IoT Based Soil Irrigation Monitoring and Control Project

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Abstract- Agriculture plays an important role in developing countries. In India, the majority of population rely upon rural cultivating. Thus the Project goes for influencing agriculture business to brilliant utilizing computerization and IOT innovation. Besides checking the task through Web View application in any cell phone. In this journey paper are utilizing three sensor. The moisture sensor measure the moisture level of distinctive plants. In the event that the moisture level is observed to be underneath the coveted level the moisture sensor sends the flags to the Arduino board which Automatic the Water Pump to turn ON and supply the water to the plant. At the point when the coveted moisture level is achieved the framework ends without anyone else and the Water Pump2 is off [1]. Another main aspect of this project is Light intensity sensor. It senses the Light Intensity of farm and it send the information to the microcontroller. The whole information about the agriculture field is send to Web View application which is made in home assistant system.

Keywords- Soil Moisture Sensor, Temperature and Humidity Sensor, Light Intensity Sensor, Node MCU ESP8266.

I. INTRODUCTION

The Agriculture industry is one of the major industries of any nation. It plays an important role in the economy as well. Farmers face a wide range of problems some of which include large crop failures due to rough weather conditions or sheer negligence as well. Many a times it is hard to tell which plant is not sufficiently being watered and this is one of the leading causes of crop failures [6].Sometimes it may happen that a given fix of land gets more water produce water-logging, or it might get far less or no water at all inciting dry soil. In both of the cases, the yields can get harmed and agriculturist may endure misfortunes. So keeping in mind the end goal to take care of this issue, paper proposed an "IOT Based Soil Irrigation Monitoring and control system". This is an extremely valuable undertaking wherein, the client can screen and control the supply of water from a remote area. This framework makes utilization of an idea called IOT (Internet of Things). So for our task, paper associated framework to the web utilizing a Wi-Fi module. Paper utilized a NodeMCU ESP 8266 board to send the control flags and to interface with our coveted website. Get access to mobile Application.

II. LITERATURE SURVEY

[1] Divyavani Pale, Aruna Kommu, Raghavendra Rao Kanchi et al [2] Proposed Measurement and control of stickiness and temperature assume an imperative part in various fields like Agriculture, Science, Engineering and Technology. Likewise, it ends up fundamental to screen the continuous climate state of one place from somewhere else. In thispaper exhibited the outline and improvement of CC3200-based Cloud IOT for estimating moisture and temperature. CC3200 is the primary Simple Link Wi-Fi web on-chip Launchpad created by Texas instruments, USA in 2014. The HRT393 sensor is utilized for estimating stickiness and temperature. Estimated parameters are sent to the Cloud servers of AT&TM2X Cloud innovation (HTTPS). Mugginess and temperature estimations set aside a few minutes are indicated graphically. The product is created in Energies coordinated advancement condition (IDE). The deliberate esteems are contrasted and the estimations recorded by the ground station Laboratory set up by ISRO, India, on the University Campus.

[2]Raja Lakshmi P., Mrs.S.Devi Mahalakshmi et al [3] Internet ofThings [IoT] plays an important role in agriculture industry which can feed 9.6 billion people on the Earth by 2050. Smart Agriculture diminishes wastage, successful utilization of manure and along these lines increment the harvest yield. In this work, a framework is created to screen trim field utilizing sensors (soil moisture, temperature, humidity, Light) and robotize the water system framework. The data from sensors are sent to web server database utilizing remote transmission. In server database the data are encoded in JSON arrange. The water system is robotized if the Moisture and temperature of the field falls underneath the verge. In nurseries light force control can likewise be robotized notwithstanding water system. The warnings are sent to agriculturists' versatile occasionally. The agriculturists' can ready to screen the field conditions from anyplace. This framework will be more valuable in regions where water is in rare. This framework is 92% more productive than the regular approach.

III. EXISTING SYSTEM

Agriculture monitoring is not a new concern. In fact land surveying were developed in former Egypt. The aim was gauge cultivated areas influenced by water level alteration of the River Nile, with the purposes of taxation and for preventing famine. Today, a regional to global agricultural intelligence is needed to respond to various societal needs. For example, national and international agricultural policies, global agricultural trade and organizations dealing with food security issues heavily depend on reliable and timely crop production information [7].

IV. PROBLEM STATEMENT

The framework is created and tried in different conditions. The dirt moisture is tried in every single climatic condition and results are deciphered effectively. The LDR is tried in every single light condition. Distinctive readings were taken under various condition. The remote transmission was accomplished utilizing NodeMCU ESP8266 Wi-Fi Module. The information was put away in MySQL database utilizing PHP script. The information was recovered effectively from My-SQL database which is utilized for observing reason. The web-view application parses the information in Home Assistant.

V. PROPOSED SYSTEM

Here paper proposed a shrewd climate detailing framework over the Internet. Paper proposed framework considers climate parameter revealing over the Internet. It enables the general population to specifically check the climate details online without the need of a climate gauging organization. Framework utilizes temperature, moisture and in addition rain sensor to screen climate and give live detailing of the climate insights. The framework always screens temperature utilizing temperature sensor, stickiness utilizing mugginess sensor and furthermore for rain. This information is live refreshed to be seen on the online server framework. Additionally framework enables client to set alarms for specific occurrences, the framework gives cautions to client if the climate parameters cross those qualities. Along these lines the IOT based climate announcing framework gives a productive web based climate revealing framework for clients.

5.1 Sensor Information

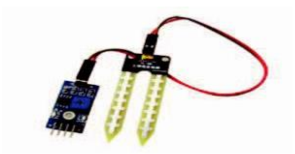

Fig. 1: Soil moisture Sensor

The soil moisture sensor uses capacitance to measure the water content of soil. Simply embed this tough sensor into the soil to be tested, and the volumetric water content of the soil is reported in percent. And it will give accurate moisture present in the soil. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners. Soil moisture sensors typically refer to sensors that estimate volumetric water content.

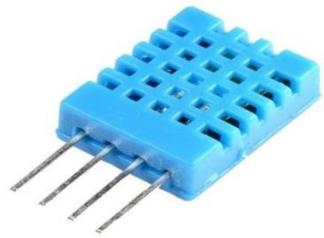

Fig.2: Temperature & Humidity Sensor

Temperature and humidity sensor is adjusted with digital signal output. This sensor include a resistive-type humidity estimation component and an NTC temperature estimation component.

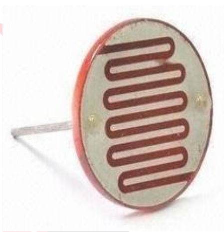

Fig. 3:Light Intensity Sensor

Light sensor is used to detect light intensity of the environment. Light is the major source for crops which is responsible for photosynthesis. Light Dependent Resistor (LDR) is used in which the resistivity decreases with increase in light intensity and vice versa.

5.1.2 Module Information

1. Node MCU ESP8266 Module

Fig.3:NodeMCU ESP8266 Module

NodeMCU V1.0 is an open source IOT platform with ESP8266-12E chips. It is low-cost, breadboard friendly, integrate a USB to serial chip, and a simple USB to micro USB cable can be used to power this board. This modules aimed for developing ESP8266 based Lua IoT applications and it includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif system.

5.2 User Interface

5.2.1 Home assistant system

Home Assistant is an open source home automation platform running on Python3. Track and control all devices at home and automate control. Perfect to run on a Raspberry Pi.

5.2.2 MQTT

MQTT refers to Message Queuing Telemetry Transport. CloudMQTT is one such platform which provides machine-to- machine messaging. It is managers by message servers in the cloud. In our system paper has been used the CloudMQTT platform for communicating the soil moisture level reading of plants from the system to various devices that the user uses.

VI. SYSTEM ARCHITECTURE

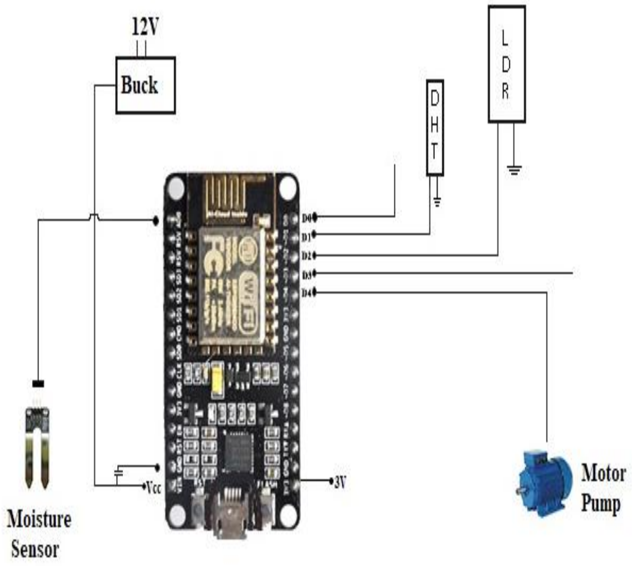

Fig. 4: System Architecture

In this work low cost soil moisture sensors, temperature and humidity sensors, are used. They continuously monitor the field and send it to the web server using NodeMCU ESP8266 transmitter and receiver and ends. The sensor data are stored in database. The web application is designed in such a way to analyze the data received and to check with the threshold values of moisture, humidity and temperature. If soil moisture is less than the threshold value the motor is switched ON and if the soil moisture exceeds the threshold value the motor is switched off. This method can also be used in green houses where in addition light intensity control can also be controlled and automated.

6.1 FLOWCHART

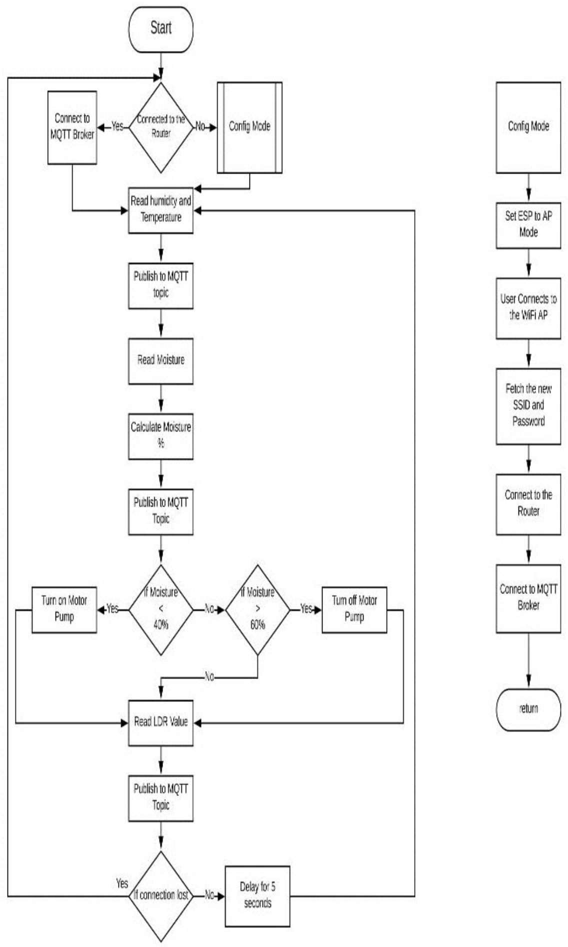

Fig. 5:Flowchart

Table no.1: Comparative Analysis

SR. NO.	NAME	AUTHOR NAME	TECHNOLOGY/ ALGORITMS	MERITS	DEMERITS
01	Automated Irrigation System Using a Wireless Sensor Network and GPRS Module	Joaquin Gutiérrez, Juan Francisco Villa-Medina	FAST	Improve the performance of Irrigation System.	Difficult to implement.
02	A Crop Monitoring System Based on Wireless Sensor Network	Stefano's A. Nikolidakis , DionisisKandris	EFFECTIVE	Improve the performance of Irrigation System.	Difficult to Understand.
03	Automatic Drip Irrigation System using Wireless Sensor Network and Data Mining Algorithm	D. K. Fisher and H. A. Kebede	VERY GOOD	Best approach Explained.	Little Bit Time Consuming.
04	Wireless lysimeters for real-time online soil water monitoring	S. Li, J. Cui, Z. L	GOOD	Good approach explained	Time Consuming

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VII. ADVANTAGES

1. Simple to design and install.
2. User Controllable with ease to access.
3. Less manpower is required.
4. Increase productivity.
5. It reduces water consumption in agriculture field.

VIII. RESULTS AND DISCUSSION

The system is developed and tested and various conditions. The soil moisture is tested in all climatic conditions and results are interpreted successfully. The LDR is tested in all light conditions. The soil sensor measures the values based on the resistance of the soil. The soil moisture level values vary between 0 and 100, 0 being extremely moist (in ideal conditions) and 1024 being extremely dry (ideal condition). These numbers are digitized voltages where 0=0V and 104=5V. The soil sensor system was placed in a large number of plants having dry, moderately moist, and extremely moist soil.

Table no.2: Ranges of soil moisture sensor during the experiment

TYPE OF SOIL	READING RANGE BY SOIL MOISTURE SENSOR
Dry soil sample	94-92
Moderately moist soil sample	60- 61
Very humid soil sample	25-26

Table no.3: Recommended crops

	A	B	C	D	E	F	G
1	crop name	humidity	temprature	mosture	soil needed		
2							
3	cashew	43 to 90%	30-45' c		sandy-loam soil		
4	gram	50 to 70%	25-30' c		drained-loam		
5	jowar		23-32' c		sandy-loam soil		
6	bajra		25-30' c		sandy-loam soil		
7	groundnut	50-65%	22-32' c		clay-loam soil		
8	sugarcane	55-85%	23-35' c		loam-soil		
9	mango	40-75%	23-27' c		deep and well drained soil		
10	tomato		21-25' c		well-drained soil		
11	brinjal		26-32' c		both sandy and clay soils		
12	wheat		15-25' c		loam-soil		
13	pomegranate		18-25' c		well-drained soil		
14	watermelon		21-30' c		sandy-clay soil		
15	rice		20-35' c		heavy clay soil		

IX. CONCLUSION

The system aims at developing a structure to help farmers to assist developing profitable crops according to season change, calculates few parameters required to grow green crops like tomato, wheat, brinjal, pomegranate, watermelon, rice, bajra, jowar, mango, sugarcane, groundnut, etc.suggested recommended crops to be cultivated according to the generated values.

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