SMART IRRIGATION SYSTEM USING IOT

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ABSTRACT

Plants, blossoms and harvests are living things around us that makes our earth increasingly beneficial and delightful. So as to development sound, they need water, light and nourishment from the dirt so as to impact cleaning air normally and produce oxygen to the world. Along these lines, an innovation that figure out how to brilliantly control plants watering rate as per its dirt dampness is proposed in this paper. The created framework incorporated an Internet of Things (IoT) in Wireless Sensor Network (WSN) condition where it oversees and screens the water system framework either physically or consequently. This proposed framework applied Arduino innovation and ATmega328P as the microprocessor and handset for the correspondence channel, respectively. And likewise, this framework comprises of sun powered fueled water siphon alongside a programmed water stream control utilizing a moisture sensor. Brilliant farming and intelligent way of life can be created by executing this innovation for the future work. It will spare the spending limit for contracting representatives and keep from water wastage in every day necessities.

Keywords: smart irrigation, Internet of Things (IoT), Wireless Sensor Network (WSN), arduino.

1. INTRODUCTION.

Sri Lanka is the country of village and agriculture plays an important role for development of country. In our country agriculture relies upon the monsoons which has insufficient source of water. Regardless of whether the circumstance is, the greater part of the cultivable terrains in Sri Lanka gets very moderate measure of precipitation, it is beyond the realm of imagination to expect to rely upon the precipitation for inundating the harvests. Consequently, Irrigation assumes an imperative job in keeping up the dampness substance of the dirt for yields to develop.

Development in agricultural segment is fundamental for the improvement of financial state of the nation. Sadly, numerous ranchers still utilize the custom techniques for cultivating which results in low yielding of harvests and natural products. Wherever all through the reality where cultivating expects an urgent part in restricting up the economy and the climatic conditions or isotropic, regardless I am not plan to make full utilization of creating assets. One of the essential reasons is the absence of precipitation and insufficiency of land supply water. Extraction of water at standard between times from soil is diminishing the water level along; the zones of un-flooded land or diligently broadening. In like manner, the unconstrained use of water adventitiously accomplishes wastage of water. In a programmed water system framework, the most fundamental favored edge is that water is given precisely when sogginess in ground goes underneath a foreordained edge respect. This will assist us with saving a huge measure of water.

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As of late, the ranchers have been utilizing water system procedure through the manual control in which the agriculturists flood the land at standard between times by turning the water siphons ON/OFF when required. This structure every now and then uses more water and when in doubt the water supply to the land is moved because of which the yields dry out. Standard water insufficiency goes into deterioration lands improvement before discernible contracting occurs. Notwithstanding this blocked headway rate, lighter weight normal thing takes after water lack. This issue can be consummately readdressed in case we use mechanized water system structure in which the water framework will happen exactly when there is the genuine pre essential of water, as proposed by the clamminess in the earth.

The proposed framework is an IOT enabled Technology. The Internet of Things (IoT), it is a technology where in a mobile device can be used to monitor the function of a device. The Internet of Things (IoT) is concerned with interconnecting communicating objects that are installed at different locations that are possibly distant from each other. Internet of Things (IoT) is a type of network technology, which senses the information from different sensors and makes anything to join the Internet to exchange information.

The proposed structure comprises of sun powered fueled water siphon alongside a programmed water stream control utilizing a moisture sensor. It is an IOT enabled Technology, where the moisture sensorpersistently screens the moisture level. At the point when we considering the Arduino board expect the activity of a microcontroller where it is coded to recognize the readings of the sensor as information. Considering the impediments in the coding decided, the motor is either turned ON or OFF. Meanwhile, the readings are always moved to the smart phone using Bluetooth module associated with the Arduino.

The paper is divided into 6 sections discussing the system overview with literature survey, methodology, results & discussion, conclusion and future works, acknowledgment and references.

2. SYSTEM OVERVIEW

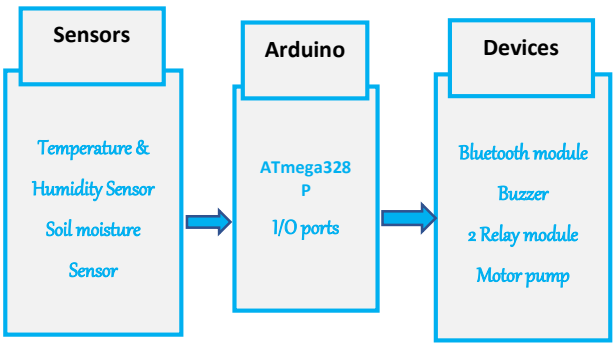

Fig 2.1; Overview of the System

The sensors and the devices are associated with the Arduino as appeared in the Fig 2.1 comprise of ATmega328P microcontroller. In this way analog readings & digital readings from the sensors sent as contributions to the Arduino. In light of the info esteems, Arduino yield determines voltage to turn ON/OFF the devices.

The proposed framework as appeared in the Fig 2.2 fills for agribusiness need. The core of the task is Arduino Uno board and appeared in the square outline. The proposed framework has been intended to beat the pointless water stream into the agrarian grounds and it comprises of sun oriented controlled water siphon alongside utilizing a moisture sensor.

Temperature, moisture and humidity readings are continuously observed by utilizing temperature and moisture sensor and send these values to the assigned IP address. Android application constantly gathers the information from that doled out IP address. When the dirt dampness esteems are surpassed as far as possible.

Then the hand-off, which is associated with the Arduino microcontroller controls the engine. The android application is a straightforward menu driven application, with 4 choices. This incorporates motor status, moisture, temperature and humidity values. The motor status shows the present status of the siphon. In this manner the sensor esteems are persistently checked and the readings are shown to the rancher's portable.

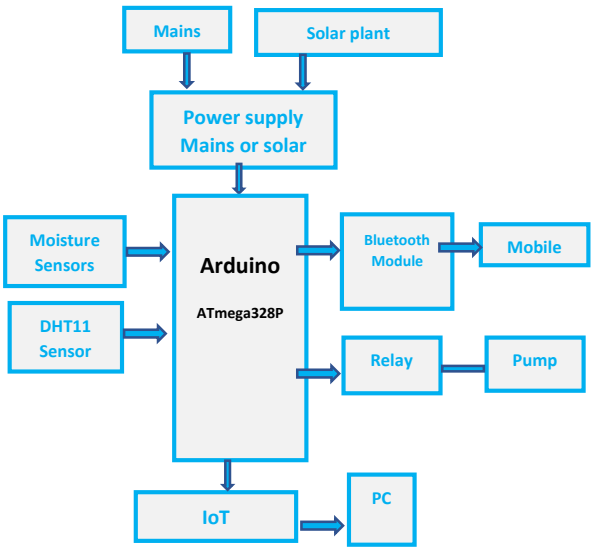

Fig 2.2; Block diagram of the system

2.1 Literature Review.

Various literature discussed method for Smart Irrigation System Using IoT. Most of the methods discussed in these literary works utilize more than one approach; it is not possible to do category wise discussion. Different Smart Irrigation Systems are discussed below.

As referred to in paper [1] sun based controlled shrewd water system procedure is the future for the ranchers and an answer for vitality emergency. So, for the proposed sun oriented fueled framework I am utilizing methods investigated in paper [2] and [4] and altered. Sine PWM procedure has been utilized for inverter activity for least sounds as given in paper [3] which further expands the proficiency of the framework. The rating of the framework was determined relating to the siphon determinations alluding to paper [5].

The paper [6] on "Automatic Irrigation System on Sensing Soil Moisture Content" is planned to make a robotized water system component which turns the siphoning engine ON and OFF on distinguishing the clamminess substance of the earth. In this paper just soil dampness esteem is considered however proposed undertaking gave expansion to this existed task by including temperature and stickiness esteems.

Remote Monitoring in Agricultural Greenhouse Using Wireless Sensor and Short Message Service (SMS). In this paper they are sending information by means of SMS however proposed framework sends the values to portable application.[7]

"Irrigation Control System Using Android and GSM for Efficient Use of Water and Power" this structure used GSM to control the structure which may cost even more so to overcome that proposed system used Arduino Uno board which starting at now involve in collect Bluetooth module [08].

A solar powered remote management and automation system for agricultural activities through wireless sensors and IoT has been proposed by Navulur [09]. It includes an equipment stage dependent on Raspberry-Pi small scale controller which arranged to interface with a User device and got to through the web organize.

Other venture [10] utilizes a Simple Link Wi-Fi module (CC3200) which associates the equipment framework to web and it screens PV framework, controls the engine and solenoid valve for siphoning water to the field on the measurements got from the water level sensor and soil moisture sensor.

Another takes a shot at water system frameworks are additionally centered on using sunlight-based control [11-15].

Accuracy Agriculture (PA) with distributed computing has been talked about in [16] that will improve the use of water composts in brilliant farming. It figures out how to augment the yield of the harvests and furthermore help in dissecting the climate states of the field. There is likewise a paper which proposed an intelligent irrigation control system that consolidated fuzzy system and neural system to go for water-sparing [17].

Tanmay Baranwal et al., [18] this venture concentrates security and assurance of agrarian items from assaults of rodents or creepy crawlies in the fields or grain stores. M. N. Umeh et al., [19] this paper focuses on controlling the water system framework utilizing the microcontrollers. The microcontrollers' models are Arduino board. B. N. Getu et al., [20] this paper suggested that how the DTMF method can be utilized to control the agribusiness siphon framework remotely.

In this manner, this paper focus on IoT-based Smart Irrigation System the executives and observing framework where anybody can screen and deal with the development of their plants

despite the fact that from area somewhere else. This work builds up an IoT, Solar power, WSN and Android Application with a minimal effort and power effective. The proposed smart irrigation system framework can be performed both physically and consequently. The proposed manual framework uses an advanced mobile phone as a stage where the farmer can physically power ON/OFF the motor pump from long range separation, while the proposed programmed framework relies upon the state of the dirt possibly it is as yet wet or dry.

3. Methodology.

The proposed framework comprises with for the most part three sections as appeared in the Fig 3.1

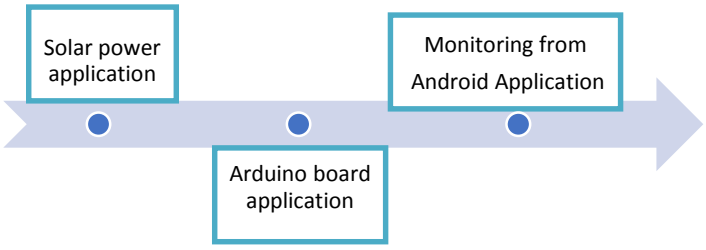

Fig 3.1; Smart Irrigation System layers.

3.1 Hardware Development

a. Solar Arrangement

In solar powered siphoning module, a sun board of required determination is mounted close to the siphon set as shown in the Fig 3.2 Then the utilization of a charge controller it is utilized to rate a battery. From the battery utilizing a converter circuit it offers rated power to the water siphon. At that point the water is pumped into the field.

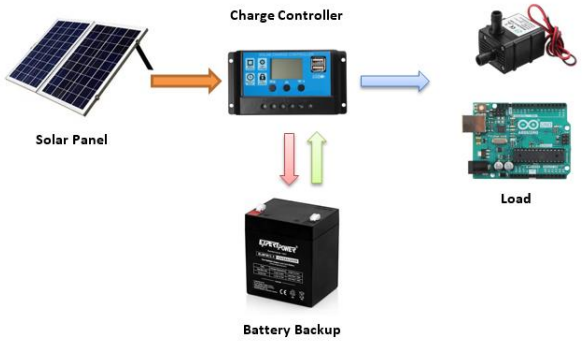

Fig 3.2; Solar arrangement of Smart Irrigation System.

b. Wiring Arrangement.

The wiring arrangement for the proposed smart irrigation system is appeared in the Fig.3.3

The moisture sensor and humidity sensors are connected to the GND port, Analog pin (A1), (A0) and (V1) port respectively. And also, OLED module is connected to the both analog pins (A4), (A5). Both indicator and buzzer are connected to pin8 and pin9 respectively.

Bluetooth module is associated with the GND port and 5V supply port, advanced ports RX & TX serial communication. The USB link is associated with the Laptop i.e.; Arduino IDE. Interface the serial port transfer to the Arduino board and associate the DC engine to the transfer. The perusing from the sensor is perused the simple stick of Arduino and is moved to the Bluetooth terminal HC-05 application in the android gadget through Bluetooth innovation. In light of the readings, it can turn on or off the motor from the android device.

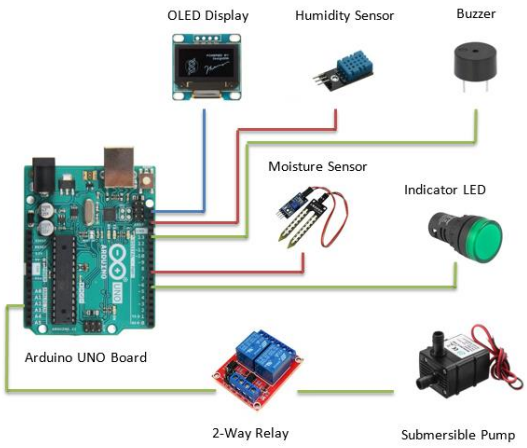

Fig 3.3; Wiring diagram of Smart Irrigation System.

3.2 Software Development.

There are two pieces of the product advancement in this work. The initial segment is the product improvement for the Android Application, while the subsequent part is the product programming for the Arduino board. So as to compose the programming, Arduino IDE must be introduced first where the board administrator and library must be downloaded from web. Board supervisor is relying upon the chose device board, for example Arduino UNO, Arduino Mega and Node MCU, while library is the interior programming for the pack's stick. This task utilized Arduino UNO as board administrator and a few libraries utilized.

3.3 Monitoring from Android Application.

The created Android application is utilized to get the information from the equipment framework and power ON/OFF in motor pump. Other than that, it can set a caution for the dirt dampness level edge to advise farmers that their plants are in basic circumstance. Other than that, the Android application will peruse the information and remind for any issue about their plants. Additionally, give manual direction from Android application to screen their plants. The chose activity will be then worked at the equipment parts.

4. RESULT AND DISCUSSION.

The proposed framework has been intended to conquer the superfluous water stream into the agricultural terrains and it will control the pre specified water level in the cultivating framework for generally development of the plants. Mugginess and dampness readings are persistently observed by utilizing moisture sensor and humidity sensor and send these values to the assigned IP address. Those live data can be seen from android application. When the dirt dampness esteems are surpassed as far as possible then the hand-off, which is associated with the Arduino microcontroller controls the engine. The portable application which is to control the framework remotely and enable a client to screen the entire framework in a powerful manner. And furthermore, solar panel with battery gives extra facility of the electricity. Along these lines it might be said that the work is exceptionally valuable for Sri Lankan ranchers.

5. CONCLUSION & FUTURE WORKS.

In this work, I am effectively built up a framework that can help in an automated irrigation system by analyzing the moisture level of the ground. The smart irrigation system framework demonstrates to be a helpful framework as it automates and manages the watering with no manual intercession. The essential applications for this task are for ranchers and plant specialists who need more time to water crops/plants. The moisture sensor and humidity sensor measure the dampness level (water substance) and stickiness and temperature of the plants. On the off chance that the dampness level is seen as underneath the ideal level, the dampness sensor sends the sign to the Arduino board which triggers the Water Pump to turn ON and supply the water to plant.

Likewise, without visiting will get the status of the motor, moisture, humidity and temperature esteems on mobile. The framework includes a custom sensor structure for control productivity, cost adequacy, modest parts, just as adaptability end convenience.

By executing the proposed framework there are different advantages for the legislature and the ranchers. For the legislature an answer for vitality emergency is proposed. By utilizing the programmed water system framework, it improves the utilization of water by diminishing wastage and decrease the human intercession for farmers. The overabundance vitality created utilizing sun powered boards can likewise be given to the lattice with little changes in the framework circuit, which can be a wellspring of the income of the rancher, subsequently reassuring cultivating in Sri Lanka and same time giving an answer for vitality emergency. Proposed framework is anything but difficult to execute and condition inviting answer for watering fields.

The framework requires insignificant support and consideration as they are self-beginning. Despite the fact that there is a high capital venture required for this framework to be executed, the general advantages are high run this framework is efficient.

In future there are a few undertakings that ought to be done and would build up the framework to a progressively develop state. A measured plan that offers the chance to clients of utilizing vitality sources, network and sensors as modules could be an

exceptionally valuable and simple to-utilize. The framework might be additionally reached out for open air use.

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