IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

## IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 4, April 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 4, April 2024 ||

DOI: 10.15680/IJIRCCE.2024.1204178 |

# Blockchain Technology for Agricultural Supply Chain

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**ABSTRACT:** The project aims to use an IoT network and Blockchain security technology in the agriculture food supply chain. The IoT network will sense food quality on farms and report to the nearest cluster head, which will then report to a base station. The base station will collect food quality data from the cluster head and store it in decentralized Blockchain nodes. This data can be accessed by various users, including distributors, suppliers, farmers, and consumers. Existing techniques use a centralized server, which can be hacked by malicious users, resulting in incorrect or fake data. Blockchain technology addresses this issue by supporting decentralized storage at multiple nodes, where each block stores data as a transaction block with a hash code. If an incorrect hashcode is reported, the node is considered attacked and data is collected from genuine nodes.

**KEYWORDS:** Block chain technology, agricultural applications, hash code, Internet of things ()

## I. INTRODUCTION

Blockchain is a decentralized technology that ensures secure, transparent, and tamper-resistant transactions. It operates on a network of computers, reducing the need for a central authority. Transactions are grouped into blocks, ensuring integrity. Consensus mechanisms like Proof of Work and Proof of Stake validate transactions. Blockchain's applications include digital currencies like Bitcoin and Ethereum, finance, supply chain management, and healthcare. Its key components include decentralization, immutability, transparency, and smart contracts.

Blockchain technology has the potential to transform the agricultural supply chain into a more transparent, efficient, and trustworthy system. It improves food safety by allowing traceability across the food supply chain, enabling intelligent farming and index-based crop insurance. Blockchain technology can be applied in four broad categories: Intelligent Farming, Food Supply Chain, Insurance for Agriculture, and Agricultural Product Transactions. Smart agriculture, which incorporates ICT, IoT, sensors, machine learning, and data collection equipment, can be made more efficient and reliable with the right security system.

Blockchain technology is being used in smart agriculture to maintain data openness, ensure irreversible statistics, and facilitate data delivery to stakeholders. It has led to smart farming models, smart farming technology, and improved food supply chains. Blockchain technology helps establish trust between producers and customers, addressing challenges like food safety, quality, traceability, and inefficiencies. Consumers benefit from trustworthy information about food production, while regulators benefit from reliable information for efficient regulations. Companies like Wal-Mart, JD.com, and Alibaba are implementing blockchain-based traceability initiatives.

Climate change has increased uncertainty in agriculture, leading to the use of agricultural insurance systems. Blockchain technology can enhance index-based insurance by providing a more accurate and timely payment based on quantifiable indicators. Etherisc, a Swiss company, uses smart index insurance contracts to improve dependability. Blockchain can also speed up the acquisition and sale of agricultural products on ecommerce sites, improving data security and supply chain management. It can also help improve food safety, quality, and traceability in the agricultural supply chain.

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Blockchain technology in agriculture offers benefits such as transparency, analytics, security, streamlined operations, and customer engagement. It enables peer-to-peer transactions without intermediaries, restoring trust and lowering transaction costs. Blockchain can record every stage of a product's value chain, providing verifiable data for data-driven facilities and insurance solutions. However, challenges include the need for further study on motivations, accessing expensive data, and integrating with existing legacy systems. Knowledge Hut Blockchain Quality Engineer training can help understand these concepts in depth.

Blockchain technology in agriculture can help eliminate counterfeit food, improve food safety, and enhance agricultural insurance. Distributed ledgers and smart contracts can improve product traceability, quality control, and storage conditions. Blockchain can also enhance agricultural finance, providing transparency for smallholders and ensuring fair market pricing. Additionally, it can help agribusinesses adhere to environmental standards, demonstrating their commitment to climate-friendly farming methods.

## II. LITERATURE

**[1] Aiken A. Zooming in on privacy concerns: Video app Zoom is surging in popularity. In our rush to stay connected, we need to make security checks and not reveal more than we think. Index Censorsh. 2020;49(2):24–27.**

Zoom, a popular videoconferencing app, has experienced rapid growth during the Covid-19 lockdowns, with daily virtual meetings reaching 300 million participants. However, concerns over privacy have been raised, with concerns over "Zoom-bombing" and the potential for data interception. Businesses have experienced online meetings hacked, and data-scraping has occurred, with users' LinkedIn profiles being cross-referenced and publicized. The company has been branded "malware" and a "privacy disaster" by security researchers. The data stored on USA servers is vulnerable to national security letter requests, and the western intelligence community fears foreign surveillance. Governments in countries like Germany and Taiwan have banned Zoom use for work purposes.

**[2] Bermeo-Almeida O., Cardenas-Rodriguez M., Samaniego-Cobo T., Ferruzola-Gómez E., Cabezas-Cabezas R., Bazán-Vera W. International Conference on Technologies and Innovation, 6-9 November 2018. Guayaquil; Ecuador: 2018. Blockchain in agriculture: a systematic literature review; pp. 44–56.**

Blockchain technology is increasingly being applied in agriculture to improve food safety and transaction times. A systematic literature review (SLR) was conducted on 10 primary studies published between 2016 and 2018, focusing on the application of blockchain in agriculture. The majority of the studies were dominated by Asian researchers, particularly from China, and focused on the challenges related to privacy and security of the Internet of Things (IoT). The study aims to identify research topics, main contributions, and benefits of blockchain in agriculture, with future work aiming to include a wider range of digital libraries and evaluate the effectiveness of proposed solutions.

**[3] Brewin D. The impact of COVID-19 on the grains and oilseeds sector. Can. J. Agric. Econ. /Rev. Can. Agroecon. 2020; 68:185–188.**

Brewin (2020) optimistically predicted the Canadian grains and oilseeds sector's success in 2020 amidst the COVID-19 pandemic. The sector generated a large crop and saw a lift in prices, contributing to record farm income in Canada. The pandemic did not significantly affect grain and oilseed exports or ethanol demand, but the forecast of a "near normal" 2020 was accurate. Production and prices remained on track due to no new barriers to trade and distanced labor in the supply chain. Global demand remained the dominant price factor, possibly stimulated by deficit budgets. Canada's past participation in trade and safety protocols allowed the sector to earn a good income. The recent spikes in grain and oilseed prices may lead to increased input use and large crops in 2021, making supply chain coordination crucial.

## III. PROPOSED SYSTEM

**Algorithm**

In propose work we are using IOT networks and this IOT network consists of following operations

**Generate Network:** using this module IOT network will get setup

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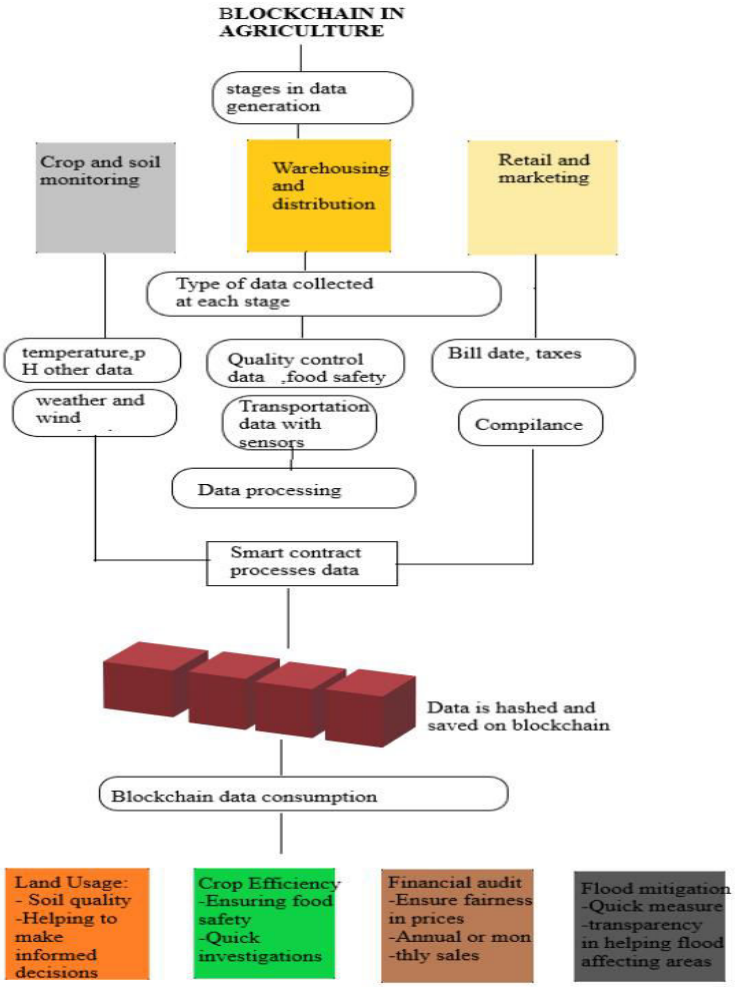


**Cluster Head Selection:** all IOT networks exchange there available battery power and then check which IOT covering more number of nodes and can reached to base station with less energy consumption then that node will be elected cluster head.

**Collect Data:** using this module IOT will collect/sense food data from agriculture farm.

**Data Transmission Routing Phase:** using this module IOT will find shortest path to reached cluster head and then transfer data to selected cluster head. CH will send data to base station. Base station will collect data and then store in Blockchain node. Blockchain store each data as block of transaction and will generate hashcode for verification

**View Blockchain Data:** various users such as consumer, farmers, distributors and many more users may use this module to retrieve data from Blockchain and view it. In this project they have used IOT sensors and agriculture field but we don't have any sensors so we built this concept as simulation.

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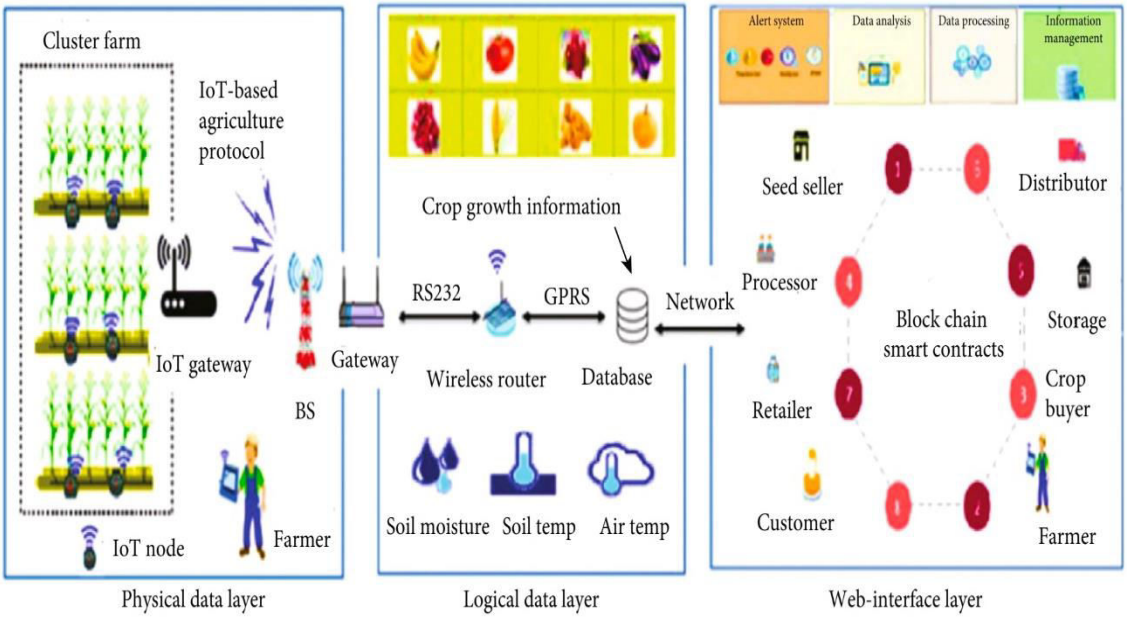
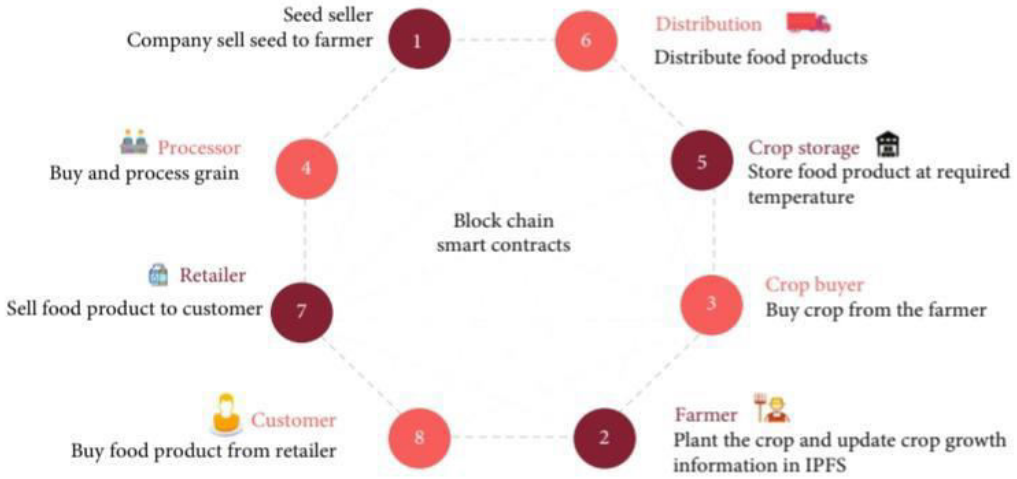



**Block Chain Integration with IoT in the Smart Model**

Exclusive blockchain characteristics will combine agricultural and food supply chain processes into a single smart system to ensure that consumers receive healthy food. Figure 7 shows a functional overview of the blockchain




The role of stakeholders in the overall system is also discussed. The research used blockchain smart contracts to exchange data between mining nodes in the system. All business transactions are recorded in the shared ledger by mining nodes, and smart contracts receive all transactions in the blockchain in the form of function calls and generate activities, as well as providing access to parties involved in the transaction to exchange control track and receive alerts in the event of a violation. Finally, smart contracts help to maintain the best conditions and respond to food supply chain misappropriations.

**IoT-Based Agriculture Protocol for the Smart Model**

IoT nodes are ideal for cluster farms because they consume less energy than WSN and can be further reduced through an efficient clustering protocol. Therefore, this research proposed a new clustering protocol IoT-based agriculture, as shown in Figure 8, based on the LEACH protocol, to reduce energy consumption and extend network life.

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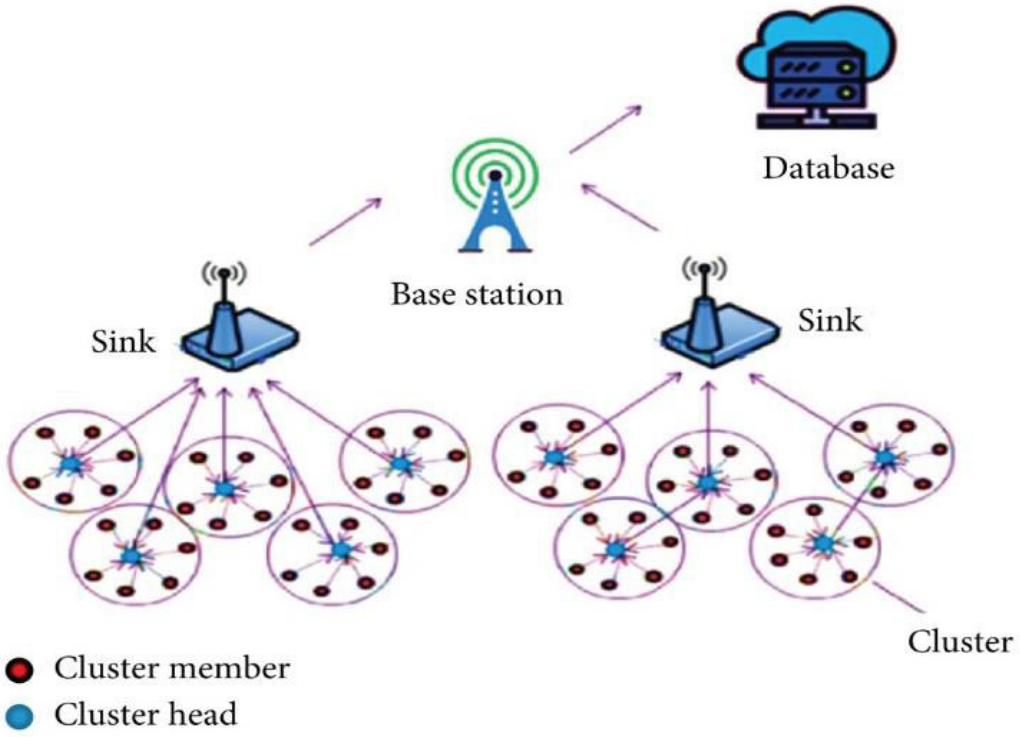
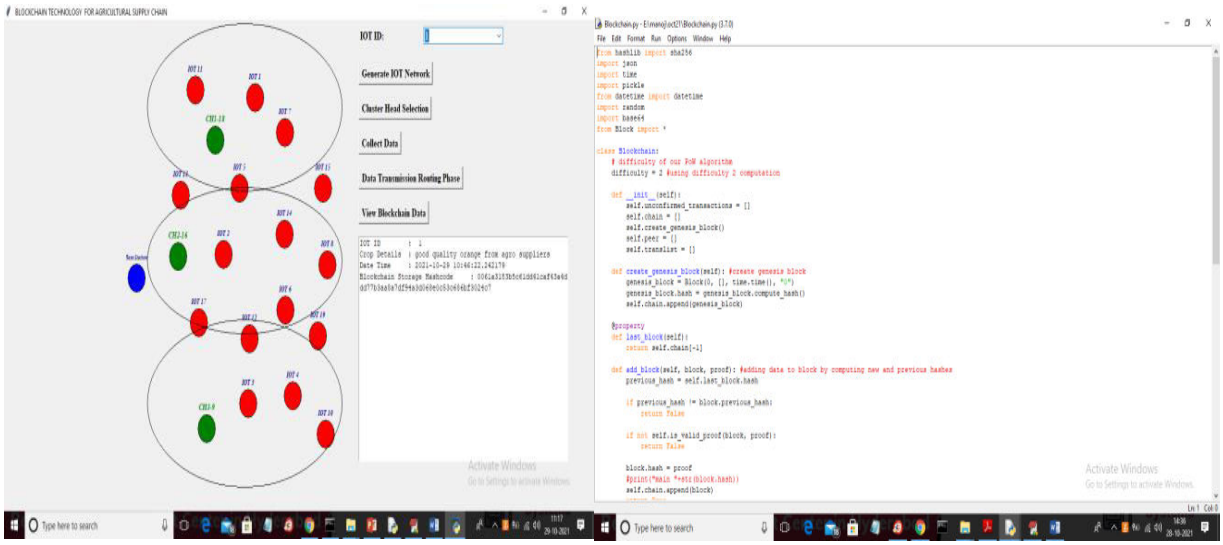



## IV. RESULT

The project aims to use an IoT network and Blockchain security technology in the agriculture food supply chain. The IoT network will sense food quality on farms and report to its nearest cluster head, which will then send the data to a base station. The base station will collect data from the cluster head and store it in decentralized Blockchain nodes. This data can be accessed by various users, including distributors, suppliers, farmers, and consumers. Blockchain technology helps detect and secure data by storing data at multiple nodes, with each node storing data as a block of transaction. The project uses IoT networks to generate networks, select cluster heads, collect data, transfer data, and view the data. The project uses IoT sensors in the agriculture field, but the concept is built as a simulation.



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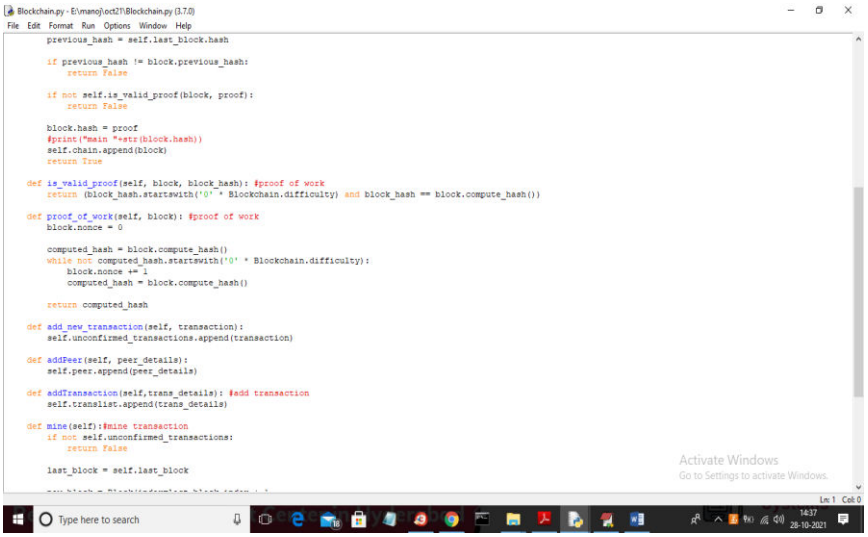


## V. CONCLUSION

Above Blockchain technology helps in detecting attack nodes and make data secured. In propose work we are using IOT networks and this IOT network implemented following operations successfully, Generate Network: Cluster Head Selection: Collect Data: Data Transmission Routing Phase: View Blockchain Data: In this project we have used IOT sensors and agriculture field but we don't have any sensors so we built this concept as simulation and analyzed successfully.

## REFERENCES

[1] Aiken A. Zooming in on privacy concerns: Video app Zoom is surging in popularity. In our rush to stay connected, we need to make security checks and not reveal more than we think. Index Censorsh. 2020;49(2):24–27.
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