Modern Agriculture: Smart Agriculture

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Abstract*: Internet of Things (IOT) sensors are used in the fast developing sector of "smart agriculture" to improve agricultural practises. Farmers may receive real-time data from their fields through the use of IOT sensors, allowing them to make data-driven choices and optimise resource allocation. The feature of this paper includes development of a system which may monitor temperature, level of water, moisture and even the movement if any happens within the field which may destroy the crops in agricultural field through sensors using Arduino UNO board. In this article, the usage of IOT sensors in agriculture is examined, with an emphasis on user engagement and field monitoring in particular. It goes through the benefits of using IOT-enabled smart agriculture, the many types of sensors used, and how touch-based user input may improve farming operations*

Keywords: Internet of Things (IOT), Smart Agriculture using IOT, Arduino, Soil Moisture Sensor, Water levelSensor

I. INTRODUCTION

Smart Farming could be a farming management concept based on modern technology to extend the amount and quality of agricultural products. Farmers within the 21st century have access to GPS, soil scanning, data management, and Internet of Things technologies. The goal of smart agriculture research is to ground a call making web for farm management.

Smart farming is necessary as it handle the problems of increase, temperature watering of crops to health and harvesting.

The need of smart agriculture to expand and develop from what it currently is because this practice will substantially decrease the negative environmental externalities of recent agriculture. Smart cities use Internet of Things (IOT) devices like connected sensors, lights, and meters to gather and analyze data. The cities use this data to enhance infrastructure, public utilities and services, and more. For Farmers, it's difficult for them to know technical terms and usage of technology, and also it's a value effective affair.

II. PROBLEMS

To create an effective decision-making web utilizing a wireless sensor network that can manage various agricultural operations and deliver relevant farm-related data. information pertaining to temperature, humidity, and soil moisture. The weather is to blame for the rising water level. There are many diversions for farmers, which is bad for agriculture. Farmers use that smartphone application to regulate water levels in both Automatic and Manual modes. It will make farming simpler. Agriculture takes a huge amount of time to complete.

It should utilize minimum resources in terms of hardware and value. This overcomes the manual operations required to observe and maintain the agricultural farms in both automatic and manual modes. It should be able to measure the rise or decrease in level of water yet as moisture within the soil.

III. LITERATURE SURVEY

This article explains how Internet of Things (IOT) technology has revolutionized every aspect of the everyday lives of the average person by making everything smart and intelligent. IOT describes a network of autonomously configuring objects. IOT-based intelligent smart farming technologies are changing the face of agriculture production on a daily basis by not only improving it but also making it more efficient, cost-effective, and waste-free. The purpose of this paper is to propose a completely original smart IOT-based agriculture system that helps farmers get real-time data

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(temperature, soil moisture) for effective environment monitoring so they can try smart farming and improve their overall yield and product quality. It should use the least amount of resources possible.
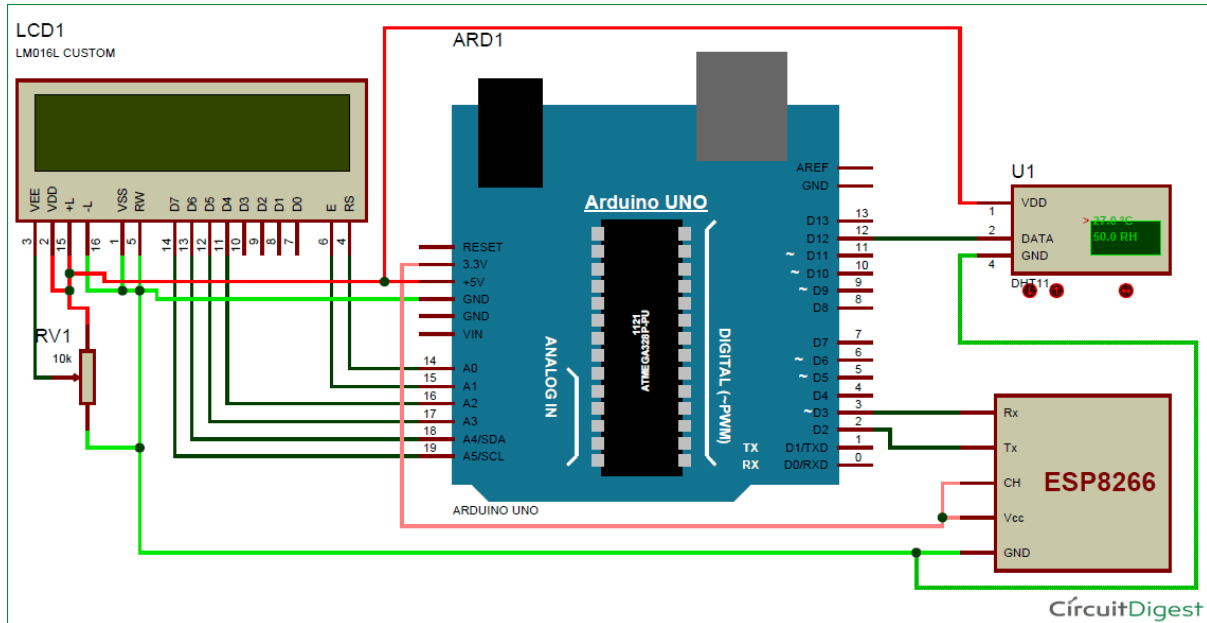

Fig: Arduino & IOT

IV. IMPLEMENTATION

Implementation of IOT in the field of smart agriculture:

The worldwide population is predicted to the touch 9.6 billion by 2050 – this poses a giant problem for the agriculture industry. Despite combating challenges like extreme atmospheric condition, rising temperature change, and farming's environmental impact, the demand for more food needs to be met. to satisfy these increasing needs, agriculture has got to intercommunicate new technology. New smart farming applications supported IOT technologies will enable the agriculture industry to scale back waste and enhance productivity. The application of ICT (Information and Communication Technologies) into agriculture. A system is created for monitoring the agricultural field with the use of sensors (light, humidity, temperature, soil moisture, etc.) in IOT-based smart farming. Farmers may check on the state of the sphere from anywhere.
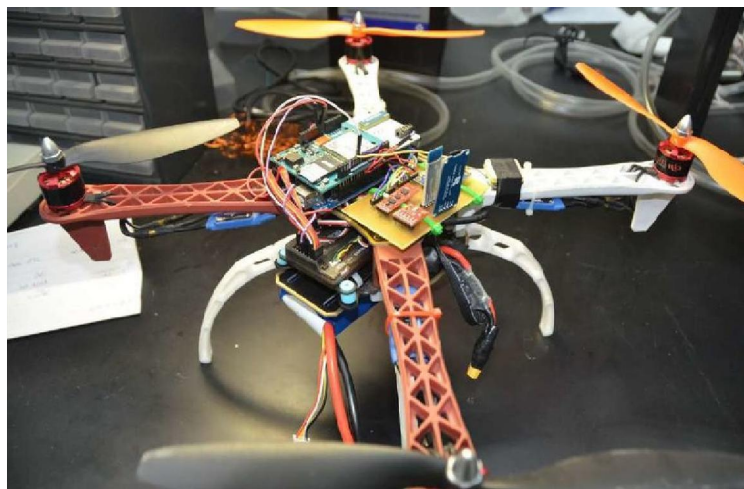

Fig: Connection of IOT with drone top view

4.1 Implementation of Soil moisture sensor in smart agriculture

The amount of water in the soil is measured by soil moisture sensors. Utilized for distant sensing in hydrology and agriculture, reflected microwave radiation is influenced by soil moisture. Portable probe instruments are utilized by farmers and gardeners. Oil moisture sensors aid good irrigation management. Good irrigation management gives better crops, uses fewer inputs, and increases profitability. Soil moisture sensors help irrigators to grasp what's happening within the root zone of a crop.
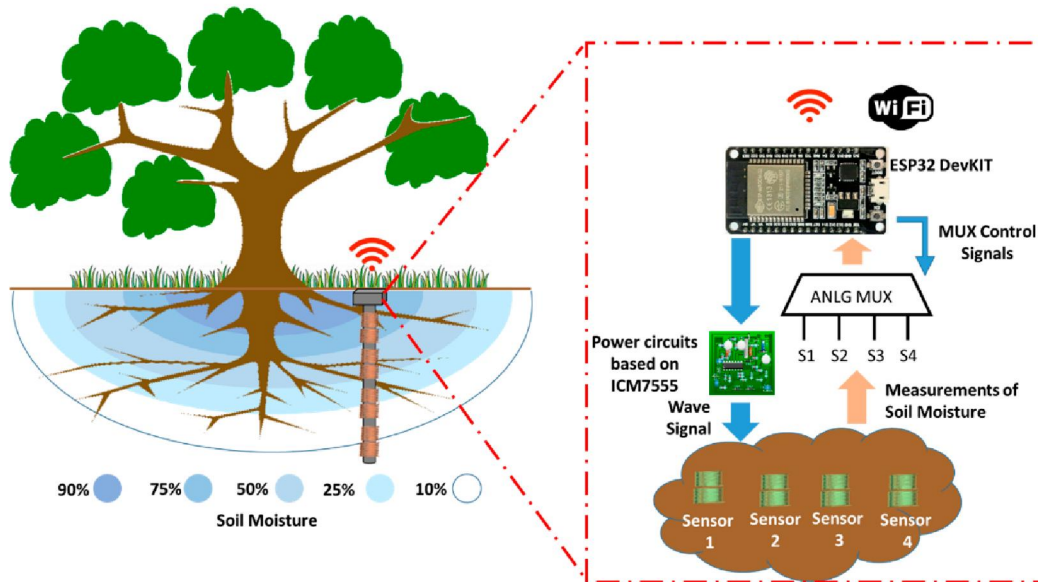

Fig: Soil moisture detection with smart sensor

4.2 Implementation of Water Level Sensor

Water source is critical and a very important think about agricultural and farm production and could be a key of our quality of life further. Monitoring water level of a water source, like tank or bore well etc., plays a key role in agricultural.

The management of water resources, such as cisterns, bore wells, etc., involves regularly checking the water level. Keeping track of water level during a water source will be accustomed preserve water and to check the water us age. Thus monitoring water level is a very important task in agricultural.

V. APPLICATIONS

5.1 Precision Farming
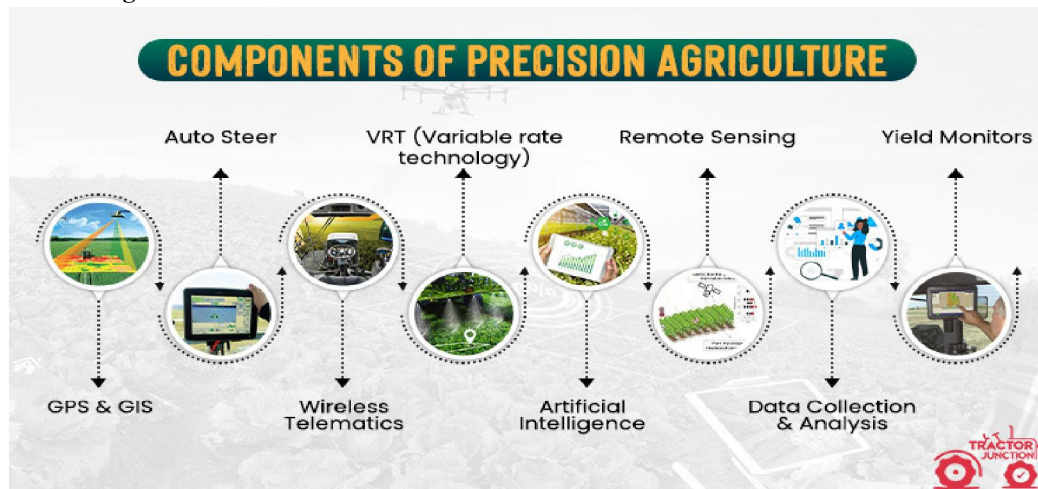
Precision farming, commonly referred to as precision agriculture, is any kind of farming that makes the process of producing animals and cultivating crops precise and under control. The utilization of information technology and several other technologies, including sensors, robots, automated vehicles, control systems, automated hardware, variable rate technology, and others, is a fundamental element of this farming method. Use of IOT technology in Precision Agriculture. The use of high-speed internet, mobile devices, and dependable, affordable satellites (for images and location) by manufacturers is the crucial element of precision farming. One of the most well-known IOT applications in the agricultural industry is precision farming, which is used by several organizations throughout the globe. One illustration is Crop Metrics.

5.2 Drones in Agriculture

In the last several years, technology has advanced dramatically and at a faster rate. Drones for farming are an excellent illustration of this evolution. In the agriculture industry, drones are being utilized to improve several farming techniques. Drones that are ground-based and aerial-based are utilized in agriculture for a variety of tasks including crop health assessments, crop monitoring, pesticide spraying, irrigation, planting, and field analysis. During flight, these drones record multispectral, thermal, and visual images. Drone use has various advantages, including improved crop yields, integrated GIS mapping, time savings, and crop health imaging. Drone technology can transform the agriculture industry when combined with smart strategy and planning based on real-time data collecting.

5.3 Greenhouse Effect

Increased yields of fruits, vegetables, and other crops are a goal of greenhouse farming. By using manual labor or a proportional control system, greenhouses may regulate the environmental conditions. Manual intervention, however, results in a loss of output, a waste of energy, and a cost of labor. Due of this, greenhouses as a whole are useless. The preferable option is thus intelligent greenhouses. With IOT's assistance, a smart greenhouse may be built. The climate is intelligently monitored and managed by these smart greenhouses without the need for any kind of physical assistance.

A smart greenhouse uses a variety of sensors to monitor environmental conditions and determine if they are favorable for plants. The system is linked to a cloud via IOT to create a remote access. As a result, there is no longer any need for ongoing manual

5.4 Climate Condition Monitoring

Crop output is greatly impacted by the climate. Any lack of understanding about climate seriously impairs the quantity and quality of agricultural output. Different crops require different climatic conditions to flourish. IOT systems provide farmers access to up-to-date weather information. Farmers may select a crop that will thrive in a certain climate by using the environmental data that is collected by the sensors installed in agricultural areas.

5.5 Computer Imaging

In this type of imaging, sensor cameras are mostly used to create images that are processed digitally. These cameras are positioned across the farm.

- Quality control: Using photographs from the database to compare with images of crops allows for the conclusion of size, shape, color, and growth, which then allows for the adjustment of quality. Image processing mixed with machine learning.
- Grading and sorting: Sorting and classifying product based on its color, shape, and size can be facilitated using computer imaging. Irrigation Observation: The mapping of irrigated areas is aided by irrigation over an extended period of time. This assists in deciding whether to harvest during the pre-harvest season.

VI. FUTURE SCOPE

Increased production, less environmental effect, and solutions to the problems facing the agricultural sector are all possible with the IOT's potential applications in agriculture. Farmers may increase productivity, sustainability, and profitability in their operations by using IOT technology.

VII. CONCLUSION

IOT reduces the time and resources when compared to manual labor in agriculture with the use of smart technology. Additionally, the system is used to measure field water levels and soil moisture along with climate monitoring, greenhouse effect, computer imaging, etc. When the circumstances are optimal, such as with sufficient lighting or lightning, this approach performs admirably. With the growing population it seems to be agriculture areas will become smaller as a result, and limited natural resources will be depleted. Increasing crop production is therefore imperative. IOT may thus be a significant element in this process. Farmers may spend less time in the fields while still increasing crop yields. The IOT-based ecosystem has a number of uses in the agriculture industry.

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