IOT Based Smart Agriculture Monitoring System

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IOT Based Smart Agriculture Monitoring System

Baldev Kaur, Manthan Chaudhary, Vipul Pratap Singh and Ayush Kumar

Abstract

Agriculture is the main occupation in our country from many decade. More than 50% population depend on agriculture. It is the main source of income and it also provide food our survival. But now a day's farmers' faced many problems like soil and water erosion, lack of modern equipment and machinery, poor irrigation, inadequate storage facilities etc. So overcome this problem we are adopted smart agriculture techniques using IOT. This technique includes various feature like GPS based remote controlled monitoring, moisture & temperature sensing, proper irrigation facilities and many more. It contains the wireless sensor network for gather the information about soil property and environmental factors continuously.

Introduction

IOT consists of two words internet and things. The full form of IOT is Internet of thing. The IOT describes the network of physical devices or thing that are inserted with sensors software and other technology. These devices gather information and share data with other connected devices. This system has the ability to share the data over a network without requiring human to human or human to computer interaction. IOT has many applications in agriculture. It play important role in development of our country's economics.

History

In 1999 Kevin Ashton proposed the term Internet of thing. The main aim was that connect the each and every thing to the internet & relationship between will be people to people, people to thing and things to things.

IOT based smart farming system

The smart agriculture means uses of new and advance technology like sensors, remote sensing, GPS, GIS, robots and many more for increasing the quantity & quality of the crop. IOT gadget focusing on live monitoring information about environmental factors such as temperature, moisture, humidity and other type depending on the sensors with it. Farmers can easily implement smart farming using by such system on the field and gather live data on various devices like smart phone, computer, tablets etc.

Why IOT for agriculture

- ✓ IOT technology enhance the quantity and quality of produce.

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- ✓ reduce the cost.
- ✓ Its provide the improved irrigation techniques and help to decide the right quantity & right time for irrigation.
- ✓ Soil moisture sensors can help us save water.
- ✓ IOT drives automation to higher level with the help of advance idea.

Application of IOT in agriculture

Monitoring

- ✓ The cameras are used for monitoring the field.
- ✓ Monitoring the soil moisture and temperature.
- ✓ Livestock monitoring.
- ✓ Storage monitoring.
- ✓ Smart fisheries, motion detection with buzz/alarm, and intelligent cameras
- ✓ Aerial monitoring system using drone.

Irrigation

- ✓ In India 55-75% amount of water use for irrigation. Nearly 60% of water waste at the time of irrigation. We can minimize such losses with the help of soil moisture sensors
- ✓ Wireless sensor control water flow in the field. This save the wastage & activated only when soil need water.
- ✓ This gadgets send an alerting message to the farmer when the irrigation level is increase or decrease
- ✓ Soil moisture, leaf wetness, temperature based automation.
- ✓ Remotely operated irrigation system.

Pest management and control work

- ✓ Pest monitoring using infrared sensors.
- ✓ This system can be very useful to the farmers for reducing the damage done by the insect pests.
- ✓ The agriculture internet of thing has a system that detach the motion of predators using PIR sensors.
- ✓ Farmer waste time and energy to destroyed these insects from the field that results in huge loss to farmers.

Automation

- ✓ Advance planting techniques use to sow the seeds.
- ✓ Harvesting techniques for crops readiness detection and automation.
- ✓ Tracking farm product.
- ✓ Mobile money transfer.

Precision agriculture

- ✓ High accuracy is required in term of weather information which reduce the chance of crop damage.
- ✓ Agriculture IOT timely delivery the real data to the farmer through moblie or computer in term of weather forecasting, GPS, GIS, quality of soil, cost of labour.

Food production & safety

Agriculture IOT system monitors the various type of parameters like warehouse temperature, shipping transportation management and also integrates cloud based recording system.

Benefits of IOT in agriculture

1. IOT is an easy way to collection and management of data collect from sensors.
2. Reduced wastage and cost management
3. End-to-production

4. IOT in agriculture focuses on optimizing use of resources like land energy and water

Components and module

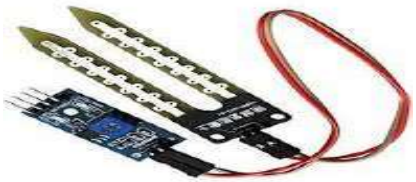
Arduino: The Arduino is based on a microcontroller which is easy to use hardware and software used to build electronics projects. A microcontroller is basically a mini computer. An Arduino is an open source electronics devices. With the help of Arduino we can design and build. It has 14 digital input/output pins 6 can be used as PWM outputs and 6 inputs, a 16 MHz crystal oscillator, a USB connection, power jack, an ICSP header and a reset button.

WIFI modules-ESP8266: The ESP8266 WIFI module is a self contained SOC with integrated TCP or IP protocol stack that can give any microcontroller access to your WIFI network. The ESP8266 is capable of either hosting an application or offloading all wifi networking functions from another application processor.

Sensors

1) **Temperature sensor-DS18B20:** These sensor provide 9 bit to 12 bit Celsius temperature measurement and alarm function with non-volatile user-programmable upper and lower trigger point. The DS18B20 has 64bit serial code which allow multiple DS18B20s to function on same 1-wire bus.

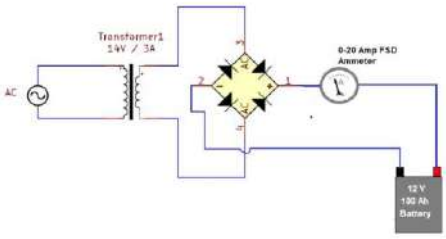
2) **Soil moisture sensor-FC 28:** soil moisture sensor used to measure the moisture in soil and temperature and other similar materials. The sensor has two large exposed pads which function as probes for the sensor, together acting as a variable resistor.



Power supply

1) **Rechargeable battery:** rechargeable batteries are useful when designing connected devices that require higher power capacity than can be accommodated by a non-rechargeable coin cell battery. This battery act as internal power supply for the whole circuit.

2) **Battery charging circuit with transformer:** the circuit as a 12 volt battery for lead battery



External AC adapter

External power adapter are a type of power supply that plug into a wall outlet and convert AC to DC that power certain electronic device.

Conclusion

IOT based smart agriculture system used for live monitoring of temperature, soil moisture and monitoring the other environmental factor. We can conserve ground water through IOT based agriculture. The wastage of water can be control by this techniques. Insects and pest can also be better control by this advance technology. Adopted IOT based agriculture it increase the productivity and better quantity & quality of produce. Famers earn more profit than traditional agriculture. All types of losses reduces by this smart agriculture techniques.

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