple to use, but requires careful timing to grab the data.

III. Related Work

Chandan kumar sahu and Pramitee Behera [1], introduced a model for completely mechanization getting to of water system engine where Prototype incorporates number of sensor hub set in various ways of ranch field. Every sensor are coordinated with a remote systems administration gadget and the information gotten by the "ATMEGA-328" microcontroller which is on an "Arduino-Uno" advancement board. The Raspberry Pi is use to send messages through web correspondence to the microcontroller procedure.

In A Remote Measurement and Control System for Greenhouse Based on GSM-SMS [2] the proposed framework presented a GSM-SMS remote estimation and control framework for nursery in light of PC-based database framework associated with base station. Base station is produced by utilizing a microcontroller, GSM module, sensors and actuators. In pragmatic activity, the focal station gets and sends messages through GSM module. Rule estimation of parameters to be estimated in each base station is set by focal station, and after that in base stations parameters including the air temperature, the air mugginess.

Indu et al. (2013) [3] primarily centers around audits in the field of remote observing and control, the innovation utilized and their potential points of interest. The paper proposes a creative GSM/Bluetooth based remote controlled installed framework for water system. The framework sets the water system time contingent upon the temperature and moistness perusing from sensors and kind of yield and can naturally inundate the field when unattended. Data is traded between far end and composed framework by means of SMS on GSM organize. A Bluetooth module is additionally interfaced with the primary microcontroller chip which disposes of the SMS charges when the client is inside the constrained scope of few meters to the assigned framework. The framework advises clients about numerous conditions like status of power, dry running engine, expanded temperature, water content in soil and smoke through SMS on GSM arrange or by Bluetooth.

In [4], R.Suresh et al. (2014) said about utilizing programmed microcontroller based rain firearm water system framework in which the water system will happen just when there will be serious necessity of water that spare a huge amount of water. These frameworks convey a change to administration of field asset where they built up a product stack called Android is utilized for gadgets that incorporate a working framework, middleware and key applications. The Android SDK gives the instruments and APIs important to start creating applications on the Android stage utilizing the Java programming dialect. Cell phones have nearly turned into a necessary piece of us serving different requirements of people. This application makes utilization of the GPRS highlight of cell phone as an answer for water system control framework. These framework secured bring down scope of farming area and not monetarily reasonable.

In IOT SMS alert framework in view of SIM900A [5], an IOT caution framework in light of SIM900A module of SIMCOM Company was intended for nursery. The framework can assemble natural parameters, for example, air temperature and air mugginess. Then, with the utilization of AT direction, this framework can likewise acknowledge SMS programmed sending and getting, natural parameters overwhelm alert and lacking parity caution. Through the framework setting, the alert message can be sent to the client indicated cell phone consequently regardless of what the clients' area is. This framework as a run of the mill use of IOT in the farming has got some palatable outcomes in the genuine task.

IV. CONCLUSION

The technique implemented in the paper serves its purpose by making the entire system more advanced and more efficient in the way of work. The addition of temperature and Humidity sensors along with a two times water supply system enables a lot of opening for creativity in the system. Thus as the goal of this system suggests increasing the efficiency of the previously existing system is implemented successfully by taking the environmental conditions into account and thereby performing important decision making regarding the water irrigation options, switching it between the morning and evening phases thus saving water as well as energy.

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