ISSN NO: 9726-001X
Volume 10 Issue 01 2022

JOURNAL OF CURRENT SCIENCE

A NEW IOT FOR ARTIFICIAL INTELLIGENCE IN AGRICULTURE

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Abstract:

The art and science of cultivating plants has been practiced for generations in every nation. Keeping up with the latest technological developments is essential in modern life, and the same is true in agriculture. In smart agriculture, the Internet of Things is important. In order to get important data regarding agricultural areas, Internet of Things (IoT) sensors are used. With the use of wireless sensor networks, which gather data from a variety of sensors placed at different nos. and sent via wireless protocol, the primary goal of the Internet of Things is to keep an eye on farming. The smart agriculture is powered by the Node MCU via the Internet of Things system. The components include a DC motor, humidity, temperature, and moisture sensor. The building starts to check the relative humidity and moisture content. The sensors detect when the water level drops below a certain threshold, at which point the irrigation system begins automatically. When there is a change in temperature, the sensor will activate. Internet of Things devices also display specifics like humidity and moisture level along with time and date. It is also possible to change the temperature measurement depending on the crop type.

Introduction

Agriculture is one of the most important industries in India.Agriculture has a crucial role in supporting human existence. An increase in agricultural output is directly correlated with a rise in the population. The lack of sufficient water supplies has a direct impact on agricultural manufacturing, which is highly dependent on seasonal circumstances. Smart agricultural devices based on the internet of things are used to produce good results in agriculture and to solve difficulties. Modern records of food production are sought after by agricultural monitoring institutions that operate on a global and regional basis. Using sensors for things like light, humidity, temperature, soil moisture, etc., a gadget is constructed in IoT-based smart farming to keep an eye on the crop discipline. No matter where they are, farmers can see the field requirements. When compared to the traditional method, smart farming that is based on the Internet of Things is rather efficient. Computerised irrigation systems may benefit from the latest developments in sensor technology, as well as the expansion of WSN and IoT, which are used in agricultural irrigation structures. The device will compile a list of the most popular nodes and wifi technologies used to implement WSN and IoT based intelligent irrigation systems, as well as the parameters that are monitored in these systems, including water volume and quality, soil characteristics, weather, and fertiliser usage. Survey of Relevant Literature The display of a crop field is described by an IoT-based crop-field monitoring irrigation automation equipment. The gadget is built using sensors, and the watering system is automated according to the decision made by a server based on the observed data. All of the detected data is sent to the database on the net server via wireless transfer. The moisture and temperature fields are brought down to an acceptable level using computerised irrigation. With the use of software that provides a web interface to the user, the user may remotely access and control the device [1].In contrast to the modern smart agriculture monitoring system, the time-honoured practice of manually examining agricultural parameters is still in use today. The farmers independently check all the parameters and determine the reading using this procedure [2]. A wi-fi sensor community system is the primary emphasis of this device, which aims to administer, display, and inform users to the advantages of this system. The goal is to make farming smarter by using IoT and automation technologies [3]. At the very end of the machine that can build a complete computer system, from sensors to equipment that look at data from the agricultural field, are the cloud computing units. Using wi-fi conversation science, it suggests a new approach to smart farming that incorporates a smart sensing device and a smart irrigator machine [4]. When considering installation costs, this machine is more affordable. Here one may access and even operate the agricultural equipment from a desktop, laptop, or smartphone [5].

ISSN NO: 9726-001X
Volume 10 Issue 01 2022

Block diagram

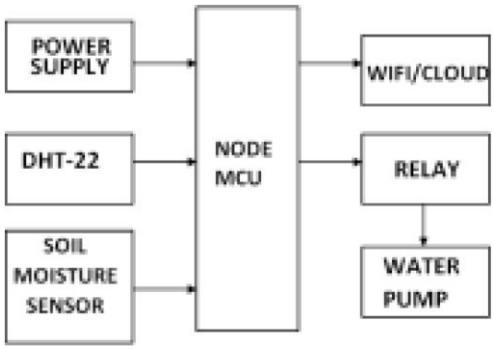

Figure 1: Block Diagram

The Block diagram of the proposed system which gives information of the required modules is shown in Figure 1.

Required Modules

Hardware requirements

- Soil moisture sensor
- Temperature sensor (DHT-11)
- Relay
- Pump
- IoT (WI-FI module ESP8266)
- Power supply: 5V, 700mA Regulated power supply **Software tools required**
- Arduino IDE
- Thingspeak website

Soil Moisture sensor

A system which is used to experience the moisture stage in the sand is referred to as soil moisture sensor and is proven in Figure two When the sensor senses the water scarcity in the field, the module output is at excessive degree else the output is at low level. This sensor reminds the consumer to water their flora and additionally video display units the moisture content material of soil. It has been extensively used in agriculture, land irrigation and botanical gardening.

Figure 2: Soil Moisture Sensor

Temperature Sensor (DHT-11)

Temperature Sensor (DHT-11) is used to reveal temperature and humidity of the atmosphere. The DHT-11 proven in Figure three is a primary extremely low value digital temperature and humidity sensor. It makes use of a capacitive humidity sensor and a thermistor to measure the surrounding air and cut up out a digital sign on the information pin. The DHT-11calculate relative humidity by measuring the electrical resistance between two electrodes.

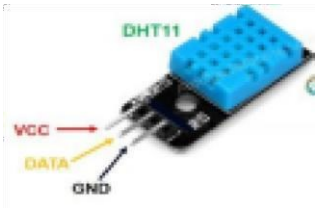

Figure 3: Temperature sensor

Relay

A relay is used as electrically operated alternate which is validated in Figure 4 It has a set of enter terminals for a single or a couple of manipulate indications and a set of going for walks contact terminals. The swap may additionally comprise vary of contacts in extra than one contact sorts which make contacts or injury contacts. Relay is used to flip on the water pump in order to maintain the moisture stage of the crop.

ISSN NO: 9726-001X
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Figure 4: Relay

Water pump

The DC 3-6V Mini Micro Submersible Water Pump proven in Figure 5 is a low cost, small measurement Submersible Pump Motor. It operates with a 2.5 to 6V strength supply. It can pump up to a hundred and twenty litres per hour with a very low contemporary consumption of 220mA. Just join the tube pipe to the motor outlet, submerge it in water, and strength it.

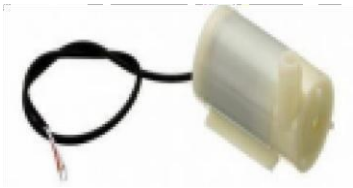

Figure 5: Water Pump

IoT (WI-FI module ESP8266)

The NodeMCU (ESP8266) proven in Figure 6 is a microcontroller with an built in Wi-Fi module. The complete pins on this system are 30 out of which 17 are GPIO (General Purpose Input/Output) pins which are linked to a range of sensors to get hold of information from the sensors and ship output information to the linked devices. The NodeMCU has 128KB of RAM and 4MB flash reminiscence storage to save applications and data. The code is dumped into the NodeMCU thru USB and is saved in it. Whenever the NodeMCU receives enter information from the sensors, it crosschecks the information acquired and shops the acquired data. Depending on the records acquired it sends a pulse to the Relay Module which in-turn acts as a change to on or off the pump. The running frequency of the NodeMCU stages from eighty to one hundred sixty MHZ and the working voltage of this system vary from three to 3.6V. The Wi-Fi module presents in the NodeMCU range from 46 (indoors) to 92 (Outdoors) Meters.

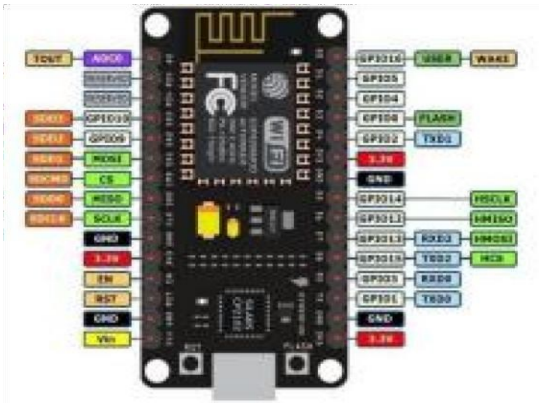

Figure 6: ESP8266 module

Power Supply

Power grant tested in Figure 7 is an electrical device which assets electric powered powered strength to an electrical load. The first characteristic of a electrical energy provide is to convert electric powered powered current day from a provide to the proper voltage, present day and frequency to strength up the load. As a result, energy assets are moreover referred to as electric powered powered power converters. Some electrical energy substances are separate standalone parts of tools while others are built into the load domestic tools that they power

Figure 7: Block diagram of a fixed regulated power supply

Arduino IDE

The Arduino Integrated Development Environment (IDE) is a cross-platform utility in which the features are written in C and C++ languages. It is used to write and dump the written applications to Arduino like minded boards with the assist of 1/3 birthday party cores and different supplier improvement boards. **Thingspeak website**

ThingSpeak is an IoT analytics platform which is used to aggregate, visualize, and analyse stay facts streams in the cloud. When the information is despatched to Thingspeak from the devices, it creates on the spot visualization of stay statistics and sends an alert.

Internal Work of ThingSpeak is proven in Figure eight

ISSN NO: 9726-001X
Volume 10 Issue 01 2022

Working

The clever agriculture monitoring device is examined beneath a number conditions. The soil moisture sensor is used to check the soil for all climatic stipulations and outcomes are interpreted successfully. The moisture output readings at exceptional climate prerequisites is taken and updated. Wi-Fi is used to gain the wi-fi transmission. The values of soil moisture sensor purely depend on the resistivity of the soil. The value of the sensor at beginning of wet condition is 0. The sensed value is sent to microcontroller through NodeMCU and motor pump gets OFF in this condition. The most threshold fee upon dry soil is1023. When the sensed price with the aid of sensor reaches the threshold value, the microcontroller set off the relay and motor receives ON. When enough quantity of water is furnished to plants, the motor pump is became ON and is became OFF automatically.

Advantages

It is easy to maintain and cost is reasonable to purchase. The components which are used are easily available.

- It has advantage to observe the status on smartphone or laptop using internet. The information is up to date even in absence of farmer.
- The collected data is updated and the farmer is conscious about the status of the crop.
- To achieve more effective and accurate details of crop several additional sensors can also be included.

Results and Analysis

Implementing cutting-edge research in crucial sectors like agriculture is the primary goal of this challenge. This equipment simplifies farm monitoring by using IoT technical know-how in the field. Saving water and labour are two of the most important advantages in today's agricultural kingdom. So, smart irrigation is made possible by the sensor community's use in agricultural areas. The consumer receives data from the Internet of Things (IoT) over the cloud. Consequently, any changes within the crop may also be easily seen, allowing for early assessment. Figures 10, 11, and 12 show the measured and monitored soil parameters, humidity, and moisture, respectively.

Figure 10: Temperature Measurement

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Figure 11: Humidity Measurement

Figure 12: Soil Moisture Measurement

Conclusion and Future Scope

7.1 Conclusion

IoT will assist to decorate clever farming. Using IoT the gadget can predict the soil moisture stage and humidity so that the irrigation machine can be monitored and controlled. IoT works in distinct domains of farming to enhance time efficiency, water management, crop monitoring, soil administration and manipulate of insecticides and pesticides. This machine additionally minimizes human efforts, simplifies methods of farming and helps to attain clever farming. Besides the benefits furnished by using this system, clever farming can additionally assist to develop the market for farmer with single contact and minimal effort.

7.2 Future Scope

- The venture has widespread scope in creating the device and making it greater consumer pleasant and the extra aspects of the machine like:
- By putting in a webcam in the system, images of the vegetation can be captured and the facts can be despatched to database.
- Speech based totally choice can be applied in the machine for the human beings who are much less literate.
- GPS (Global Positioning System) can be built-in to grant unique region of the farmer and greater correct climate reviews of agriculture subject and garden.Regional language feature can be implemented to make it easy for the farmers who are aware of only their regional language.

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