

# BLOCKCHAIN

*Crypto Insights*

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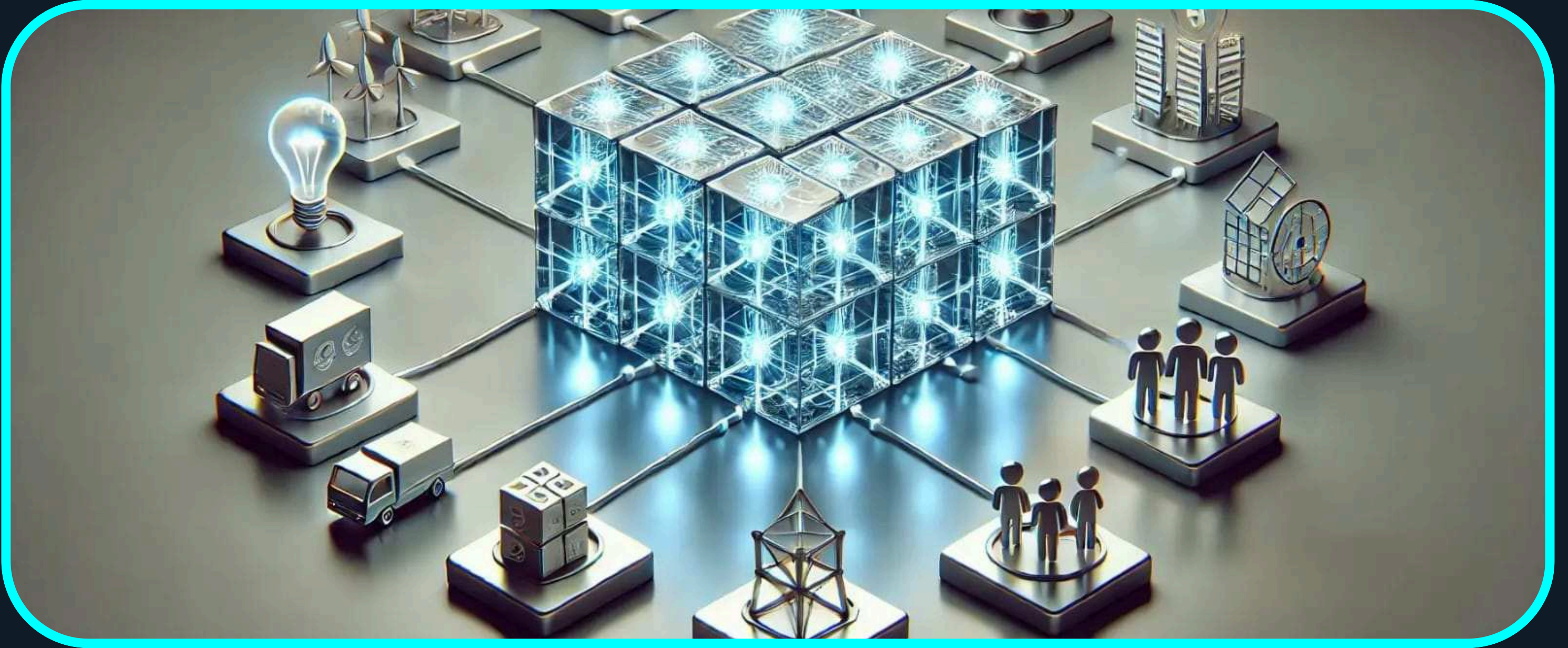
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## INTRODUCTION TO BLOCKCHAIN



Blockchain technology has been gaining popularity in these recent years. We all can see its popularity in tech news, in the words of tech students, in educational websites and much more. So, let's know about blockchain

A blockchain is a distributed database among computer network's nodes. In its simplest form, a blockchain is a distributed list of transactions that is constantly updated and reviewed. It is also known as Distributed Ledger Technology (DLT).

### • WHAT DOES A BLOCKCHAIN LOOK LIKE?

A block in a blockchain is like a block full of data linked in a virtual chain. You can think of a blockchain as a train consisting of multiple carriages connected in a line, where each carriage contains an amount of data. Apart from data, each block contains timestamp, and so it's clear when the data was recorded and stored.

### • IS THERE ONLY SINGLE MASTER COPY OF A BLOCKCHAIN?

There is not a single master copy of a blockchain. Instead, every node maintains their own copy of the blockchain, and constantly checks with other nodes to make sure everyone has the same record of data.

If a hacker group wanted to manipulate any transaction on a blockchain, they would have to break into the device of every single network contributor around the world and change all records to show the same thing.

If one wants to develop blockchain application then it involves multifaceted approach. Besides this, one of the first considerations in blockchain development is the type of network to be deployed. Public blockchains are open and permissionless. They allow anyone to participate in the network and view the transaction history

Private blockchains are permissioned environments. Authorised participants can only access it. This is suitable for enterprise applications where privacy and regulatory compliance are crucial.

This was just the one part about blockchain. Explore the next topics and have a fun learning!



**TEJASWINI NAYYAR** (BCA 2ND YEAR)

## HEADLINES ON BLOCKCHAIN

### CASE STUDY 1: BLOCKCHAIN IN SUPPLY CHAIN MANAGEMENT

One of the most impactful applications of blockchain technology is in supply chain management. IBM and Walmart partnered to create a blockchain-based system that tracks food products from farm to table. By utilizing this technology, Walmart can trace the origin of food items within seconds, improving food safety and reducing waste. This case study highlights how transparency in the supply chain can enhance consumer trust and facilitate quicker responses to foodborne illnesses.

### CASE STUDY 2: BLOCKCHAIN FOR DIGITAL IDENTITY

In India, the government launched the “Aadhaar” program, which aims to provide a unique digital identity to citizens. Recently, a pilot project utilized blockchain to secure the Aadhaar data, ensuring its integrity and reducing the risk of identity theft. This approach not only empowers citizens with greater control over their personal information but also streamlines various governmental services, showcasing blockchain’s potential to improve public administration.

### CONCLUSION: THE FUTURE OF BLOCKCHAIN TECHNOLOGY

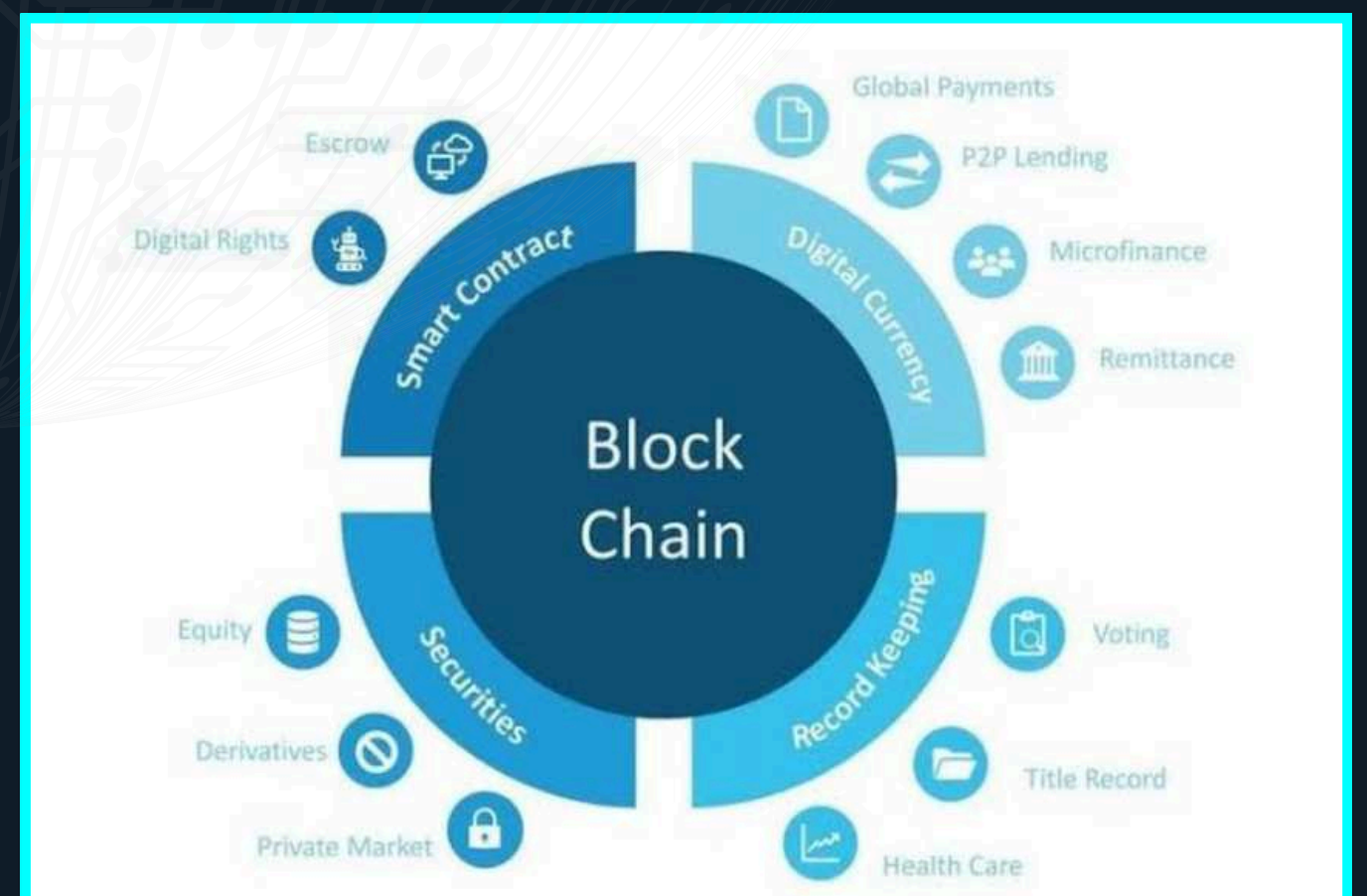
As blockchain technology continues to evolve, its applications across various sectors are becoming more pronounced. From enhancing supply chain transparency to securing digital identities and revolutionizing financial systems, the potential is vast. Staying informed about these developments is crucial for IT professionals and students alike, as blockchain is likely to play a pivotal role in shaping the future of technology.

### RECENT NEWS: CENTRAL BANK DIGITAL CURRENCIES (CBDCS)

Central banks worldwide are exploring the implementation of Central Bank Digital Currencies (CBDCs) to modernize financial systems. In September 2023, the European Central Bank announced its plans to launch a digital euro, aiming to provide a secure and efficient payment method. This move is expected to enhance cross-border transactions and promote financial inclusion. Countries like China have already made significant strides with their digital yuan, setting a precedent for other nations.

### EMERGING TRENDS: BLOCKCHAIN IN EDUCATION

Blockchain technology is also making waves in the education sector. Universities are increasingly adopting blockchain for credential verification. In 2023, a consortium of universities in the UK began using blockchain to issue and verify academic certificates. This initiative not only reduces fraudulent claims but also simplifies the job application process for graduates. By ensuring that qualifications are easily verifiable, blockchain fosters a more transparent and trustworthy educational landscape.



**MISHTI** (BCA 2ND YEAR)

## APPLICATIONS OF BLOCKCHAIN BEYOND CRYPTOCURRENCY

Blockchain technology, which powers the Bitcoin cryptocurrency system, is regarded as both fascinating and essential for guaranteeing improved security and privacy for a wide range of applications across numerous other domains, such as the Internet of Things (IoT) ecosystem. MarketsandMarkets estimates that the worldwide blockchain industry will produce over \$94 billion in revenue by 2027, growing at a compound annual growth rate (CAGR) of 66.2% from its estimated \$7.4 billion in 2022. As of right now, North America leads the world's blockchain market. In reality, blockchain is being widely adopted across a number of sectors.

### SUPPLY CHAIN MANAGEMENT :

Blockchain provides real-time tracking of goods, ensuring transparency, validation of transactions and preventing fraud in the supply chain by tracking every step from production to delivery. It allows real-time tracking of goods as they move through the supply chain, ensuring all stakeholders have access to the same data. This prevents issues like counterfeiting and fraud by verifying product authenticity and origin. Smart contracts automate processes, reducing the need for intermediaries and speeding up transactions. The use of blockchain also strengthens data security, ensuring that records cannot be tampered with, resulting in more efficient and reliable supply chains. Actual Deployment : Walmart is developing a distributed ledger based on blockchain technology to facilitate communication and monitoring among suppliers, buyers, transporters, and other parties engaged in the transportation of pigs throughout China. Blockchain lowers the possibility of inaccurate or tampered data in this case

### TRANSFORMING VOTING SYSTEM :

Although still in development, implementing blockchain in the voting process could provide full transparency by removing the need for intermediary systems. Voters download a voting app like MiVote and submit their voter ID for registration. After verification, they can cast their vote anonymously. Once recorded on the blockchain, votes become immutable, ensuring accuracy as each ID is linked to only one vote. Additionally, voters can track their votes throughout the process. Although still in development, implementing blockchain in the voting process could provide full transparency by removing the need for intermediary systems. Actual Deployment : MiVote is a token-based blockchain platform which is similar to a digital ballot box. Currently it is implemented in Australia, however the US is also ready to bring it in use

### SAFE NETWORKS :

Blockchain enhances cybersecurity by providing a decentralized, tamper-proof system for storing and sharing data. Its cryptographic algorithms protect data integrity, making it harder for hackers to alter information. Blockchain can also secure identity management, authenticate transactions, and prevent DDoS attacks by eliminating central points of failure. Actual Deployment : Mastercard uses blockchain for sending and receiving money.



**ELISHA** (BCA 3RD YEAR)

## CHALLENGES AND LIMITATIONS



### 1. SCALABILITY ISSUES

- **Transaction Speed:** Payment systems such as Visa can process thousands of TPS whereas frameworks such as Bitcoin and Ethereum are limited to lesser TPS. That erodes the edge that blockchains are supposed to have in powering adoption of productive usage at scale.
- **Network Congestion:** As a blockchain gains popularity and the number of users increases, the time it takes to confirm a transaction also increases affecting the speed and performance.

### 2. ENERGY CONSUMPTION

- **Proof of Work (PoW):** This has made many blockchains to enforce PoW consensus mechanisms which require a lot of effort to protect the network. Mining Bitcoin, for instance, is physically draining and raises doubts over the sustainability of the system.
- **Non-traditional Proposers:** More recent consensus methods, including Proof of Stake (PoS), seek to reduce power expenses while judging by the simple facts that security and scalability are still issues.

### 3. SECURITY CONCERNS

- **51% Attack:** It is a consensus that every crypto network is being watched by bad actors and if anyone forks over 51% control over a node, a bad actor could rewrite the blockchain as they see fit, where they could even double spend.

- **Smart Contract Vulnerabilities:** Smart contracts enable the end-to-end management of processes without human interference which seems sheer impossible how be it trust if human is replaced by code. However, codes are fallible which means that there could be breaches or loss associated with these smart contracts as exemplified by the DAO hack on Et.

### 4. REGULATORY AND LEGAL UNCERTAINTY

- **Lack of Clear Regulations:** Most countries are just developing their regulatory frameworks concerning blockchain technology. This leads to a legal uncertainty given that there is a lack of consistent regulation throughout the globe, which could make it easier for companies to implement blockchain-based solutions across borders.
- **Compliance:** The very nature of blockchain-its decentralization-in many ways contradicts the traditional regulatory frameworks that have been set up. For example, it challenges the right to be forgotten under the General Data Protection Regulation.

### 5. INTEROPERABILITY

- **Lack of Standardization:** Most of the blockchain platforms operate independently and barely with other chains. This prohibits the flow of assets and data between different blockchain ecosystems and restricts mass adoption and unified systems.
- **Cross-chain Solutions:** Examples include atomic swaps and cross-chain protocols. In any case, actual interoperability is far from becoming a reality.



**RAKHI** (BCA 3RD YEAR)

## 6. DATA PRIVACY AND CONFIDENTIALITY

- **Transparency vs. Privacy:** Public blockchains are open in nature-that is, every transaction is recorded on the ledger. This breeding ground for transparency sometimes works completely against the need for privacy in many of the transactions of individuals and organizations. While a few solutions, such as zk-SNARKs for maintaining privacy, were already developed, they have not attained wide adoption.
- **Sensitive information cannot be stored directly on open blockchains without sacrificing certain levels of privacy.**

## 7. IMPLEMENTATION COST

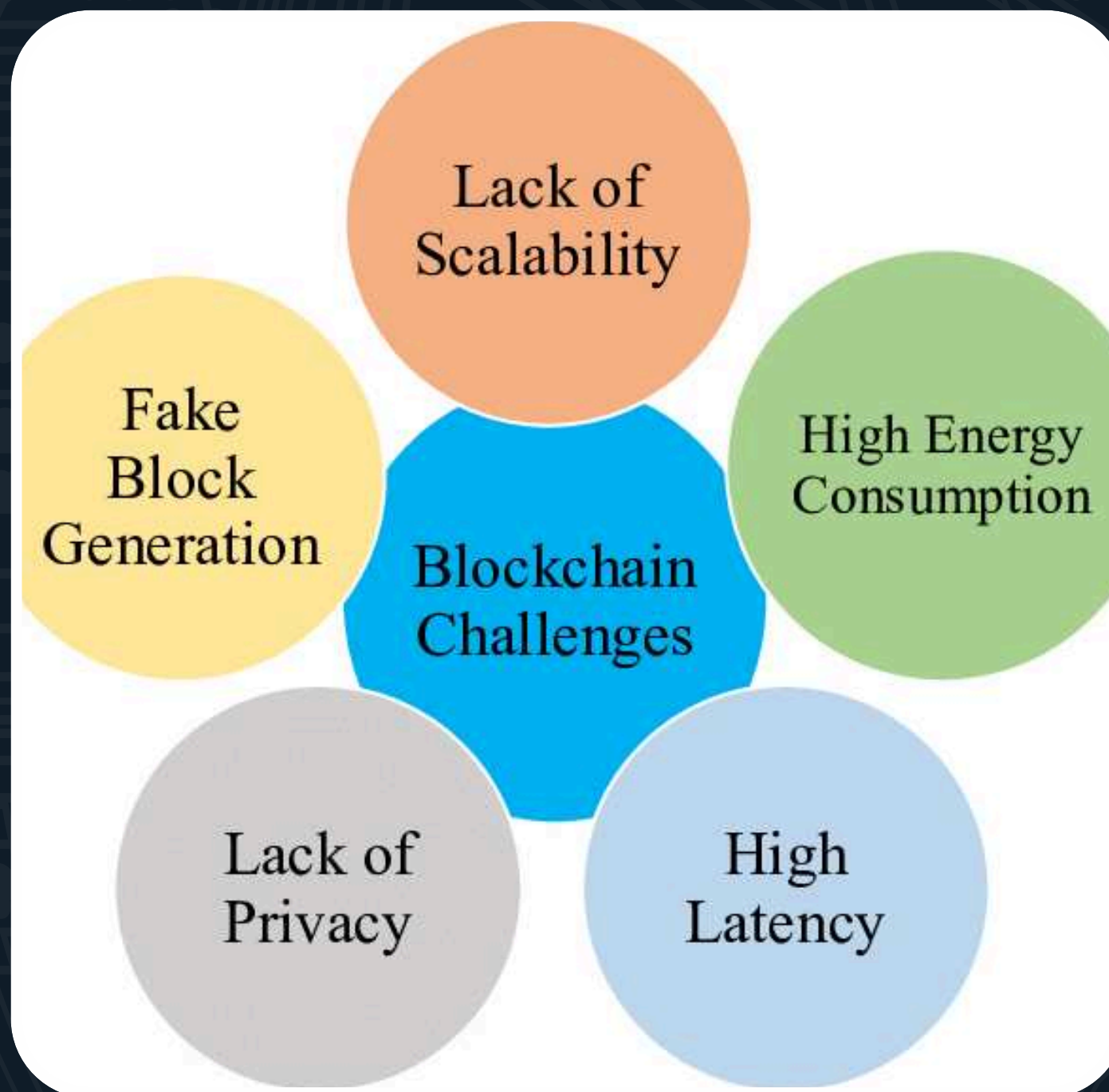
- **Initial Investment:** Setting up and integrating blockchain solutions can be very costly as it requires special hardware, development, and care. This can be seen as a barrier to the possible mainstream adoption of blockchain by enterprise.
- **Transaction Fees:** Heavy fees that come along with network congestion in some cases are those said to be charged by Ethereum for the execution of every transaction

## 8. COMPLEXITY OF TECHNOLOGY

- **Learning Curve:** Still a very nascent technology, knowing how to actually use the blockchain and implement it effectively is a steep learning curve for developers and businesses alike.
- **Usability:** The complexity of wallets, keys, and dApps makes the usability of this technology less user-friendly for the average consumer, capping mainstream use of the underlying technology.

## 9. GOVERNANCE ISSUES

- **Centralized Governance:** Most blockchains have no central authority. Decentralized governance may therefore mean slow and contentious decision-making. Examples of hard forks include the divergence between Bitcoin and Bitcoin Cash.
- **Challenges in Consensus Mechanism:** Different consensus mechanisms come with trade-offs between security, decentralization, and performance. Finding the right balance remains one of the major challenges for blockchain systems.



## 10. QUANTUM COMPUTING THREAT

- **Possible Future Risk:** Quantum computing is still in its infancy and is theoretically considered to threaten the encryption algorithms deployed by blockchains. When quantum computers are fully established, they will break the cryptographic algorithms that currently secure blockchain networks, thus making them vulnerable.

## 11. LIMITED THROUGHPUT FOR COMPLEX APPLICATIONS

- **Inadequate Data Processing:** Blockchains are incapable and inefficient in handling applications involving high data processing as they process and store information comparatively slowly



**RAKHI** (BCA 3RD YEAR)

THE BLOCK-TALK

What's New, What's Cool

1. Where art thou blockchain? Why, everywhere, of course.

Blockchain development deepening more than ever before. Financial Firms are moving away from traditional ways, and embracing Blockchain. Companies include our favourite undergraduate recruiters such as JP Morgan, Goldman Sachs, Standard Chartered, HSBC, etc.

2. American state goes crypto.

Louisiana has a crypto positive attitude and their policies show it. State services are now payable via cryptocurrencies.

3. Quantum Computing and Blockchain

Inaugurating a new era of finance and digital security led by a project by Quranium.

4. Solana goes up.

In this month's pop culture special, our very own, Solana, sees price surge of 10%.

5. PM Solar Scheme to include Blockchain

As part of Prime Minister, Narendra Modi's Surya Ghar: Muft Bijli Yojana, innovative projects such as blockchain based peer-to-peer rooftop solar to be included.



Block and Roll

Can't talk blocks and chains, without some decentralized puns for centralized readers.

Warning: These will be bad.

1. "Why did the blockchain go to therapy?" It had too many unresolved transactions.
2. "What do you call a blockchain that sings?" A Bit-tune!
3. "Why don't blockchains gossip?" They know how to keep a ledger of their secrets.
4. "Why should you never cross a blockchain?" Because they keep a receipt of everything.

Crypto Curiosities

1. The first ever transaction on the blockchain technology was a pizza transaction. The customer has paid 10,000 in bitcoins back in 2010, to get two pizzas. This is especially mind blowing considering that the current value of a single bitcoin is estimated at 63,537 USD (~53,13,712. INR).
2. Unlike you and me, Blockchain's been to space. A SpaceChain satellite with blockchain enabled made it across the seven layers of earth's atmosphere back in 2019.
3. For all we know about the iconic Satoshi Nakamoto, we don't actually know much at all. The name is a pseudonym for the creator. Despite numerous theories, the true identity of Satoshi has never been confirmed. They have last known to have been 'seen' back in 2010.
4. NFTs has grown to officially sell real estate now, although the real part of the estate is debatable. Virtual real estate is another attraction on what has only been known for Digital Art such as music, graphics and gaming, until recent.



HIMANSHI (BCA 2ND YEAR)

## THE ROLE OF BLOCKCHAIN IN DATA SECURITY

Data security is rising to the top of businesses' and individuals' priorities in the today's digital era. Traditional centralized systems have found it challenging to offer full dense protection against risks like data breaches, hacking, and unauthorized access due to the exponential increase of data. Blockchain technology, which was initially become popular by cryptocurrencies, provides a robust solution to boost data security in a number of various sectors.

Blockchain is mainly a distributed, decentralized ledger solution which guarantees security, immutability, and transparency. In contrast to traditional databases, which rely on one organization for the storage and management of data, Block chain is a peer-to-peer network in which each node, or user, maintains a copy of the whole ledger. Since in Blockchain we have decentralized systems, so there is no chance of a single point of failure, which resulting in far more challenging for hackers to break into the system.



The use of cryptographic techniques to protect data is one of the main feature of blockchain. Each of the block in the chain has transaction data, a timestamp, and a cryptographic hash of the block preceding it. As a result, a secure link becomes established among the blocks, making it extremely hard to alter or modify the data without altering each subsequent block. Essentially, data that has been written to the blockchain is immutable and impervious to tampering. This capability is particularly beneficial in sectors like finance, healthcare, and supply chain management where protecting data integrity is essential.



Blockchain improves confidentiality of the data as well. The identities of those who operate on a blockchain can stay anonymous, regardless whether transactions or records are public and accessible to all network participants. The utilization of both public and private keys allows for the secure sharing of data avoiding revealing sensitive information, all while ensuring transparency and privacy. Along with security Blockchain ensures accountability and transparency by providing an audit trail for every transaction. This is particularly useful for businesses that deal with compliance with regulations, as every operation or modification to the data must be logged and validated.

In conclusion, blockchain provides a strong foundation for data security in a world becoming increasingly interconnected by the day. The solution's decentralized structure, cryptographic protection, and clear audit trail feature make it a desirable option for organisations seeking to enhance data security.



**SNEHA** (BCA 3RD YEAR)

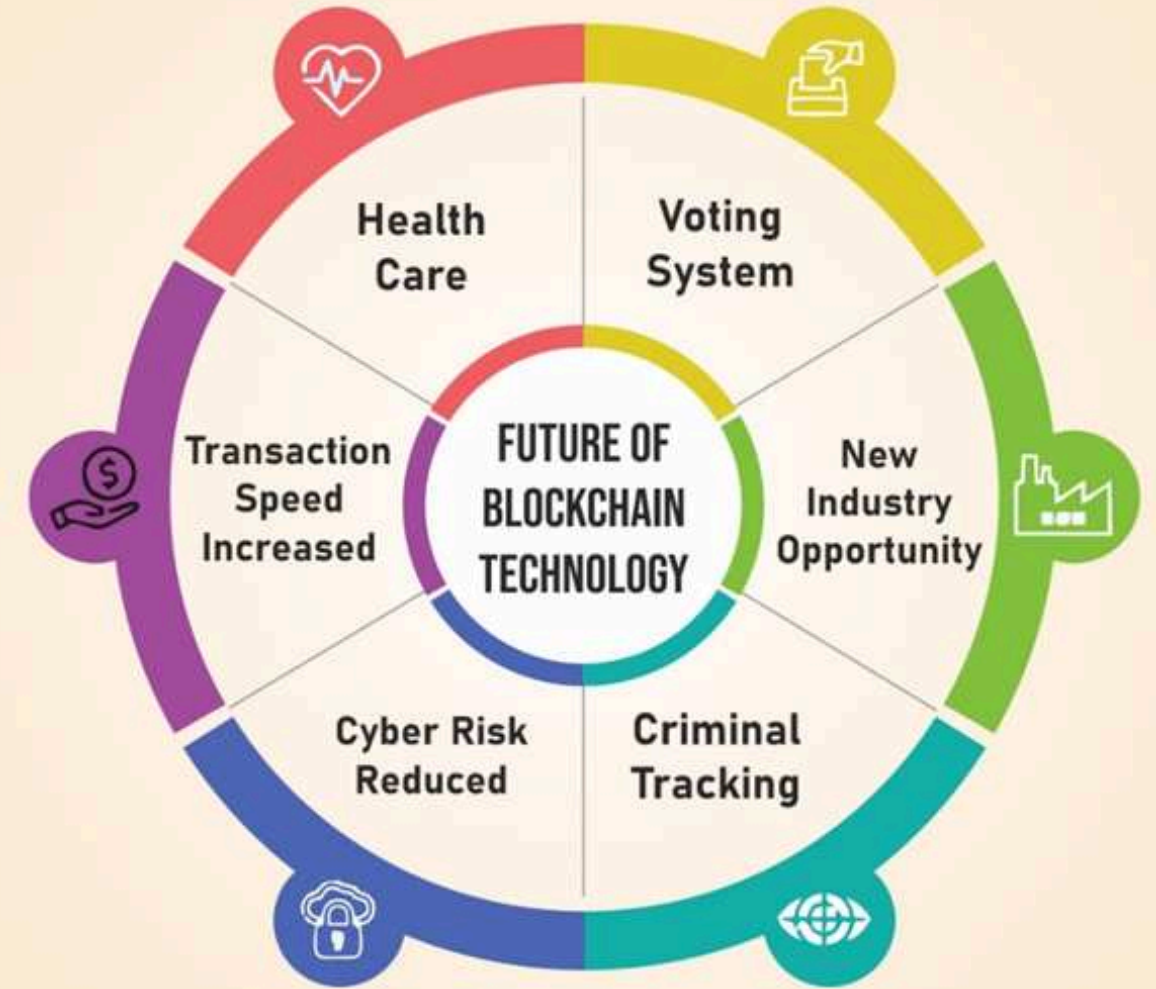


## FUTURE OF BLOCKCHAIN

Initially popularized by cryptocurrencies like Bitcoin, blockchain has evolved into a transformative technology with potential applications far beyond digital currency. Its core attributes—decentralization, immutability, and transparency—make it a promising solution for various industries. As we look toward the future, blockchain stands poised to revolutionize sectors such as finance, supply chain, healthcare, and governance.

Finance is where blockchain has already made the most visible impact. Beyond cryptocurrencies, blockchain technology promises to streamline payments, reduce fraud, and enable more secure and faster international money transfers. The rise of decentralized finance (DeFi), which eliminates intermediaries like banks, may further empower users by providing financial services directly on blockchain platforms. As central banks worldwide explore digital currencies, blockchain could become the backbone of new financial infrastructures.

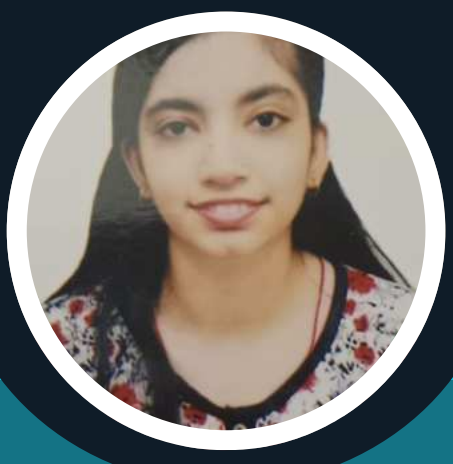
In supply chain management, blockchain offers a transparent, tamper-proof ledger that can track goods from the point of origin to the consumer. This could enhance product authenticity, improve logistics, and reduce inefficiencies, particularly in industries like food and pharmaceuticals. Companies can ensure that their products are ethically sourced, and consumers can verify the origins of what they buy. As global supply chains become more complex, blockchain's role in ensuring transparency and accountability is likely to expand.



Healthcare also stands to benefit from blockchain technology. With patient data scattered across different systems, the potential for blockchain to create a secure, unified record is immense. Blockchain can ensure that medical records are accurate, tamper-proof, and accessible only to authorized personnel, improving data privacy while allowing for smoother collaboration between healthcare providers. It could also streamline clinical trials and drug supply chains, ensuring the integrity of research data and medical products.

Governments may also adopt blockchain for governance and voting. Blockchain's immutable and transparent nature makes it a perfect fit for secure voting systems, helping to prevent fraud and enhance trust in electoral processes. Additionally, smart contracts could be used to automate and enforce laws and regulations.

However, there are challenges ahead. Issues like scalability, regulatory uncertainty, and energy consumption need to be addressed for blockchain to reach its full potential. Despite these hurdles, the future of blockchain looks promising, with the potential to reshape how we interact with technology, businesses, and governments on a global scale.



**VAIBHAVI** (BCA 3RD YEAR)

## BLOCKCHAIN IN EDUCATION

"Imagine a world where every academic credential—from your kindergarten certificate to your university degree—is secure, easily verifiable, and never lost. Where students from around the world have access to educational materials without borders and can truly own their learning experiences." Does this sound like a futuristic scenario? It's much closer than you might think, thanks to the power of blockchain technology. But how does a technology, primarily known for powering cryptocurrencies, become a transformative force in the educational sector?

### BLOCKCHAIN FOR CRYPTO INCENTIVES

#### 1. BIT DEGREE:

How it uses blockchain for education: Bit Degree combines blockchain ledgers and tokenization on its tech-focused online education platform. The company offers free and paid online courses on, blockchain implementation and gamified coding to help more people learn about DLT and eventually enter a blockchain-oriented career. The platform also incentivizes learning by offering tokenized scholarships for successful course completion or certain achievements.



#### 2. BLOCKCERTS

How it uses blockchain for education: Learning Machine (now a part of Hyland) teamed up with the MIT Media Lab to create Blockcerts, an open standard platform for creating, issuing, and verifying blockchain-backed certificates. By creating records like academic transcripts and credentials on a blockchain, the company can review the credibility of documents and discover falsified information. Academic achievements — grades, transcripts, and even diplomas — can also be stored on a Blockcerts blockchain for immutable insight into past academic history.

#### 3. APPII

How it uses blockchain for education: APPII combines blockchain, smart contracts, and machine learning to verify the academic credentials of prospective students and professors. Users create a profile and fill out their academic CV, including education history and transcripts. APPII then uses blockchain to verify a user's background and lock their information into its blockchain



#### 4. COLLABORATIVE LEARNING AND ACADEMIC RESEARCH

Additionally, blockchain might improve cooperation between academic institutions and research centers. Researchers could safely communicate their data, findings, and grant applications between organizations to maintain intellectual property protection and promote a collaborative environment. As part of a global educational ecosystem, students could collaborate on projects with peers from various institutions worldwide.



**ANUSHREE** (BCA 1ST YEAR)

REAL WORLD CASE STUDIES

**CASE STUDY:**

Walmart makes use of blockchain technology to improve the process of food item security.

The use of blockchain technology is not only being used for currencies such as Bitcoin but it is also being utilized by big enterprises or businesses to solve problems and overcome challenges that are faced in real-life scenarios.

When we talk about food item security or prevention, Walmart is a brilliant case study for understanding the process of "how the management of food supply chains may be improved by blockchain technology".

**THE PROBLEM:**

Walmart found it difficult to properly track the origin of their product before the invention of blockchain. It may take several days or weeks to identify the source of a food contamination problem, such as rotting lettuce or mangoes. Walmart could be in trouble and may have to pay a high price for having to recall a significant number of items, which could put consumers in danger.

**HOW BLOCKCHAIN HELPED:**

Walmart and IBM worked together and developed a blockchain-powered IBM Food Trust. Blockchain is more like an electronic record system in which data is stored across multiple computers.

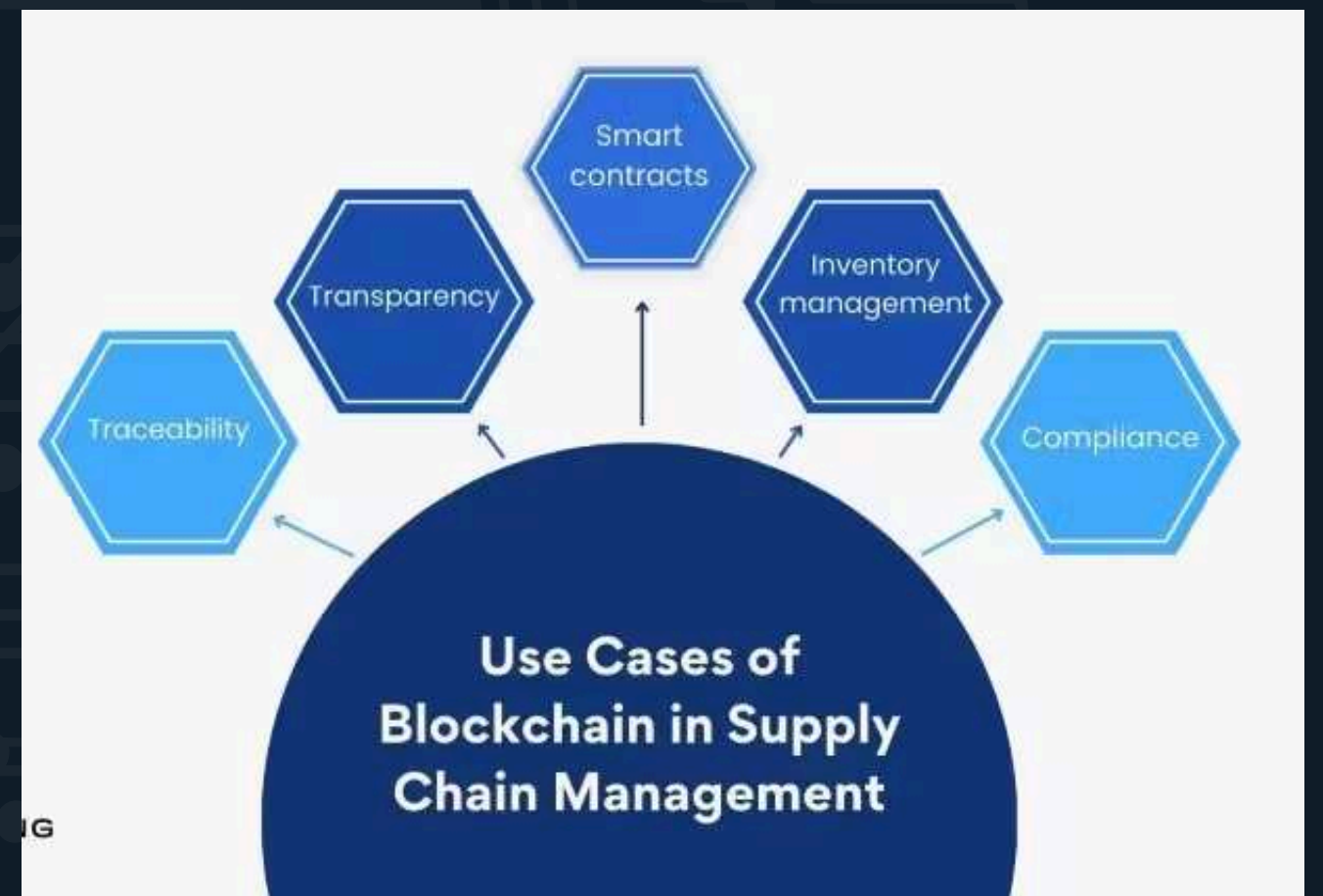
This made it easy for Walmart, for example, to trace food items at any time from farm gates to shop shelves.

Farmers, suppliers, and other players in the food chain of supply processing inputted food-related data (such as harvest dates and shipment details) into this electronically recorded system. The food's history was visible to all, but once it was documented, it could not be changed, which helped to gain a bond of trust and belief between every participants and consumers.

**THE RESULTS:**

Walmart uses blockchain technology to track the source or origin of its food in few seconds. When there was any security concern, Walmart was able to quickly determine whose farm the mangoes came from in one instance. This meant that rather than taking all the mangoes out of the stores, they only needed to recall and track those mangoes from a certain farm.

Ultimately, Walmart was able to secure its food supply and save time and money by utilizing blockchain technology efficiently. Additionally, it gave customers peace of assurance since they knew Walmart would surely take care of any food-related problems quickly.



**IN CONCLUSION:**

Walmart's adoption of blockchain technology clarifies how it might boost company productivity and efficiency. By making the food supply easy to track, Walmart has improved the security of food for consumers and lessened the impact of problems or challenges related to food security.



**RAKSHITA** (BCA 3RD YEAR)

INTRODUCTION TO BLOCKCHAIN

1

**1. Learn the Basics**

Understand blockchain fundamentals, cryptography, decentralization, and consensus mechanisms. Explore cryptocurrencies like Bitcoin and Ethereum.

5

**Build Projects**

Develop DApps, participate in blockchain hackathons, and contribute to open-source blockchain projects.

2

**Smart Contracts & Solidity**

Learn smart contracts and their role in DApps (Decentralized Apps). Master Solidity for writing Ethereum smart contracts.

**Advanced**

**Blockchain Concepts**

Explore Layer 2 solutions like Polygon for scaling. Learn about Zero-Knowledge Proofs (zk-SNARKs) and privacy protocols.

**Blockchain**

**Development Tools**

Use tools like Remix IDE for smart contracts, and frameworks like Truffle or Hardhat. Learn to connect smart contracts with the frontend using web3.js or ethers.js.

4

3



**SAMARTH** (BCA 3RD YEAR)

**OUR TEAM**



**DR.PRAVEEN ARORA**  
PROGRAM INCHARGE

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FACULTY INCHARGE

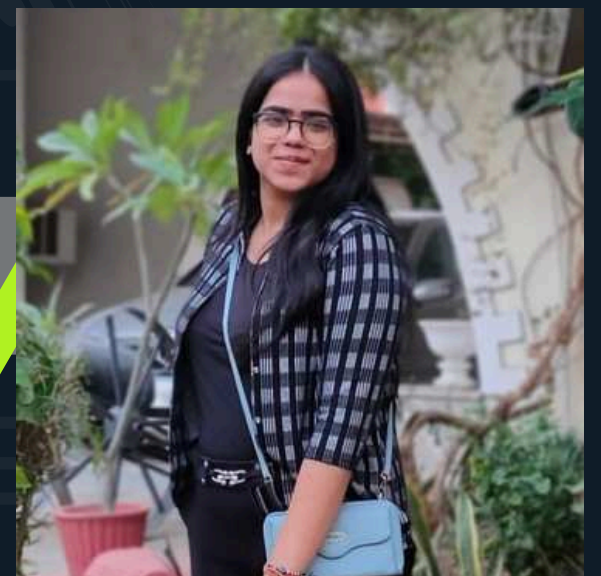


**STUDENT INCHARGE**



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