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Popular Article

USE OF BLOCKCHAIN TECHNOLOGY AND INTERNET OF THINGS IN AGRICULTURE

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Introduction

What is Blockchain Technology?

Databases are currently using ICT (information and communication technology) to track data and manage information flow. The use of blockchain technology to power these databases is a novel concept. They distribute privileges to all network members rather than having a single server and administrator. Multiple parties can then access and validate new database additions, increasing security and lowering the risk of corruption.

How Block-chain Technology Can Revolutionize Agriculture Sector?

Blockchain is a technology that can bring breakthroughs in the Agri sector with its potential. By allowing information to be traced across the agricultural supply chain, blockchain agriculture enhances food safety. The ability of blockchain to store and manage data allows for traceability, which is used to aid in the development and implementation of intelligent farming and index-based crop insurance systems.

Uses of Blockchain Technologies in Agriculture

Blockchain technologies can track all types of information about plants, such as seed quality, and crop growth, and even generate a record of the journey of the plant after it leaves the farm. This data can improve supply chain transparency and eliminate concerns associated with illegal and unethical operations. In the case of a recall, they can also make it easier to track any contamination or other issues back to their source. The primary goals of these technologies are sustainability and food security. When consumers have this amount of transparency, they can make informed purchasing decisions. They frequently utilize this information to reward farmers and producers that implement good farming methods.

Barriers to Using Blockchain Technologies

Concerns have been raised that blockchain technology could be misapplied or misused, putting food security at risk. For example, privately held block chains are easier to



hack and less secure. Because these blockchains are based on private organisation norms, it's easy to see how the wrong people could take advantage of them. Small-scale farmers, on the other hand, who lack the necessary size, technological know-how, and scalability to take advantage of blockchain technology, may be left behind.

Many issues must be resolved before blockchain technology can be completely incorporated into agriculture.

First, blockchain implementation must be decentralized to accommodate small farmers and rural dwellers. Otherwise, food security will remain a problem. Implementation must enable sustainable and equitable food systems, allowing consumers to make better decisions.

Those who lack the digital literacy required to engage in blockchain technology must be educated. This is part of the system's decentralisation process. Because of aged infrastructure and a lack of digital literacy, the world's poor may be unable to participate.

Why blockchain technology can be the game-changer for bolstering farming in India?

While the food goes through many different players on its journey from the farm to the food plate, there is a strong urge by consumers today to know what they are eating. Also, as supply chains have become

longer, any user becomes more concerned about the origin and journey of the produce. Blockchain is the only way that traceability can be brought reliably to farm produce with the distributed market architecture.

IoT devices and sensors are being introduced by agritech companies, and blockchain technology can be used to consolidate data on a variety of topics, including seed quality, crop tracking, and the path of crops from the farm to the market.

Apart from increasing transparency in the food supply chain, blockchain technology can also improve security by prohibiting unethical crop production and distribution, which endangers farmers' livelihoods.

Consumers will be able to make more educated decisions thanks to blockchain's data collection, and they may even be able to help small-scale farmers who are often in need of food and financial security.

Before the data can be preserved, it must first be formatted and made comprehensible. Blockchain technology makes it easier to add meta information to data and structure. It can be saved after that, making compliance enforcement easier. Data compliance ensures that the information gathered is kept secure and secured.

What is IOT?

The Internet of Things refers to the rapidly growing network of connected objects that



are able to collect and exchange data in real time using embedded sensors.

What is smart agriculture?

Smart agriculture is mostly used to denote the application of IoT solutions in agriculture. So what is smart agriculture using IoT? By using IoT sensors to collect environmental and machine metrics, farmers can make informed decisions, and improve just about every aspect of their work – from livestock to crop farming.

The adoption of IoT solutions for agriculture is constantly growing. COVID-19 has had a positive impact on IoT in the agriculture market share. Disruptions in the supply chain, and the shortage of qualified workers, has propelled its CAGR to 9,9%. In fact, as per recent reports, the smart farming market share is set to reach \$6.2 billion by 2021.

At the same time, the global smart agriculture market size is expected to triple by 2025, reaching \$15.3 billion (compared to being slightly over \$5 billion back in 2016). Because the market is still developing, there is still ample opportunity for businesses willing to join in.

IoT use cases in agriculture

There are many types of IoT sensors for agriculture as well as IoT applications in agriculture in general.

Monitoring of climate conditions

Probably the most popular smart agriculture gadgets are weather stations,

combining various smart farming sensors. Located across the field, they collect various data from the environment and send it to the cloud.

Greenhouse automation

The use of IoT sensors enables them to get accurate real-time information on greenhouse conditions such as lighting, temperature, soil condition, and humidity. In addition to sourcing environmental data, weather stations can automatically adjust the conditions to match the given parameters. Specifically, greenhouse automation systems use a similar principle.

Crop management

Just like weather stations, they should be placed in the field to collect data specific to crop farming; from temperature and precipitation to leaf water potential and overall crop health. You can monitor your crop growth and any anomalies to effectively prevent any diseases or infestations that can harm your yield.

Cattle monitoring and management

Just like crop monitoring, there are IoT agriculture sensors that can be attached to the animals on a farm monitoring their health and log performance. Livestock tracking and monitoring help collect data on stock health, well-being, and physical location.



For example, such sensors can identify sick animals so that farmers can separate them from the herd and avoid contamination.

Precision farming

Also known as precision agriculture, precision farming is all about efficiency and making accurate data-driven decisions. It's also one of the most widespread and effective applications of IoT in agriculture. By using IoT sensors, farmers can collect a vast array of metrics on every facet of the field microclimate and ecosystem: lighting, temperature, soil condition, humidity, CO2 levels, and pest infections. This data enables farmers to estimate optimal amounts of water, fertilizers, and pesticides that their crops need, reduce expenses, and raise better and healthier crops.

Agricultural drones

Perhaps one of the most promising agritech advancements is the use of agricultural drones in smart farming. Also known as UAVs (unmanned aerial vehicles), drones are better equipped than airplanes and satellites to collect agricultural data.

Predictive analytics for smart farming

Precision agriculture and predictive data analytics go hand in hand. While IoT and smart sensor technology are a goldmine for highly relevant real-time data, the use of data analytics helps farmers make sense of it and come up with important predictions: crop harvesting time, the risks of diseases and infestations, yield volume, etc. Data

analytics tools help make farming, which is inherently highly dependent on weather conditions, more manageable, and predictable.

End-to-end farm management systems

A more complex approach to IoT products in agriculture can be represented by the so-called farm productivity management systems. They usually include a number of agriculture IoT devices and sensors, installed on the premises as well as a powerful dashboard with analytical capabilities and in-built accounting/reporting features. This offers remote farm monitoring capabilities and allows you to streamline most of the business operations. In addition to the listed IoT agriculture use cases, some prominent opportunities include vehicle tracking (or even automation), storage management, logistics, etc.

Smart Agriculture System Using IOT

IoT device includes every object that can be controlled through the Internet. IoT devices have become commonplace in consumer markets with wearable IoWT (Internet of Wearable Things), such as smart watches, and home management products, like Google home. It is estimated over 30 billion devices could be connected to the Internet of Things by 2020.

The applications of Internet of Things in agriculture target conventional farming operations to meet the increasing demands



and decrease production losses. IoT in agriculture uses robots, drones, remote sensors, and computer imaging combined with continuously progressing machine learning and analytical tools for monitoring crops, surveying, and mapping the fields, and provide data to farmers for rational farm management plans to save both time and money

Agriculture implements IoT through use of robots, drones, sensors, and computer imaging integrated with analytical tools for getting insights and monitor the farms. Placement of physical equipment on farms monitors and records data, which is then used to get valuable insights.

What are infrastructure requirements for adopting a smart agriculture system using IoT?

- The high initial investments in sensors, drones, and bots and their setting up
- Hiring well-trained field staff for operating and management
- Connectivity to power to charge and operate the drones and robots
- Hardware maintenance costs
- Continuous connectivity to the internet

How easy is it to operate agricultural IoT?

IoT in agriculture uses technology which integrates sensitive physical hardware with analytical software. Analytical dashboard is mostly software that is processing the data recorded by equipment. Hence, a sound

technical knowledge of robotics and computer-based intelligence is a prerequisite for operating, maintaining, and understanding the insights of these valuable equipment.

Related resources

IoT Adoption in Indian Agriculture: A 2020 Landscape

Leveraging IoT to improve water efficiency in agriculture