INTERNET OF THINGS AND CLOUD COMPUTING FOR AGRICULTURE

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By

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ABSTRACT

The development of new technologies in this regard the modern era has led to the formation of small nerves as well attempts to apply them in different areas are successful. Also, the adopting of Internet of Things (IoT) and Cloud like Smart Health Care programs, Smart Cities, Smart Mobility, Smart Grid, Smart Home and Smart Metering etc. One such a research center that also saw these agricultural discoveries and thus made it Smart Agriculture. As agriculture is one of the major source of income for many major countries of many people such as India, China etc. earning money and making subsistence. Integrating IoT with Cloud Computing in the field of agricultural will lead us to better productivity plants by cost control, performance monitoring as well care, thus benefiting farmers and everything nation. This seminar focuses on the introduction of Smart crop management where real-time soil data is compiled with the help of Cloud Computing and IoT technology in building Sustainable Smart Agriculture with all data collected in the field.

Keywords: Agriculture, Internet of Things, Cloud Computing

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LIST OF ACRONYMS AND ABBREVIATIONS

IoT	Internet of Things
PA	Precision Agriculture
WSN	Wireless Sensor Network
SNet	Sensor Network
IaaS	Infrastructure as a Service
PaaS	Platform as a Service
SaaS	Software as a Service
ML	Machine Learning
DL	Deep Learning
NLP	Natural Language Processing
SSCM	Site Specific Crop Management

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Chapter 1

INTRODUCTION

1.1 Introduction

Agriculture is the backbone of national development and India is referred to as an agricultural country because of its marvelous agricultural land and other resources. Over the past years, soil moisture and temperature factors have great impact on agricultural growth, such as crop yield, disease, and crop yield.Solving these problems using limited natural resources requires the deployment of new technologies and different machines or devices such as Internet of Things (IOT) and cloud computing in agriculture.With the help of the detector, actuator and built-in micro controller, you can achieve your goal of creating great objects. These good objects collect knowledge from the development environment, process them and initiate appropriate actions. Connect to the internet via embedded devices, seamless communication is possible between people, processes, and things. Adoption of cloud computing is a new approach that improves cloud hosting capabilities with faster internet speeds, allowing farmers and producers to make smarter decisions, reduce costs, achieve efficiencies, and increase in productivity of the crops.

1.2 Aim of the Seminar

The aim of this seminar is focused on helping farmers by increase the yield and reducing the supply and demand gap, making sure that they receive high production, profitability and security from the environment.

1.3 Scope of the Seminar

To cut off the intermediate people and to make farmers to supply food all wide area, which would make them profitable.For the advancement of this technology, we can introduce the Machine Learning technique and reduce the human load in agriculture

1.4 Methodology

The methodology used here is Internet of Things and Cloud Computing by which we analyse the crops properties and store those data in Cloud Computing for the faster access and anywhere availability.

Chapter 2

LITERATURE REVIEW

[1] It explains about the fundamental of cloud computing with level by level technology and different kind of services provided by cloud computing. It brief about the Attackers and its type and the trust model. Virtual machine trust was evaluated based on continuous monitoring of sessions established between machines.

[2] Reliance can be used to improve the quality of cloud services in many areas, but the cost of reliance calculations are significant an issue to be discussed. To reduce overhead of trust calculation and storage, based on the variables of trust, we propose a model of trust that is appropriate for an unreliable person a cloud based on trust party (TTP) and trust relationships between nodes.

[3] It describe about the IoT components like microprocessor, sensors, actuator, etc., for determining the moisture of the soil, pH and so on in the field of agriculture. It can be used for change the water spray according to soil moisture level thus automating the process of alternative irrigation method. It helps prevent over or under irrigation the soil thus avoids damage to the plants.

[4] It describe about how the precision agriculture technology make us to farm in remote area using drone and condition/requirement of the crops that are being cultivated.It informs the connection problems they face in remote areas as well Lack of financial support is a barrier to Precision's approach Agriculture. Successful adoption of PA includes three categories that include evaluation, analysis and practice.

[5] It delivers about the Cloud computing characteristics, model, benefits in agriculture and different kind of services which could be used by farmers. This will change the whole supply chain, which is in big hands companies, now, but can change into a straight, short series between producers and consumers. Cloud computer technology, which is active in promoting agricultural growth, food, grain, production, economy status, Ensuring food security,

[6] It research was investigated and compared to explore the current problems in agricultural applications based on WSNs and obtain optimum solutions for maintaining system performance. Challenges and limitations were introduced for design considerations in the future. The state-of-the-art approaches of IoT in agricultural applications were reviewed and compared to explore various sensors, actuators, devices, IoT platforms, and application layers.

[7] The area of inquiry deals with the representation of markers in all areas of management. In the cloud context, an integrated approach can be considered there common understanding of tags can negotiate on multiple domains. CamFlow was upgraded with cloud computing

mind. Our future work will investigate the challenges of shared context.

[8] Wireless sensor Networks (WSN) and their technologies, standards and requests have been made. Wireless sensor networks consisting of small nodes with sensors, counts, and wireless communication skills. Many routes, power management, and data distribution processes specially designed for WSNs where power awareness is an important design problem.

[9] It applied through Advanced ARM controls and core processors. And long-term use and implementation of many rooms to improve the situation monitoring can be used including the challenges mentioned above. And future research can focus on energy savings, data integration and other directions.

[10] It proposed a new and standard solution based on a combination of UAV and WSN flexible monitoring from different plant fields. Problems related to the fragmentation of interested regions over a wide area such as the impossibility of fully integrated WSN deployment, large distances to be integrated and continuous monitoring of environmental degradation can be overcome in the proposed manner.

Chapter 3

SEMINAR DESCRIPTION

3.1 Existing System

3.1.1 Weather Tracking and Satellite Imaging

There are online weather services focused exclusively on agriculture, and farmers can access these services with dedicated farm technology and hand-held but also mobile applications running on almost every consumer smartphone. These technologies can give farmers enough advanced warning of frost, hail and other weather conditions so that they can take safety precautions to protect crops or reduce losses on a large scale.

As long-distance satellite imagery becomes more complex, real-time crop photography is allowed. These are not just bird's eye shots but images in a pixel fixation of 5 meters and more. Pictures of plants allow the farmer to inspect the plants as if standing without standing there. Even weekly photo updates can save a farm a lot of time and money.

Advantages

Satellite Imagery can be used for tracking pollution, deforestation, climate change, and land use. Also to monitor weather and the vegetation

Disadvantages

Most satellites can't see everything because clouds block the view and so do tree tops. Ground truthing is used sometimes to double check the satellite images. This causes a lot of time wasting

3.2 Feasibility Study

Technically Sensors, drones, robots should be maintained carefully otherwise unnecessary costs and suspension of work. It may be difficult to do setup and communication between them and the clouds. Economically, The The initial setup costs are high, it will return the profit per year. This is legal but the data should be kept confidential, sometimes it may lead in an unexpected legal case. In practice, It will make the immersion change in the agricultural sector, there is a need for someone to be cared for as well can produce food without wasting waste will eventually increase the wealth of the world.

Chapter 4

METHODOLOGIES

4.1 Wireless Sensor Network

Wireless Sensor Networks (WSN) is widely used in agricultural surveillance to improve quality and productivity of agriculture. Ku this application, sensors collect different types of data (i.e., moisture, carbon dioxide level, and temperature) in real-time conditions.A Sensor network (SNet) is a type of widely distributed system that integrates multiple sensors installed in a competent environment. communication through wireless networks. The function of this distributed system is to collect sensory data and to identify information better describes the surveillance phenomenon. WSN is a wireless network consisting

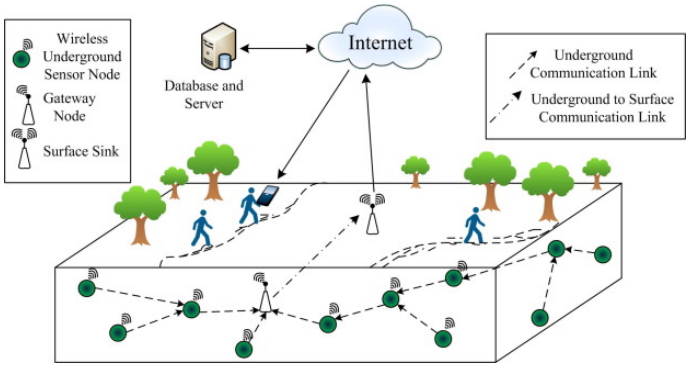

Figure 4.1: WSN Agriculture

of devices that can be distributed locally, called sensors, for monitor-

ing physical or environmental conditions and parameters. WSNs are increasing used in agriculture. They can be used in the following areas: environmental monitoring, precise agriculture, mechanical and process control, automated surveillance of surveillance systems, and monitoring systems.

4.1.1 Sensor

Optical Sensors: It employs light to measure soil properties, various frequencies of light. These sensors placed on vehicles or drones, allowing soil reflectance and plant colour data to be gathered and processed.

Soil Moisture Sensors: It measures moisture levels in the soil. The moisture sensors use in connection with rain check locations throughout the farm. This allows for the observation of soil moisture conditions when vegetation level is low.

Airflow Sensors: Its measurements can made at particular locations while on the go. The desired output is the pressure needed to push a decided amount of air into the ground at a prescribed depth. Various soil properties, including compaction, structure, soil type, and moisture level, produce a different identifying signature.

PIR Sensors: The Passive Infrared Sensor (PIR) sensor is used to measure the receipt of entry. The PIR sensor used in the proposed system is HC-SR501. The minimum voltage required for the operation of this sensor is 5v.

Accelerometer Sensors: Accelerometers detect slight variations in movement and vibration inconsistencies and predict when standard maintenance is required or a compromised component needs replacement.

4.1.2 Precision Agriculture

The world is on the verge of a third modern revolution Accurate farming is an important part of your life. Precision Agriculture (PA), Satellite Farming or Specific Crop Management (SSCM) explains the term 'technology-enabled approach to agricultural management looking at, evaluating, and analyzing the needs of each sector as well crops'. Predictive farming is like taking a pill to identify a disease. Solutions are mostly made with the right kind of plants with a plan to use pesticides only in the target areas. Acceptance to Precision farming reduces production costs and waste, as the corresponding needs of each site are taken into account. Accurate farming is done by adopting analytics software and the use of technology equipment. It's solid Data collection was performed on soil testing, structural measurements, climate pattern analysis and crop analysis using sensory devices by the fields. Data is measured to draw conclusions and be supported for those results a more detailed and accurate set of procedures can be accepted.

Soil/Factor	Moisture	Optical(NVDI)
Average	40-60	0.35-0.6

Table 4.1 Average Soil Level of moisture and NVDI

4.2 Cloud Computing

Cloud computing provides computing services such as servers, storage, websites, networking, software, statistics, and intelligence over the Internet (the ”cloud”) for faster redesign, flexibility, and economics. To do. Normally, you only pay for the cloud services you use. This allows you to reduce operating costs, use your infrastructure more efficiently, and adapt to changing business needs.

Types of cloud services: IaaS, PaaS, serverless and SaaS

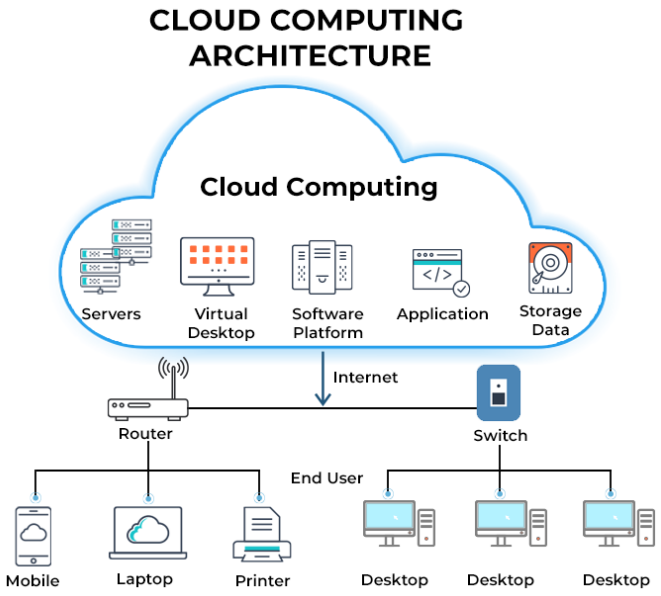

Figure 4.2: Cloud Computing

4.2.1 Software as a Service

Software as a service is a way to deliver software applications online, as needed and usually by subscription. With SaaS, cloud providers host and manage software and basic infrastructure and manage any improvements, such as software development and security amendments. Users connect to the app via the Internet, usually via a web browser on their phone, tablet or PC.

4.2.2 Characteristics

On-demand self-service: The client can provide computer capabilities in combination, such as a server network time and maintenance, as required automatically without the need for personal interaction with each individual service provider.

Broad network access: Skills are available through the network and are accessed in the normal way methods that promote the use of thin or thick client forums (e.g., cell phones, tablets, laptops, and workstations).

Rapid elasticity: Cloud services can be provided quickly and easily, in some cases by default, instant and quick output for quick measurement. For the consumer, the available skills offered are often considered unlimited and can be purchased at any amount at any time.

Measured service: Pay per capita billing capabilities using metered, service charge, or advertising payment model based on promoting efficient use of resources. Examples of measuring storage, bandwidth, and computer resources consumed and charge a number of active user accounts according to the moon.

Resource pooling: The provider uses integrated computer resources to provide more customers using a a multi-employer model, with distinct visual and virtual resources that are powerfully allocated and redistributed according to consumer demand.

4.2.3 Benefits

- Data Readiness any time any where
- Local and global communication
- Improve market price of Food, seeds, other product
- Data availability at any time and at any location without delay

Chapter 5

RESULTS AND DISCUSSIONS

5.1 Problem Faced

Farmers need to deal with many problems, including: How to cope with climate change, soil erosion and loss of biodiversity. Satisfying the transformation of what consumers like and what they expect. Meet the growing demand for high quality extra food. Even common items Irrigation on time, choosing the right fertilizer and manure.

5.2 Solution

With the help of Internet of Things, farmers can detect the availability recourses conditions like , soil temperature and moisture and they can easily deliver the crops without the intermediates, not only in small range as wide range like direct marketing and in shops.Cloud Computing in agriculture used to store and back up the data which is sent by sensor, microprocessor, actuator etc.., Using the previous data, we can analysis the present problems and rectify those problems.

Chapter 6

CONCLUSION AND FUTURE ENHANCEMENTS

6.1 Conclusion

With the help of those average data we can evaluate the current requirement of the crops/plants even better than normal times. Even if it arise any bad situation and gave any bad difference between the current data and average data, we can intimate it to farmer(user) after storing those data in database by Cloud Computing. Using which we can share the availability of plants to the market and demand of price in any of the platform for bulk ordering and even small marketing.

6.2 Future Enhancements

As a scope of future work, NLP based chat bots can be built for farm- ers and more ML, DL and hybrid algorithms can be explored in the agriculture industry for sustainable use of available resources.

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