IOT BASED SMART AGRICULTURAL MONITORING SYSTEM

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ABSTRACT

In the past, farmers wanted to calculate the growth of their land and its impact on their crops. They do not take into account stickiness, water levels and atmospheric conditions, which are especially difficult for farmers. The Internet of Things (IoT) is slowly revolutionizing various methods, including agricultural companies, even in agricultural production, for example. Solve problems in the field. IoT helps collect data on conditions such as weather, conservation, temperature, and land productivity. Advances in the Internet of Things can reduce the expenses farmers generate every day and increase profitability.

INTRODUCTION

The Internet of Things can be a combination of information and networked activities and is also an important part of the Internet in the long run. IoT focuses on automating processes to reduce human intervention. The goal of agricultural IoT is to make many aspects of agriculture more efficient and effective. Traditional farming methods do not include livestock management and require human relations, labor costs, energy use, water use, etc. It has many disadvantages. Data is received from different sensors and sent to most servers using wireless protocols. The data collected in this process provides information on different environments to evaluate the entire process. Environmental monitoring is not the answer to crop improvement, quality and yield. It is necessary to create an integrated, special system that does everything related to production such as planting, harvesting and post-harvest.

METHODOLOGY

The Internet of Things can be a combination of information and networked activities and is also an important part of the Internet in the long run. IoT focuses on automating processes to reduce human intervention. The goal of agricultural IoT is to make the use of many aspects of agriculture more efficient and effective. Traditional farming methods do not include livestock management and require human relations, labor costs, energy use, water use, etc. It has many disadvantages. Data is received from different sensors and sent to most servers using wireless protocols. The data collected in this process provides information on different environments to evaluate the entire process. Environmental monitoring is not the answer to crop improvement, quality and yield. It is necessary to create a comprehensive and specific program that includes everything related to production such as tillage, harvest and post-

harvest. and I doubt the parliament's output. They don't care about temperature, water level and weather.

are terrible to farmers. the net of things (IoT) is reconstructing the agri-commercial enterprise which enables farmers to pander to demanding situations within the area, as an example via a vast range of strategies, like accuracy and realistic farming.

IoT assists inside the assembling of know-how concerning conditions like weather, humidity, temperature, and soil fertility, a IoT-primarily based examination allows the invention of wild vegetation, water stages, precise area, subject interruption, discipline improvement, horticulture. IoT facilitates in assembling facts IoT makes use of farmers to attach from everywhere to his house. faraway sensors are accustomed track family conditions and smaller controls are wont to manipulate and mechanize the house shapes.

• The sensor community deployed in each phase will preserve updating the parameter readings within the MY-square database thru a WIFI communication module.

• Any changes with the facts that could trigger to set the alarm can also be recorded and notified at the server room.

• The worried authorities or the locals can get admission to the records and the warning notifications of the identical.

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• The information is stored inside the MY-sq. Database known as Hypertext Preprocessor web server, where it is able to be used to make some analysis on fields.
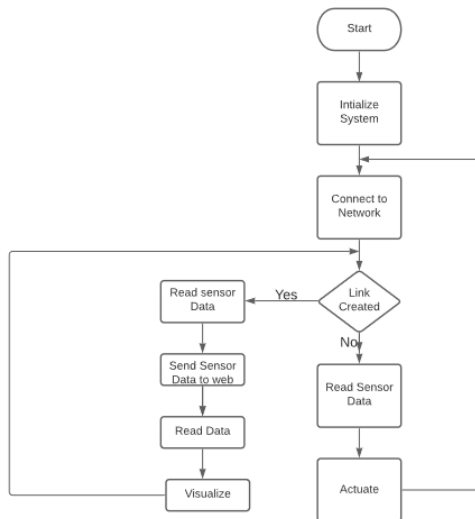

FIG. DATA FLOW DIAGRAM

SYSTEM ARCHITECTURE

• To make a farmer understand the operating of huge labour machines and tech devices we precious and realistic era for monitoring.

• To prevent this smuggling, in this task we use various sensors like soil moisture, temperature, humidity, wi-fireplace, and buzzer sensor. And we use c084d04ddacadd4b971ae3d98fecfb2a verbal exchange cause.

• in this proposed gadget a unique technique has been added to prevent the reduce down of timber using a server referred to as Hypertext Preprocessor web.

• the tilt sensor is used to decide whether or not the tree is reduce down or no longer further temperature sensor is used to decide whether wi-fithe wiwireless is on wiwireless or no longer,

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moisture sensor checks the moisture content material in the soil, and relay transfer activates primarily based at the behaviour of the sensor that's implemented in wirelesselds.

• This price may be continuously despatched to the MY-sq. database through c084d04ddacadd4b971ae3d98fecfb2a which can be accessed using an internet view software.
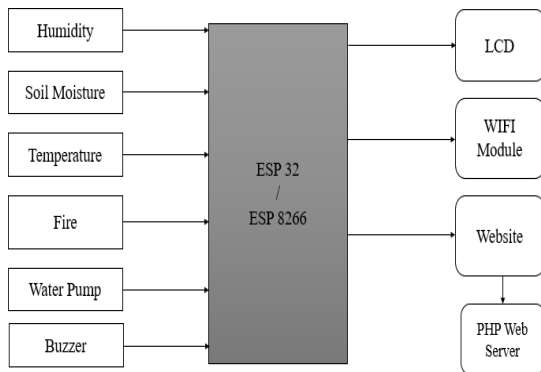

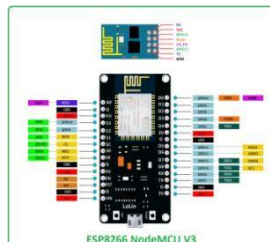Fig. System Architecture

I. MODULES

Fig. Esp32/ESP8266

ESP32 could be a series of a low-cost, low-power systems on chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs either a Ten silica Extensa LX6 microprocessor in both dual-core and single-core variations, Extensa LX7 dual-core microprocessor, or a single-core RISC-V microprocessor and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules. ESP32 is formed and developed by Express if Systems, a Shanghai-based Chinese company, and is manufactured by TSMC using their 40 nm process. It's a successor to the ESP8266 microcontroller.

FIG. TEMPERATURE AND HUMIDITY SENSOR DHT11

The DHT11 is a basic, ultra-low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin (no analog input pins needed).
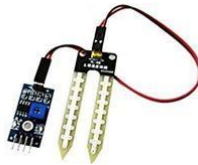

FIG. SOIL MOISTURE SENSOR

A resistive soil moisture sensor works by using the link between impedance and water content to measure the moisture levels of the soil. When the water content within the soil is low, it's poorer electrical

conductivity. Hence, a better resistance reading is obtained, which indicates low soil moisture.

FIG. FIRE SENSOR

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire. Responses to a detected flame depend on the installation but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system. The IR Flame sensor used in this project is shown below, these sensors are also called Fire sensor module or flame detector sensor sometimes.

FIG. BUZZER

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An Arduino buzzer is also called a piezo buzzer. It is basically a tiny speaker that you can connect directly to an Arduino. You can make it sound a tone at a frequency you set. The buzzer produces sound based on reverse of the piezoelectric effect.

FIG. OLED DISPLAY

They are indeed a thing of past. Enter the super-cool OLED (Organic Light-Emitting Diode) displays! They're super-light, almost paper-thin, theoretically flexible, and produce a brighter and crisper picture.

LITERATURE SURVEY

(i)   IOT based totally clever Agriculture monitoring and Irrigation device :

for many days about farmers' losses and farmers used to exercise session the soil maturity and suspicions for the production of yield. They won't fear approximately the temperature, water stage, and absolutely weather situations which are terrible to farmers. The net of things (IoT) is reconstructing the agri-enterprise which permits farmers to address challenges inside the subject, for example thru a wide range of strategies, including accuracy and realistic farming.

(ii)   "wi-fi sensor network survey." computer networks 52.12 (2008) :

unlike other networks, WSNs are designed for specific packages. programs encompass, but are not confined to, environmental monitoring, commercial device monitoring, surveillance systems, and army target tracking. each software differs in functions and requirements. To aid this variety of applications, the development of new verbal exchange protocols, algorithms, designs, and offerings is wanted.

(iii)   Sensor networks: a top level view :

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(iv)   Implementation of a wireless sensor community with EZ430-RF2500 development equipment and MSP430FG4618/F2013 experimenter forums from Texas contraptions :

The ultralow-electricity and low-value gadgets from Texas units. through applying a polling scheme with channelization and Wake-On-Radio, the discount of power intake is finished. the full system energy can be obtained by using measuring every unmarried tool.

(v)   design of wooded area hearth Early Detection device using wireless Sensor Networks :

The protection of nature reserves of wooded area fires is viable with this type of network, because it lets in not best set a parameter for continuous tracking of the signal however on the same time lets in greater sources to optimize along with electricity and the reduction of visitors traits with the administration of huge networks to generate vast benefits for small networks are indistinguishable.

(vi)   A review on partial root-area drying irrigation :

various crop species show ed that in assessment to the traditional deficit irrigation method (DI) that the crop is subjected to a few diploma of water pressure, PRD is correctly alternative irrigation as compared to FI that can store irrigation water up to approximately 50% with out big yield loss, while may additionally improve the yield first-rate.

however, the amount of saved irrigation water and improved WP strongly relies upon on the crop, soil, and placement specifications. furthermore, cumulative effects found out that PRD could not be effective in reproductive plants which might be touchy to water pressure. In such cases the advocated approach is that irrigation occasions should be more common and supplementary complete irrigation should be applied in sensitive phonological periods of crop growth. due to the fact PRD is newly carried out to a few tree species, it is encouraged to do more studies on exceptional types of timber in special environmental situations.

(vii)   real-Time Atomization of Agricultural surroundings for Social Modernization of Indian Agricultural gadget using Arm 7 :

The proposed machine may be very used full for ordinary monitoring of farm reputation without travelling manually and saves time and also use complete to reveal hilly regions and faraway areas, which had been difficult to go to manually. The system not handiest saves energy consumption significantly but additionally reduces a huge number of enter on the human and fabric assets within the management. making use of embedded technology and ZigBee wireless transceiver technology to the speedy deployment device of the incident detection of emergency food garage environment with out complex connections, enhances the device's flexibility, small size, low cost, and properly effectiveness, so it is simple to put in and migrate.

(viii)   electricity-efficient automatic manage of irrigation in agriculture by means of the use of wi-fi sensor networks :

the automated irrigation device proposed is based on the usage of a novel routing protocol named CHIRP. The usage of this protocol gives great electricity efficiency. The development of novel structures, just like the one proposed on this paper, which mixes efficient irrigation fashions along side energy-green utilization of WSNs indicates to be a completely promising and powerful software

of automation in agriculture. The proposed version may be further prolonged to don't forget the impact of the sphere characteristics on the quantity of water required for irrigation.

LITERATURE SURVEY IN SUCCINT

Sr. No	Author and Year	Name of paper	Paper is about	Result	Conclusion / Remark
1	Swaraj C M, K M Sowmyashree (2020)	IoT based Smart Agriculture Monitoring and Irrigation System	The design also helps in decreasing global warming to a grand period.	Inventing in the specialization where the crops are costly are monitored and all the climatic requirements are well preserved essential.	The innate habit of plants is controlled indirectly. The plants can also be saved from fire by use. This in turn helps in decreasing crop obliteration. Thereby, the ecological equilibrium is preserved.
2	Yick, Jennifer, Biswanath Mukherjee, and Dipak Ghosal (2008)	Wireless sensor network survey." Computer networks	WSN applications such as communication architectures, security, and management.	Close the gap between technology and application.	Studied WSN applications such as communication architectures, security, and management between technology and application.

3	Tubaishat, M., & Madria, S. (2003)	Sensor networks: an overview	Sensor networks should sustain network connectivity actually if some of their sensors are transferred.	Sensors are their ability to maintain connectivity in case of movement. As these sensors are very tiny, they are vulnerable to being accidentally moved.	Data produced by the sensors usually have to be routed through several intermediate nodes to reach their destination.
4	Yang, L. D. (2011)	Implementation of a wireless sensor network with EZ430-RF2500 development tools and MSP430FG461 8/F2013 experimenter boards from Texas instruments.	A wireless sensor network is implemented with eZ430RF2500 wireless development tools and MSP430FG4618/F2013 experimenter boards, ultralow-power, and low-cost devices from Texas Instrument.	It can be proved that the temperature displayed on the PC is one period ago for the slave boards and two periods ago for the eZ430RF2500 nodes each time when the display is refreshed.	Every device has to be programmed to sense the temperature immediately after querying.
5	Lozano, C., & Rodriguez, O. (2011)	Design of forest fire early detection system using wireless sensor	Prevention of forest fires using wireless sensor	Protection of nature reserves from forest fires is possible with this type of network.	When deploying network equipment is set correctly selected all measures are and generates

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		networks. Electronics and Electrical Engineering	networks.		alarms when the temperature exceeds the threshold.
6	Sepaskhah, A. R., & Ahmadi, S. H. (2012)	A review on partial root- zone drying irrigation	Wide applications of partial root- zone drying irrigation (PRD) on	PRD is successful alternative irrigation compared to FI that can save irrigation water up to approximately 50% without significant yield	The amount of saved irrigation water and improved WP strongly depends on the crop, soil, and site

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			diverse plant species.	loss, while may improve the yield quality.	specifications.
7	Galgalikar, M. M. (2010)	Real-time automization of agricultural environment for social modernization of Indian agricultural system	ARM7 and GSM are concentrating on automizing the irrigation scheme for the social interest of the Indian farming technique.	The system not only saves energy consumption significantly but also reduces a large number of input on the human and material resources in the management.	Enhances the system's flexibility, small size, low cost, and good effectiveness, so it is easy to install and migrate.
8	Nikolidakis, S. A., Kandris, D., Vergados, D. D., & Douligeris, C. (2015).	Energy efficient automated control of irrigation in agriculture by using wireless sensor networks.	Automatic irrigation managing with an Avant book routing protocol for Wireless Sensor Networks (WSNs), called ECHERP (Equalized Cluster Head Election Routing Protocol).	Raised to evaluate the impact of the area features on the amount of water needed for irrigation.	Efficient irrigation ideals along with energy-efficient utilization of WSNs display to be a very favorable and adequate application of industrialization in farming.

screenshot

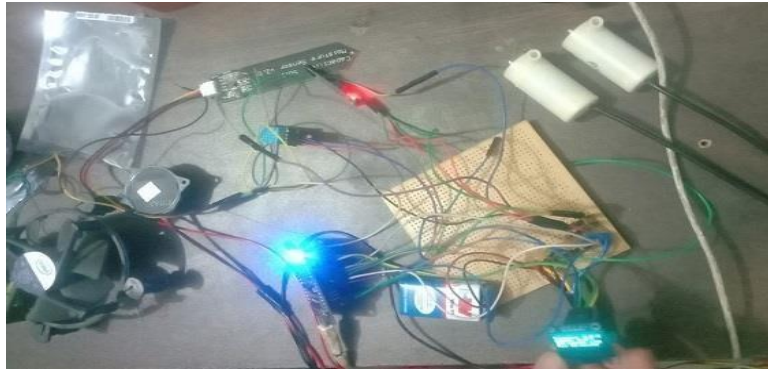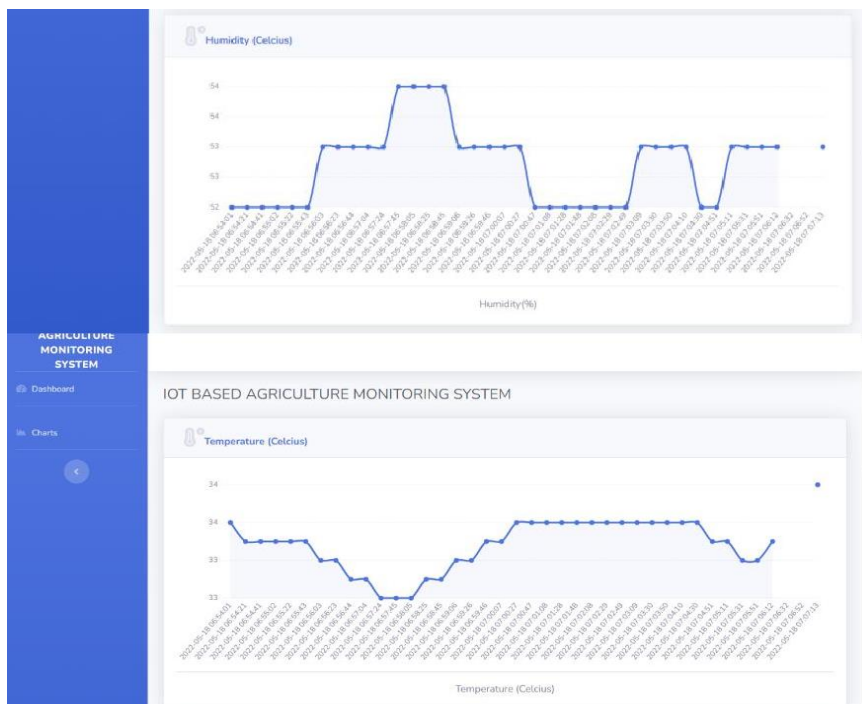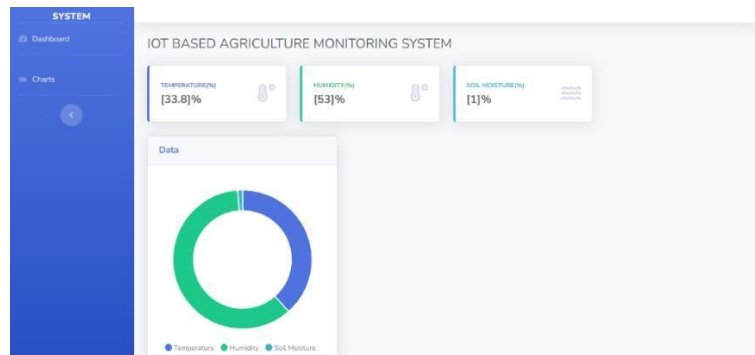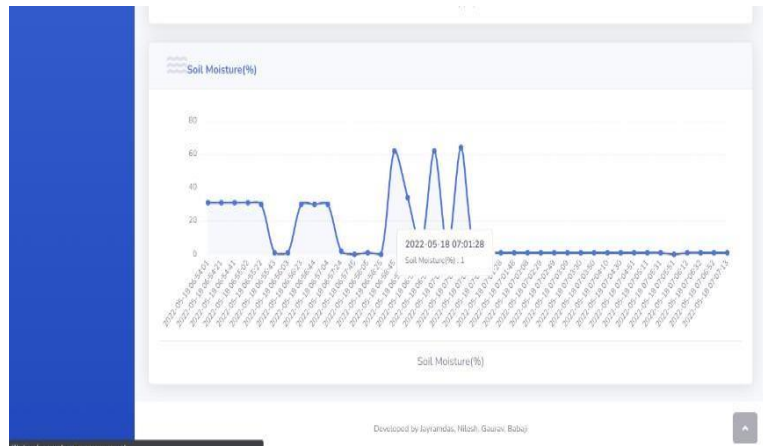All the sensors and hardware components which are interconnected to each other.

Fig. Sensors Connected to Hardware

CONCLUSION

on this way, we are increasing the gadget which equipped to control agriculture tracking in fields wherein loads aren't succesful to produce protection. this type of gadget we are growing in the subject wherein the plants are highly-priced are monitored and each one the atmospheric circumstance is properly maintained important. at some point of this place, we're supplying such a affordable gadget. thus, this effective and dependable gadget helps in agriculture monitoring. besides for the most goal, the gadget additionally facilitates in decreasing warming to an outstanding extent. The natural dependancy of plant life is averted circuitously. The plant life can even be protected against fireplace by using this method. This successively helps in decreasing crop destruction. Thereby, the ecological stability is maintained.

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