Smart and Economic Farming Using IoT

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Abstract- ***In this paper, a client server water framework system is familiar that uses sensors with sense the earth conditions, for instance, the temperature and moistness of the soil by then choose suitable decision reliant on totaled data from sensors and SMS prepared will be sent to the farmer through IFTTT. This engages the remote-control instrument through an ensured web relationship with the client. A site has been prepared which present the certifiable time regards and reference estimations of various factors required by crops. Clients can control water pumps and sprinklers through the site and watch out for the reference regards which will empower the farmer to construct creation with quality yields.***

Indexed Terms- Client, DHT11 sensor, IFTTT, SMS, Soil Moisture sensor

I. INTRODUCTION

Internet of Things is associating immense number of gadgets over a network by utilizing internet, where every gadget will have its own one of a kind address. These gadgets are known as things. Internet of Things is mix of wireless sensor network, cloud and portable application, where wireless sensor network comprises of sensors incorporated to the micro controller in a network. The sensors measure the physical and ecological boundaries around it and move the information between different nodes in a network. The microcontroller then goes about as an entryway and sends the sensor information to the cloud which will be utilized for future reason. The client from anyplace around the globe can get to the information in the cloud through the versatile application gave to the client. The utilization of most significant boundary for water system is water and utilizing water cautiously is likewise significant during water system, whenever there is possibility of downpour and simultaneously on the off chance that the yield is inundated, at that point the water will flood in the field and gets squandered [1]. Client-server model can serve the adaptability of including or expelling nodes from the wireless sensor network. There are two disengaged networks, the first serve assembling the information from nodes and conveying it to the principle station and the subsequent one is utilized for sending the orders from the primary station to the actuator (server) or from any gadget that associated with the server network [2]. Via computerizing this procedure plants and yields the same are furnished with the perfect measure of water required for their development, this spares water and expands the effectiveness of the ranch [3]. It offers an advanced lifestyle wherein an individual gets the chance to control his electronic gadgets utilizing a PDA, it additionally offers an effective utilization of vitality [4]. Routine support is required for the real execution everything being equal. Smart water system framework works programmed and utilize the dampness sensor to deliberately water the plants without human perception [5]. A Precision Agriculture has the upside of giving nonstop analysis on different unmistakable yield and site factors. As its name recommends, Precision Agriculture is definite in both the degree of the item domain it screens and what's more in the movement proportions of water, fertilizer, etc [6]. Android application ceaselessly gathers the information from that doled out IP address. When the soil dampness esteems are surpassed as far as possible then the hand-off, which is associated with the Arduino microcontroller controls the motor. The android application is a straightforward menu driven application, with 4 alternatives. This incorporates motor status, dampness, temperature and stickiness esteems [7].

II. LITERATURE REVIEW

In [1] Using Internet of Things in water system field will decrease work of farmer in the field. The technique with ease and less force utilization will be progressively powerful and it very well may be accomplished with the utilization of NodeMCU as

microcontroller and Wi-Fi module. Predator discovery in the field can be recognized with the utilization of PIR sensor and email ready will be sent to the farmer through IFTTT, in the event that anybody is distinguished in the field. The Dampness substance can be discovered utilizing soil dampness sensor. The kind of harvest to be developed in the field can be known with the assistance of pH esteem. The ph worth can be estimated utilizing pH sensor. In view of the pH esteem we will recommend the farmer the sort of harvest that gives greater profitability through the versatile application.

In [2] a client server water system framework is acquainted that utilizes sensors with sense nature conditions, for example, the temperature and dampness of the soil at that point settle on legitimate choice dependent on accumulated information from sensors and accessible data about plants, soil and plant Evapotranspiration (ET) that identify with the geographic territory and the period of planting at that point make a few computations to give the appropriate measure of water to the plant. This technique spares the water sum that expended when the customary water system strategy is utilized.

In [3] the paper is tied in with mechanizing the water system process in farming field. This is accomplished by utilizing shrewd framework dependent on NodeMCU, Moisture sensor, Humidity sensor. The NodeMCU is a microcontroller unit with an inbuilt Wi-Fi correspondence module. The Moisture sensor gathers the dampness level from the soil and sends the information to the NodeMCU comparably the mugginess sensor likewise gathers the stickiness level of the climate and sends the information to the NodeMCU (Once the NodeMCU) gets all the information, contingent upon the information it has gotten and the inbuilt information it sends a heartbeat to the transfer module which thusly turns on the pump. In [4] Advancing utilization of current data innovation in horticulture will take care of a progression of issues looking by farmers. Absence of definite data and correspondence prompts the misfortune underway. This paper is intended to defeat these issues. This framework gives a clever observing stage structure and framework structure for office farming biological system dependent on IOT. This will be an impetus for the progress from conventional cultivating to current cultivating.

In [5] the paper exhibits the productive utilization of Internet of Things for the customary farming. It shows the utilization of Arduino and ESP8266 based checked and controlled brilliant water system frameworks, which is likewise financially savvy and straightforward. This transmitted data is screen and control by utilizing IOT. This empowers the remote-control system through a safe internet web association with the client.

In [6] IOT use farmers to get related with his home from any place and at whatever point. Remote sensor structures are used for watching the estate conditions and smaller scope controllers are used to control and automate the home shapes. To see remotely the conditions as picture and video, remote cameras have been utilized. IOT improvement can lessen the expense and update the profitability of standard creating.

In [7] Agriculture is the most significant occupation for the majority of the Indian families. It assumes fundamental job in the advancement of agrarian nation. In India, agribusiness contributes about 16% of all out GDP and 10% of absolute fares. In this proposed framework we are utilizing different sensors like temperature, moistness, soil dampness sensors which detects the different boundaries of the soil and dependent on soil dampness esteem land gets naturally inundated by ON/OFF of the motor. These detected boundaries and motor status will be shown on client android application.

III. WORKING

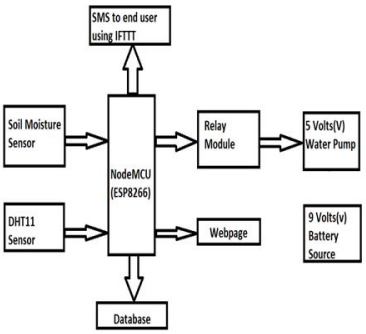


Fig: Block diagram

The commitments to NodeMCU are soil soddenness sensor and DHT11 sensor. Soil sogginess sensor gives the straightforward estimation of soil soddenness and DHT11 sensor gives temperature and tenacity estimation of the earth. A relay module is related with deftly the water when dampness increases above 45%. Water pump goes after a 9V battery source which is interfaced with relay module. At the point when these characteristics are gotten, these characteristics are appeared on page through IP address of NodeMCU and data is sent to end client as SMS using IFTTT. In the wake of appearing of data, database is made using PLX-DAQ Spreadsheet.

A. NODE MCU

The microcontroller utilized in this strategy is NodeMCU which likewise goes about as Wi-Fi module that sends sensor information to the cloud by going about as a passage. The fundamental reason for utilizing NodeMCU is it devours less intensity of 3.3v and it is less expense than other micro controllers/processors like Arduino and Raspberry pi. NodeMCU Dev Kit has Arduino like Analog (for instance A0) and Digital (D0-D8) pins on its board. It supports successive correspondence shows for instance UART, SPI, I2C, etc.

Fig: Node MCU

B. SOIL MOISTURE SENSOR

The soil dampness sensor in water system field is utilized to gauge the soddenness content in the soil and in the event that the sogginess content is not exactly the limit esteem, at that point NodeMCU will impart the control sign to the Relay and will turn on the motor that turns over watering the plants. The yield field will be checked consistently by the NodeMCU and on the off chance that the sogginess content gets over the edge esteem, at that point the motor goes to off state and quits watering the plants. The information is sent to the cloud and can be observed through portable application, this is useful in robotized water system.

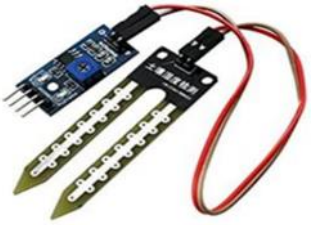


Fig: Soil Moisture sensor

C. DHT11 SENSOR

The DHT11 is a major, ultra-negligible exertion propelled temperature and moisture sensor. It uses a capacitive clamminess sensor and a thermistor to measure the incorporating air, and lets out a modernized sign on the data pin (no basic data pins required). It's truly simple to use, anyway requires mindful wanting to grab data. The principle veritable disadvantage of this sensor is you can simply get new data from it once as expected, so while using this library, sensor readings can be up to 2 seconds old.

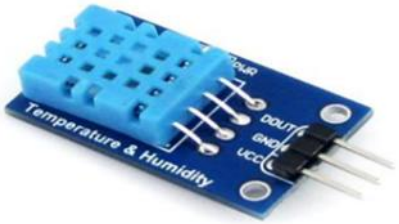


Fig: DHT11 Sensor

D. RELAY MODULE

The relay module is a different equipment gadget utilized for remote gadget exchanging. With it you can remotely control gadgets over a network or the Internet. Gadgets can be remotely controlled on or off with orders originating from Clock Watch Enterprise conveyed over a neighborhood or wide territory network.

Fig: Relay Module

E. 5V WATER PUMP

A pump is a gadget that moves liquids (fluids or gases), or now and again slurries, by mechanical activity, typically changed over from electrical vitality into Hydraulic vitality.

Fig: Water pump

F. 9V BATTERY

The nine-volt battery, or 9-volt battery, is a typical size of battery that was presented for the early transistor radios. It has a rectangular crystal shape with adjusted edges and an enraptured snap connector at the top. This sort is ordinarily utilized in walkie-talkies, timekeepers and smoke alarms.

Fig: 9V Battery

G. PLX-DAQ SPREAD SHEET

PLX-DAQ is a Parallax microcontroller information obtaining add-on instrument for Microsoft Excel. Any of our microcontrollers associated with any sensor and the sequential port of a PC would now be able to send information legitimately into Excel.

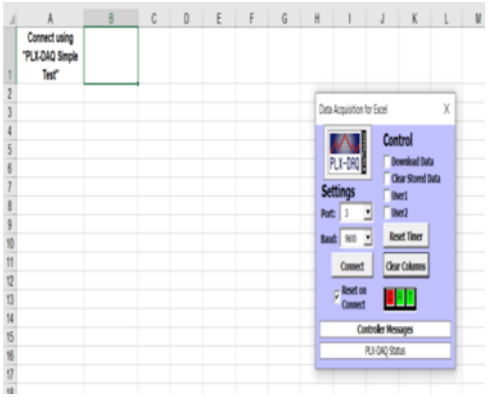


Fig: PLX-DAQ Spread sheet

H. WEBPAGE

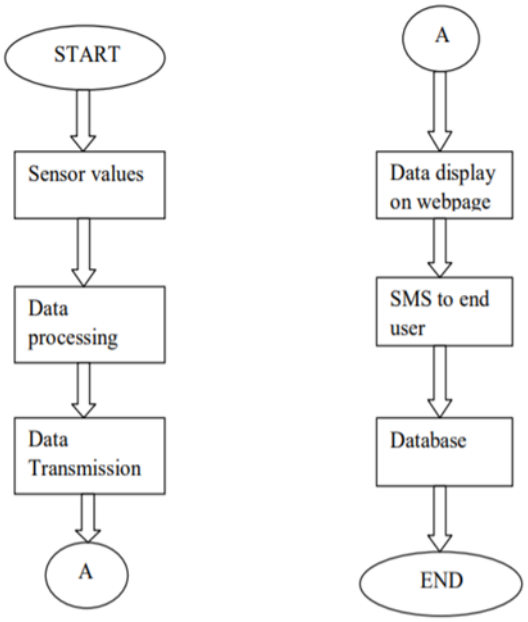
A site page or a webpage is a particular assortment of data gave by a site and showed to a client in an internet browser. A site normally comprises of many site pages connected together in a lucid manner.

I. IFTTT

If This Then That, otherwise called IFTTT is a freeware online service that makes chains of basic contingent proclamations, called applets. An applet is activated by changes that happen inside other web services, for example, Gmail, Facebook, Telegram, Instagram, or Pinterest.

Fig: IFTTT Page

IV. FLOWCHART



V. RESULTS

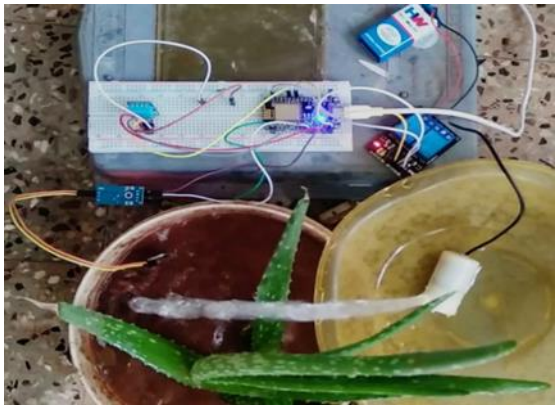


Fig: Practical model

In the above figure, Soil moisture sensor is set into the soil a ways-off of 2 cm -3 cm. toward the starting the soil molecule is blended in with water to settle down the particles inside the soil. A motor is put close to the soil with the end goal that if the stickiness of the soil increments over the set worth motor gets siphoned on as appeared in above figure. When the motor is siphoned on till the stickiness esteem is somewhere in the range of 45% and 70%, the motor pumps on constantly in this range.

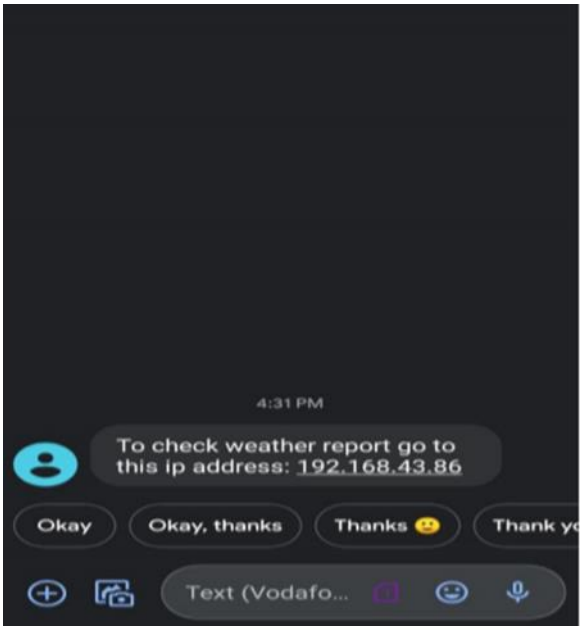


Fig: Message to the end user

Fig: Output on webpage

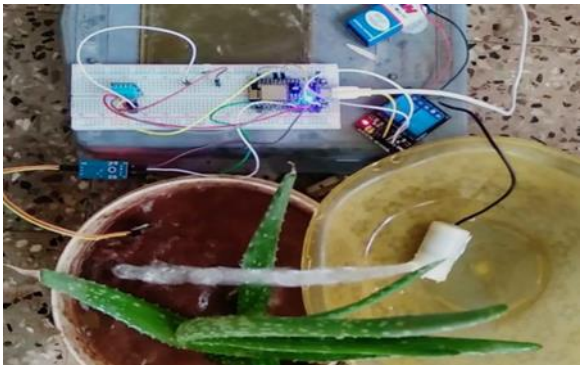


Fig: Water pump is on

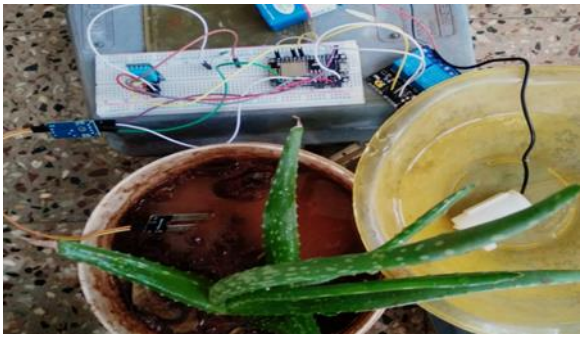
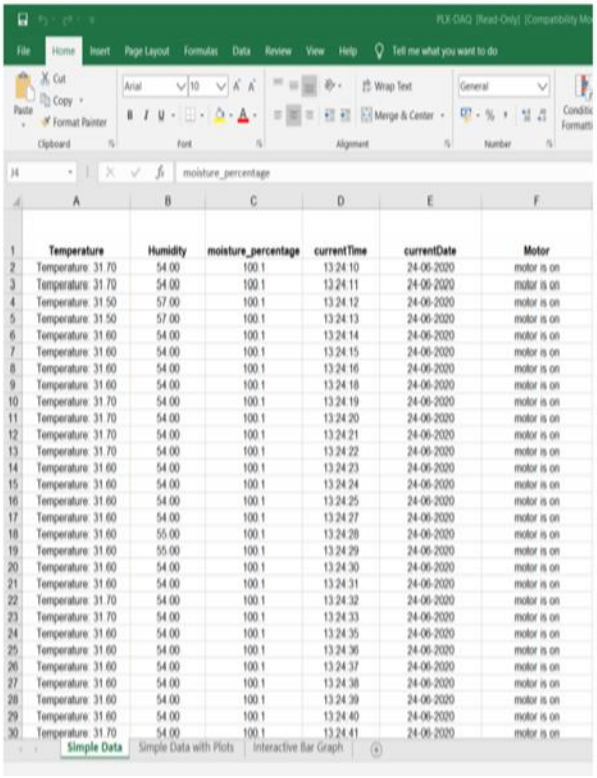


Fig: After the humidity value is satisfied



	A	B	C	D	E	F
1	Temperature	Humidity	moisture_percentage	currentTime	currentDate	Motor
2	Temperature: 31.70	54.00	100.1	13:24:10	24-06-2020	motor is on
3	Temperature: 31.70	54.00	100.1	13:24:11	24-06-2020	motor is on
4	Temperature: 31.50	57.00	100.1	13:24:12	24-06-2020	motor is on
5	Temperature: 31.50	57.00	100.1	13:24:13	24-06-2020	motor is on
6	Temperature: 31.60	54.00	100.1	13:24:14	24-06-2020	motor is on
7	Temperature: 31.60	54.00	100.1	13:24:15	24-06-2020	motor is on
8	Temperature: 31.60	54.00	100.1	13:24:16	24-06-2020	motor is on
9	Temperature: 31.60	54.00	100.1	13:24:18	24-06-2020	motor is on
10	Temperature: 31.70	54.00	100.1	13:24:19	24-06-2020	motor is on
11	Temperature: 31.70	54.00	100.1	13:24:20	24-06-2020	motor is on
12	Temperature: 31.70	54.00	100.1	13:24:21	24-06-2020	motor is on
13	Temperature: 31.70	54.00	100.1	13:24:22	24-06-2020	motor is on
14	Temperature: 31.60	54.00	100.1	13:24:23	24-06-2020	motor is on
15	Temperature: 31.60	54.00	100.1	13:24:24	24-06-2020	motor is on
16	Temperature: 31.60	54.00	100.1	13:24:25	24-06-2020	motor is on
17	Temperature: 31.60	54.00	100.1	13:24:27	24-06-2020	motor is on
18	Temperature: 31.60	55.00	100.1	13:24:28	24-06-2020	motor is on
19	Temperature: 31.60	55.00	100.1	13:24:29	24-06-2020	motor is on
20	Temperature: 31.60	54.00	100.1	13:24:30	24-06-2020	motor is on
21	Temperature: 31.60	54.00	100.1	13:24:31	24-06-2020	motor is on
22	Temperature: 31.70	54.00	100.1	13:24:32	24-06-2020	motor is on
23	Temperature: 31.70	54.00	100.1	13:24:33	24-06-2020	motor is on
24	Temperature: 31.60	54.00	100.1	13:24:35	24-06-2020	motor is on
25	Temperature: 31.60	54.00	100.1	13:24:36	24-06-2020	motor is on
26	Temperature: 31.60	54.00	100.1	13:24:37	24-06-2020	motor is on
27	Temperature: 31.60	54.00	100.1	13:24:38	24-06-2020	motor is on
28	Temperature: 31.60	54.00	100.1	13:24:39	24-06-2020	motor is on
29	Temperature: 31.60	54.00	100.1	13:24:40	24-06-2020	motor is on
30	Temperature: 31.70	54.00	100.1	13:24:41	24-06-2020	motor is on

Fig: Database on PLX-DAQ Spread sheet

CONCLUSION

The smart and economic farming using IOT has been tentatively demonstrated to work agreeably by observing the estimations of dampness and temperature effectively. Through the web control the motor in the field. It additionally stores the sensor boundaries in the convenient way. This will assist the client with analyzing the states of different boundaries in the field whenever anyplace. At that point control or keep up the boundaries of field appropriately. At last, we presume that programmed water system framework is more productive than booked water system process.

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