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SMART AGRONOMIC AUTOMATED IRRIGATION SYSTEM USING IOT

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Abstract: *Soil is the critical part of a successful agronomics, it is an original source of nutrients. Increase or Decrease of soil hydration leads to many plant diseases. In existing system There are many drawbacks like over watering, loss of signal, not accurate results, heavy cost, speed, The issues due to abnormal irrigation becomes increasingly prominent, which affects the crop health and also human who depends on crop etc. to overcome this problem we propose to Build a smart Agronomic methodology that uses the supremacy of Forefront technology such as Internet of things, Wireless Sensor Network and Cloud and also sensors like temperature and humidity sensors, soil moisture capacitive sensors, ultrasonic sensors(height Measurements). The data Accessing Process ensures the Accuracy and monitored using app. Outcome shows that the proposed system is very meticulous, coherent and best appropriate for today's agronomics.*

Keywords: *Temperature and Humidity sensors (DHT22), Soil moisture sensor, Ultrasonic sensors, at mega 328 microcontroller, RF module, Automation, Android app*

I. INTRODUCTION

People without agriculture may end up badly, a day without agriculture would put more than 22 million people out of work approximately not only that people will die due to Starvation. We know that population keeps on increasing yearly and in need of high production of crops to tolerate such population. Therefore, their constitution hangs on deliberately the agronomic circumstance in which they live. Hence, conscientious attentiveness considering safety measures and congenial for agronomic circumstance. As a major vital part of the agronomic circumstance, strong attention should also be paid for Automated Inundation system, since irrigation plays a keen role in both create and destroy of the crop. Frequently observing inundation is mandatory to make sure that the people get enough food and stay healthy and safeguard their environment.

In day to day reality agronomic monitoring system keeps agronomers to stay alert to any disaster or disease that probably present in an agronomic circumstance that takes place everyday. A spectacular agronomic monitoring system must indicate the users about the source and the reason for disaster (for real time example: increased soil moisture might lead to root rot disease in plants). A smart agronomic superintend system with numerous features is proposed in this paper agronomic superintend system. This agronomic superintend system could discover and gives data information to users and also operates automatically without involving human.

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II. EXISTING SYSTEM

Arboriculture is the rudiments of our country. In long decades years ago agronomers used to figure the litigation of soil and persuasive audacity to prosper the kind of outcome. Agronomers have no knowledge of knowing about the perspiration, stage of waterlog and first and foremost atmospheric condition which loathsome an agronomers furthermore. Agronomers avail oneself of utilization of weedkiller in owing to a few sceptial which made lead a legitimate impediment to the agronomic field if the conjecture wasn't meticulous.The mileage reckon upon the last phase of the gleaning on which agronomers mainly depends on.

III. PROPOSED SYSTEM

A good soil moisture leads to a spectacular production of crops .Here we set a low power consumption DHT22 sensors (temperature & humidity) which shows accurate readings comparative to other sensors and also soil moisture capacitive sensor which does not corrode through pulse modulation signal The data's are collected in transmitter which is an NRF module and it is received by the receiver that is user with the same NRF module ,these both NRF modules communicates via SSI and ESB communication protocol through rf frequency and Receiver receives data from those sensors and that stored in a cloud ,each and every data is monitored, all those data can be stored in local or cloud it depends on user. If the soil moisture is adequate the automated irrigation system is stopped using relay control, if the soil moisture value is dry the RF module sends message to receiver. Receiver circuit board integrated with controller which handles water pump control. By using ultrasonic sensors we can predict plants growth once the plant grown to its estimated height they are indicated for cultivation through app. By doing this the water irrigation is automated by monitoring the sensors value and each values are stored in the cloud and the farmers get indicated through smart app. And those data's stored is also used for future analysis of plant disease, where the data is also used to analyse the cause of the disease.

IV. LITERATURE SURVEY

Zhao Liqiang and et al[1][2][3] have discussed an agronomic implementations of wireless sensor network for farm field superintend . In this process, totally manipulated with couple of sensor nodes to calculate temperature, image sensing and humidity node for comparison of data's to take a wise judgement for ease agronomic field with in a desirable time. The frameworks are image, moisture, temperature. By these methods it is possible to meet the high expected stability of sensors with consumption of low power. With a high period of superintending the agronomic atmosphere. Keerthi.v and et al[4] have tackle about a greenhouse superintend system based on agronomic cloud combined with iot. In a greenhouse, controlling field can superintend various agronomic atmospheric surrounding framework efficiently using humidity, light sensor, temperature. These sensor gathers all over information of those agronomic field using these modules, and it can be viewed through cloud as it is stored in cloud using those sensors. Rajalakshmi.p and et al[5] have tackle to superintend a agronomic field process is build by sensors and relating to the judgement made from a server where the information based on data collected through sensor, here the irrigation system is automated using remote system. Baltej Kaur and et al[6] have tackle a clever drip inundation framework. Here, To reduce the Human involvement they develop an android application for easy use and it used for controlling and superintending remote accessing the crop area. Scarcity of water can be reduced by using the drip inundation system and based on the information that gathered from water level sensor the work is implemented. Various sensors are utilized to superintend the circumstance conditions. Parameswaran.G and et al[7][8][9] have tackle a smart inundation systems used Internet of Things. To examine the wetness and stages of Waterlog in soil and Few wireless sensors are Obtained. These sensor

data are sent to a clever portal via network and use another portal is called Generic IoT border router wireless Br 1000. From portal the collected information is saved in web service system through network.

BLOCK DIAGRAM

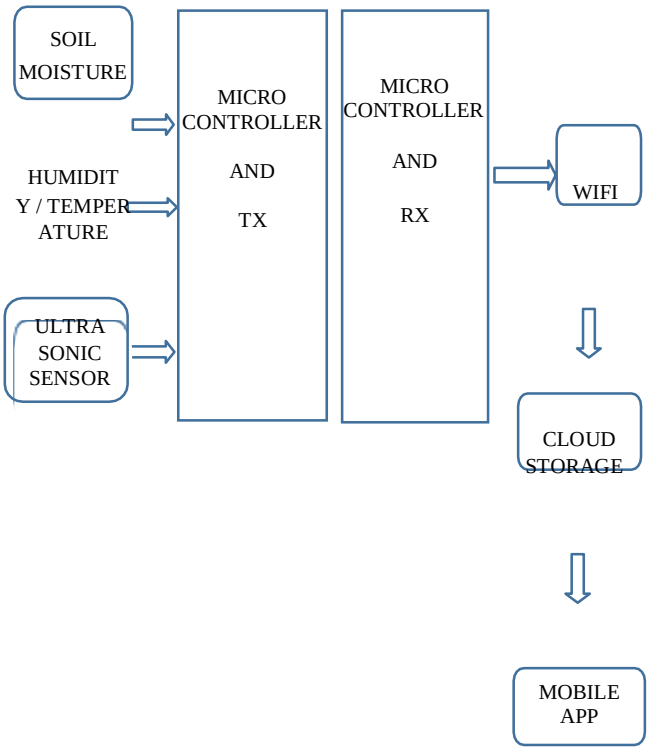

Figure.1. System Block Diagram

Figure.2.Temperature Sensor

Sensor DHT22 manipulates digital signal. It has an exclusive characteristics of calculating both temperature and humidity reading at the same time using digital-signal-collecting-technique and humidity sensing technology, comparing to other sensors it have more appropriate accuracy reading which is constant and reliable. DHT22 connected with 8-bit single-chip computer. Surrounding atmospheric temperature calibration and wetness of the soil is in accurate manner of reading is gained through this sensor. Connected to controller that transmits data, here no analog pin is needed.

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Figure.3. Capacitive Soil Moisture Sensor

Capacitive soil moisture sensor plays a vital role in sensing the wetness of the soil. There are numerous number of soil sensors available in the market, then what makes this capacitive sensors to make a huge difference? None other than its non corrodable special characteristics of this one particular sensor. Which doesn't rust minding whatever the soil is. The corrosion resistance material (lead) present here give a long life span for this sensor which is user friendly. This module have a voltage regulator ranges between 3.3 ~ 5.5V. It is 3 pinned compatible to measure gravity interface.

Figure.4. Ultrasonic Sensor

Both microcontroller and microprocessor exclusively use this ultrasonic sensor with a platform namely arduino, ARM, Raspberry pie etc. the Sensor could be charged using a regulator +5V through ground pins of sensor Vcc. There are two nodes one is transmitter and the other is receiver, in transmitter there are 2 drum like structure which triggers the signal. They are connected to I/O pins of the microcontroller. at frequency of 40Hz it triggers the ultrasonic waves between the transmitter and the receiver will wait for the wave to return. When it hits the object after reflection through the echo pins the ultrasonic waves is sensed, where the measurement of the object is done using this sensor.

Figure.5. nRF24L01

This transceiver module nRF24L01 operates and communicates through serial peripheral interface communication. It collects data information from microcontroller which connected to the DHT22 sensor and collected in nRF24L01 which main process is to decode and encode the data's and send to receiver through SPI communication using Radio frequency.

Figure.6. Relay Module

The Relay module could be operated electrically, it helps to turn on and off the switch. The relay take care of each circuits without collapsing, it has 3 connection The each channel NO, NC, and COM. It has high current frequency with 30 amplifier and it adaptable to any agriculture motor.

Figure.7. Arduino Nano

The Arduino Nano is a compatible version which is handy which works on mini B USB cable. Which is similar to more or less compared to other arduino board duemilanove but with same structured functionality is provided. All the components are surface mount device version.

Figure.8. Wemos D1 Mini

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The core processor ESP8266 is an ultra low power consumption gives wireless communication where the controller is inbuilt in it which appropriately provides signal to relay whether to turn on or off using the data information, the received data in nRF24L01 is transmitted to this Wemos D1 Mini, and this ESP8266 stores all data information in the cloud.

V. IMPLEMENTAION

A good soil moisture leads to a spectacular production of crops .Here we set a low power consumption DHT22 sensors (temperature & humidity) which shows accurate readings comparative to other sensors and also soil moisture capacitive sensor which does not corrode through pulse modulation signal The data's are collected in transmitter which is an NRF module and it is received by the receiver that is user with the same NRF module ,these both NRF modules communicates via SSI and ESB communication protocol through rf frequency and Receiver receives data from those sensors and that stored in a cloud ,each and every data is monitored, all those data can be stored in local or cloud it depends on user. If the soil moisture is adequate the automated irrigation system is stopped using relay control, if the soil moisture value is dry the RF module sends message to receiver. Receiver circuit board integrated with controller which handles water pump control. By doing this the water irrigation is automated by monitoring the sensors value and each values are stored in the cloud and the farmers get indicated through smart app. And those data's stored is also used for future analysis of plant disease, where the data is also used to analyse the cause of the disease.

VI. RESULT

sensors are being configured and the controllers being programmed and made the activation of Relay circuit by using Application programming interface, a web page is created and the following contents are being uploaded for the future review in the form of graphs.

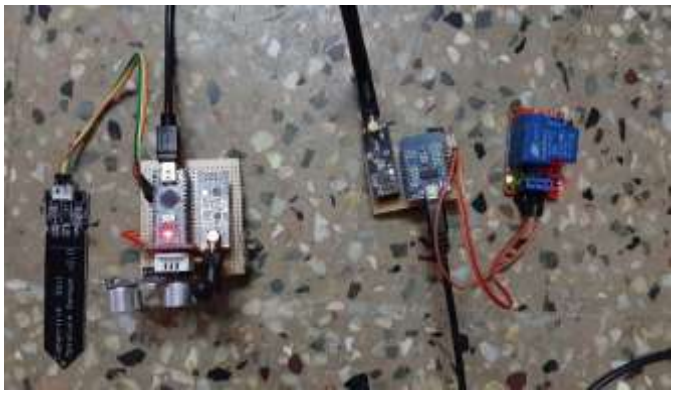

Figure.9. Hardware

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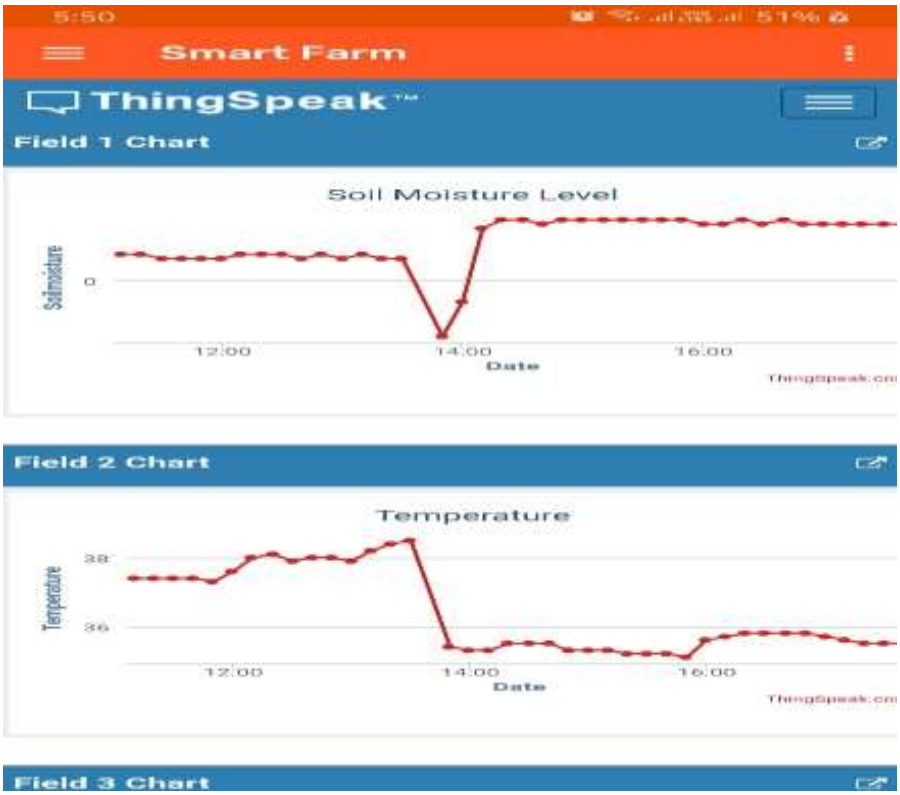
5:50
51%
Smart Farm
ThingSpeak™
Field 1 Chart
Soil Moisture Level
Soilmoisture
0
12:00
14:00
16:00
Date
ThingSpeak.com
Field 2 Chart
Temperature
Temperature
38
36
12:00
14:00
16:00
Date
ThingSpeak.com
Field 3 Chart


5:50
51%
Smart Farm
ThingSpeak™
Field 3 Chart
Humidity
Humidity
47.5
45
12:00
14:00
16:00
Date
ThingSpeak.com
soil_moisture_value
14
%
5 minutes ago
Humidity


Smart Farm
ThingSpeak™
Humidity
46.6
%
Temperature
35.4
C


Smart Farm
ThingSpeak™
Water_Pump_Status_ON
a few seconds ago
water_pump_status_OFF
a few seconds ago
Field 4 Chart

VII. CONCLUSION

Wireless sensors are deployed, monitored the activation of Agronomic field and their collected information is transmitted to server so that the end user can easily see the data's related to soil moisture, temperature, humidity, impediments in server. System can segment the indication and automation so that a good superintendent and monitoring method by reducing the human involvement effectively.

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