IoT Based Smart Crop Cultivation

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ABSTRACT:-

Intelligent agricultural systems are a pervasive theme in this materialistic world. This paper describes the concept of providing and disseminating an agricultural platform in the Internet world. Farming is the most important part of human life and can be improvised using IoT technology. IoT technology can improve the performance of agricultural automation systems. An intelligent farming system that utilizes the latest technologies such as Arduino and wireless sensor networks. In this paper, we propose the concept and properties of a sensor world in agricultural IoT that is used to improve crop productivity. The agricultural stick proposed in this document is integrated with Arduino technology, a breadboard and various sensors, and a live data feed can be viewed online via a mobile phone. India Monitoring of environmental conditions is the most important factor for improving efficient crop yields. The feature of this paper is to develop a system that can monitor temperature, humidity, humidity, and even the movement of animals that can destroy crops in the field through sensors using Arduino boards. With energy autonomy and low cost, the system could be useful in geographically isolated areas with limited water.

Keywords: Soil moisture sensor, Temperature sensor, Concept of smart agriculture, IoT

1. INTRODUCTION:

Agriculture is the main industry in India. According to IBEF (India Brand Equity Foundation), 58% of people living in rural India rely on agriculture. According to his second recommended estimate from the Central Bureau of Statistics, agriculture's contribution to GVA (India) is estimated at around 8%, which is a very significant contribution. In such a scenario, the consumption of water, especially freshwater resources, by agriculture would be enormous, with current market research estimating that agriculture consumes 85% of the world's available freshwater resources, with this We believe the ratio will continue to be dominant. To population growth and increased food demand. This requires planning and strategies to use water wisely, taking advantage of advances in science and technology. There are many systems to achieve water conservation in various crops, from simple to more technologically advanced. One existing system uses thermal imaging cameras to monitor plant water conditions and irrigation schedules. Instead of specifying an irrigation schedule, it is also possible to automate the irrigation system by measuring the ground water level and controlling the irrigation actuators as needed. This saves water and uses it more wisely.

The system consists of a microcontroller and sensors such as humidity, temperature, humidity and movement. However, it is not limited to these. The system uses both wired and wireless connections for communication between sensors, microcontrollers, and the internet. The system consists of an Android application that allows the user to provide input based on which irrigation to control. This document uses the concepts of IOT, WSN, and cloud computing to propose an intelligent farming system that enables farmers to plan irrigation schedules for their farms through farm profiles that can be edited on demand. Based on user input, an automated irrigation system is developed that optimizes crop water use. The system features a distributed wireless network for soil moisture and temperature sensors placed in the root zone of plants. Additionally, the gateway unit processes sensor information, controls actuators, and sends data to the web application.

Another important area for IoT is agriculture. In agriculture, IoT systems play an important role in soil and crop monitoring and provide appropriate solutions accordingly. The use of smart agriculture with IoT technology helps farmers reduce waste generation and increase productivity. There are some of his IoT technologies available that work in agriculture. Some of them are:

- Field surveillance drone
- Ground surveillance sensor
- Water pump for water supply
- Daily use machine

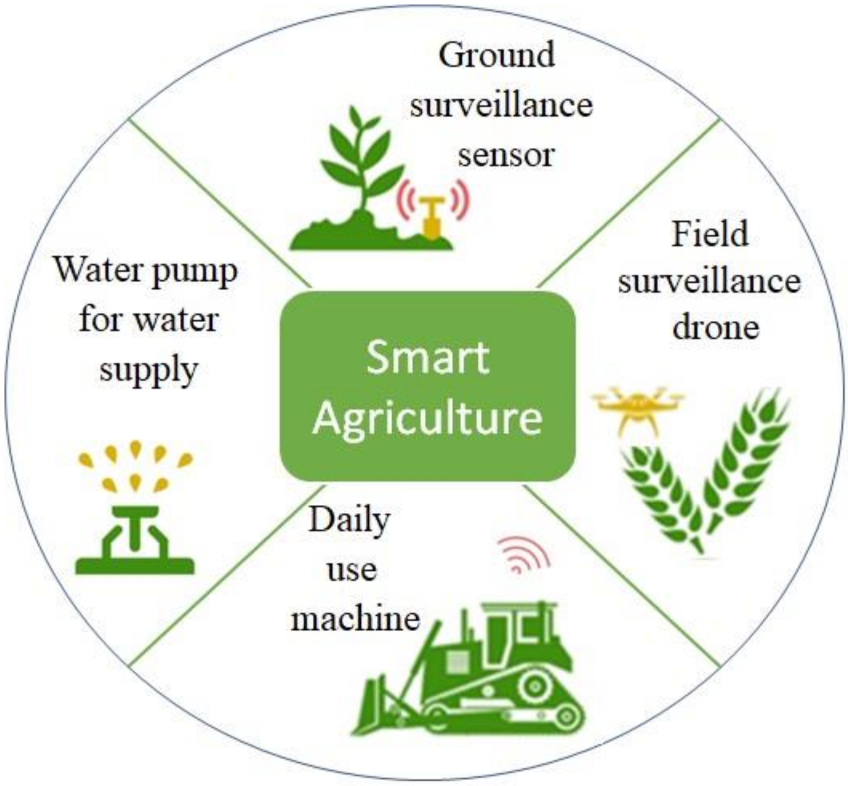

Fig. Smart Agriculture

An algorithm with temperature and soil moisture thresholds was developed and programmed into a microcontroller-based gateway to control water volume. Proper planning of irrigation and fertilization is very important for the proper development of plants.[1-2] Various factors that influence the water demand of plants in different climatic conditions are:

• Temperature

• Humidity

• sunlight

• wind speed

• Passive infrared sensor

• Seed monitoring

• Pesticides.

2. LITERATURE SURVEY

Theory includes a portable wireless data acquisition system for real-time process with dynamic temperature control. In some applications, process variables (temperature, humidity, tilt, IR, fire, soil moisture, etc.) change over time and must be noted or fixed-point control possible [1]. The document provides an 8-bit embedded framework for a temperature sensor node with a WiFi interface [2]. A sensing node in a wireless temperature sensor transmits specific temperature changes to a central processing unit within range. A central base station tracks fluctuations while collecting data and saving it to a file [3][4]. The main topic of this project is the design and development of a low-cost wireless data acquisition system using an embedded 32-bit microcontroller.

The main features of the proposed system are:

• On-site temperature, humidity, tree and water quality monitoring

• To send data to the server over the Internet via the WLAN module

• Can be set up to implement peer-to-peer and multidrop networks by configuring each module to act as a sensor node.

To improve crop quality, we need to use techniques to analyse the essence of crops and provide advice that benefits to both farmers and governments [4]. The Internet of Things (IOT) is revolutionizing agribusiness by enabling farmers to face challenges in the field through a range of techniques such as precision and conservative farming[5]. Using wireless sensor networks in precision agriculture. The advantage of this report is its ability to continuously evaluate various differentiated yield and location factors. Precision agriculture, as the name suggests, is precise both in its resource area and in the stage of transportation of soil, fertilizer, etc[6][7]. The present invention isolates a single plant to ten or several square meters for testing. Accuracy Farming requires new programming models for each land area, characteristic soil conditions, and specific crops. For example, each region is given its own ideal levels of water, compost and pesticides[8][9].

Hourly data collection is generally recommended. Collecting visitor information does not provide useful additional data for product displays, and wireless sensor networks are heavily focused on power consumption and data transmission[11]. For some mild harvests and regions with very stable and stable atmospheric conditions, a small number of ongoing studies may be sufficient[12][13].The paper focuses on developing devices and tools to manage, display and alert users while leveraging wireless sensor network systems[14]. The paper aims to take advantage of the technology under development. B. His IoT and smart agriculture through automation. Monitoring environmental conditions is a key factor in improving efficient crop yields. The paper features the development of a system using Arduino boards that can monitor temperature, humidity, humidity, and even animal movements that can destroy crops in farmland. Cloud computing devices that can create entire computer systems from sensors to tools can be used on farm sites It observes images of the robot and data from people in the field and feeds the data into memory precisely as GPS coordinates[15].

The idea proposes a new smart farming methodology by connecting smart sensor systems and smart irrigation systems with wireless communication technology. How Automated Irrigation Systems to Optimize Crop Water Use Suggest ideas about how it was developed[10]. Additionally, the gateway unit processes sensor information. Designed for IoT-based monitoring systems for analyzing the harvesting environment and how to improve decision-making by analysing harvesting statistics.Image processing is used as a tool for monitoring fruit diseases during cultivation, from plantation to harvest. Variations are found in color, texture and form.

3. RESEARCH METHODOLOGY

In this study, the qualitative technique was used since it is appropriate for problem-centric research. There is a growth in the use of qualitative research techniques in computer studies and the Information Technology discipline, partly because qualitative research offers numerous options to dealing with problem-centric research, such as the experimental method. The experimental technique was used in this study as a qualitative methodology. To find a useful answer to a problem, an experiment is carried out. The response to the experiment's query must be included. Various researchers have different points of view on the study. William I.B.Beveridge, for example, defined experimental research as "a cause of an occurrence to occur under controlled settings in which as many external influences as possible are excluded and close observation is enabled to reveal relationships between phenomena."

4. DESCRIPTION OF TECHNOLOGY AND THINGS OF IOT

In this study, IoT devices can be used to build a sensor network that can be used to continuously monitor farms. , acidity, lighting, etc.) and provides real-time data on land, crops, livestock and equipment. Farmers can choose where to feed water based on data collected from remote sensors. John Deere, the world's largest agricultural equipment company, decided in 2001 to attach his GPS sensors to tractors and other equipment. Sensors attached to moving machinery can be used to take measurements while in motion. Sensors can be implanted in cows to monitor stomach acid and study digestive problems. The intelligent farming model is this research based on Wireless Mesh Sensor Networks (WMSN). WMSN not only makes your hard work easier, but it also speeds things up. In addition, WMSN is highly efficient, requires little power, and has built-in network intelligence. We used Zigbee 5.8 (ALT5802) for wireless communication. This is a compact he 5.8GHz ISM band radio transceiver module with +30dBm transmit power that fully supports ZigBee/IEEE 802.15.4 functionality. In agriculture, implementation of WMSN applications has the potential to increase efficiency, productivity and profitability while reducing undesirable impacts on crops and climate change. The system includes active radio frequency identification (RFID), humidity and temperature sensors. Real-time data on growing areas offer the possibility to make decisions based on expected average conditions. A WSN hub consists of an intelligent sensing device, a microcontroller, and a low-power wireless handset that collects data from the field and transmits it to a remote location. The simulation uses 4 sprinklers, 2 temperature monitors, 2 water level monitors, 2 motion detectors and a buzzer. I have a home gateway where all my devices are connected via WiFi. Several conditions have been established for the activation of these devices. The minimum water level is set to 5 cm. When the water level drops to this level, the sprinklers will automatically turn on. When the water level reaches 10cm, the sprinkler will automatically turn off. The maximum temperature is set at 35 degrees Celsius. When the temperature drops to 35 degrees Celsius, the sprinklers automatically turn on, and when the temperature drops to 25 degrees Celsius, the sprinklers automatically turn off.

The first temperature monitor and first water level monitor control sprinklers 1 and 2, the second temperature monitor and second water level monitor control sprinklers 3 and 4. The buzzer turns on automatically when motion is detected by one of the motion detectors. In our experiments, we used the following for IoT:

A.WSN (Wireless Sensor Network)

A wireless sensor network (WSN) is a sensor and network system that can collect and transmit data from the environment. A wireless sensor network (WSN) is an infrastructure-less wireless network that deploys a variety of wireless sensors ad-hoc to monitor systems, machines, and environmental factors. WSN uses sensor nodes in combination with onboard CPUs to manage and monitor the environment in a specific area. They are connected to base stations that act as processing units for the WSN system. The WSN system's base stations connect to the Internet to exchange data.

B. RFID (Radio Frequency Identification)

RFID is a technology used to tag objects. RFID technology consists of tags that generate radio signals that can be recognized by RFID devices. For example, RFID can be used to tag WSN nodes in the system. It's not always easy to figure out where the signal is coming from. RFID solves this problem. RFID is widely used because it is cheap, easy to implement, and intuitive to use.

C. ZigBee

Zigbee is widely recognized as a mesh networking standard for connecting sensors, equipment, and control systems. It features a packet-based protocol designed to provide a simple architecture for reliable, secure, and low-power wireless networks. Zigbee's importance is due to its low data low cost and low battery consumption. Its main uses are in the fields of home automation, industrial and remote control, medical assistance, and other wireless sensor applications, mainly used for wireless sensors and wireless personal area network (WPAN) applications, sustainable agriculture achieve development. This is very important for implementing automation of agricultural data collection via sensor networks. As already mentioned, Zigbee technology accommodates such data collection and is a very suitable implementation architecture.

5. SYSTEM ARCHITECTURE

To make a farmer understand the working of big labour machines and tech-devices we valuable and realistic technology for monitoring. In order to prevent this smuggling, in this project we use various sensors like tilt, flame, soil moisture, temperature and humidity and infrared sensor. And we use WiFi communication purpose. In this proposed system a novel method has been introduced to prevent the cut down of trees using server called thinkspeak. Tilt sensor is used to determine whether the tree is cut down or not similarly temperature sensor is used to determine whether the field is on fire or not, IR sensor is used to determine object detection, moisture sensor checks the moisture content in soil and relay switch activates based on the behavior of the sensor which are implemented in fields, This value will be constantly sent to cloud through Wifi which can accessed using Thinkview application.

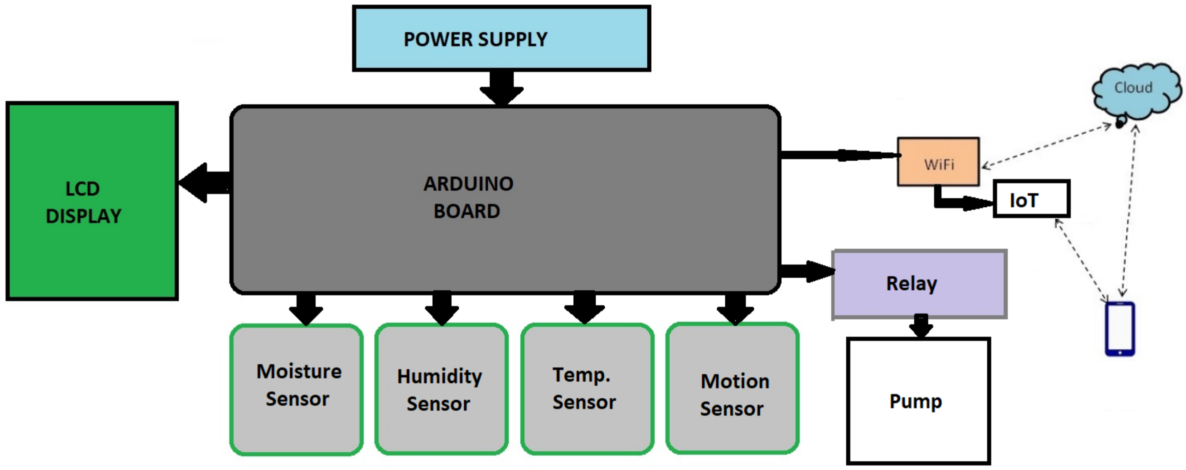

Fig. Block Diagram

6. IMPLEMENTATION

First, we write the code in Arduino IDE then upload the code to the Arduino board. Arduino starts initializing. First, we write the code in Arduino IDE then upload the code to the Arduino board. Arduino starts initializing. Then, we connect all the sensors, wife module, relay switch, bulb, water pump, and Dc fan with Arduino board. At the same time, we are joining the Arduino board and IDE with the help of a data cable. This cable helps provide the received voltage to run the hardware Arduino board and see the serial output. Then once the data is uploaded to Arduino hardware and connected to an Arduino IDE, The project starts to work. Then based on the behaviour of the sensor, the Arduino board starts the operational status of the sensors displayed on LCD. It also sends the data through the Wi-Fi module to a server and monitors its position through a mobile phone.

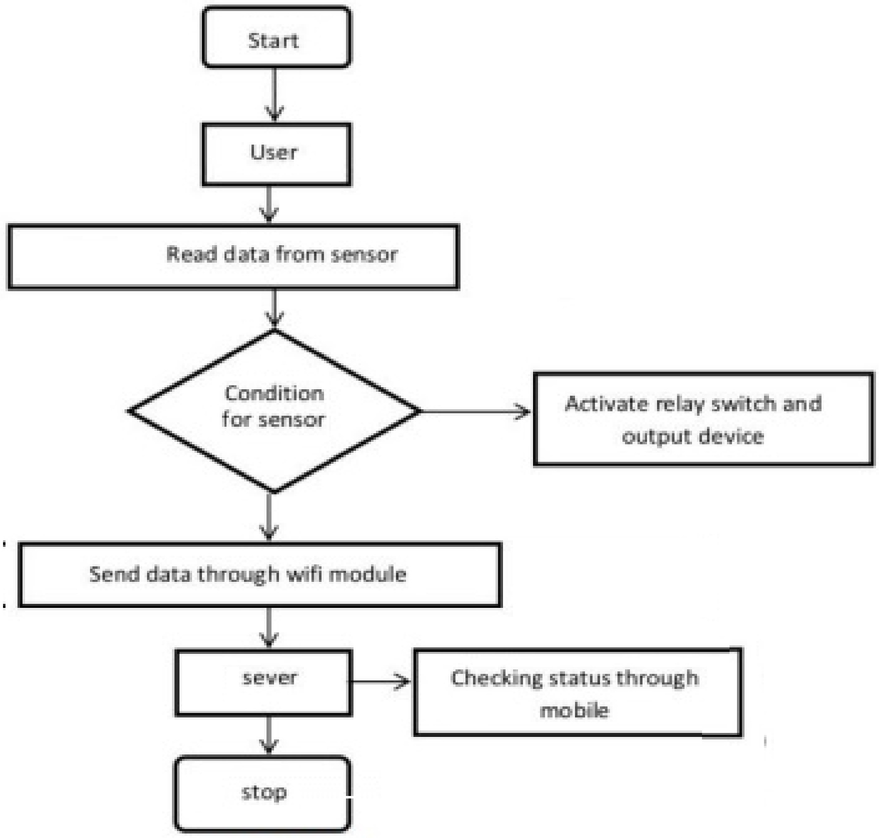

Fig. Flow Chart

Here's how it works:

- The sensor network deployed in each section updates the parameter values in the cloud via the WiFi communication module.
- Changes to data that may trigger alarms are also recorded and notified to the server room.
- Relevant authorities or municipalities have access to the same data and alerts.
- Data stored in the cloud, called ThingSpeak servers, can be used for field analysis.

7. CONCLUSION

In this manner we are increasing the system which able to control the agriculture monitoring in fields where the human being not capable to provide security. Such system we are developing in the field where the crops are costly are monitored and all the climatic conditions are well maintained important. In this area we are provide such kind of system. Thus, this effective and reliable system helps in agriculture monitoring. Apart from the main objective, the system also helps in reducing the global warming to a great extent. The natural habit of plants is prevented indirectly. The plants can also be protected from fire by using this system. This in turn helps in reducing crop destruction. Thereby, the ecological balance is maintained.

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