Ideation Phase

Define The Problem Statement

Team ID	NM2023TMID04427
Project Name	Project – Tracking Public Infrastructure And Toll Payment Using Blockchain

What Is Blockchain Technology

Blockchain is a method of recording information that makes it impossible or difficult for the system to be changed, hacked, or manipulated. A blockchain is a distributed ledger that duplicates and distributes transactions across the network of computers participating in the blockchain.

Blockchain technology is a structure that stores transactional records, also known as the block, of the public in several databases, known as the “chain,” in a network connected through peer-to-peer nodes. Typically, this storage is referred to as a ‘digital ledger.’

Every transaction in this ledger is authorized by the digital signature of the owner, which authenticates the transaction and safeguards it from tampering. Hence, the information the digital ledger contains is highly secure.

Why Is Blockchain Popular

Suppose you are transferring money to your family or friends from your bank account. You would log in to online banking and transfer the amount to the other person using their account number. When the transaction is done, your bank updates the transaction records. It seems simple enough, right? There is a potential issue which most of us neglect.

Technologically, Blockchain is a digital ledger that is gaining a lot of attention and traction recently. But why has it become so popular? Well, let’s dig into it to fathom the whole concept.

Record keeping of data and transactions are a crucial part of the business. Often, this information is handled in house or passed through a third party like brokers, bankers, or lawyers increasing time, cost, or both on the business.

Highly Secure

It uses a digital signature feature to conduct fraud-free transactions making it impossible to corrupt or change the data of an individual by the other users without a specific digital signature.

Decentralized System

Conventionally, you need the approval of regulatory authorities like a government or bank for transactions; however, with Blockchain, transactions are done with the mutual consensus of users resulting in smoother, safer, and faster transactions.

Automation Capability

It is programmable and can generate systematic actions, events, and payments automatically when the criteria of the trigger are met.

Structure And Design Of Blockchain

A blockchain is a distributed, immutable, and decentralized ledger at its core that consists of a chain of blocks and each block contains a set of data. The blocks are linked together using cryptographic techniques and form a chronological chain of information.

Blocks

A block in a blockchain is a combination of three main components:

1. The header contains metadata such as a timestamp which has a random number used in the mining process and the previous block's hash.

2. The data section contains the main and actual information like transactions and smart contracts which are stored in the block.

3. Lastly, the hash is a unique cryptographic value that works as a representative of the entire block which is used for verification purposes.

Hard Forks

A hard fork in a blockchain refers to a permanent divergence in the blockchain's history that results in two separate chains. It can happen due to a fundamental change in the protocol of a blockchain and all nodes do not agree on the update. Hard forks can create new cryptocurrencies or the splitting of existing ones and It requires consensus among the network participants to resolve.

Finality

Finality refers to the irreversible confirmation of transactions in a blockchain. If and when a transaction is added to a block and the block is confirmed by the network, it becomes immutable and cannot be reversed. This feature ensures the integrity of the data and prevents double spending, providing a high level of security and trust in Blockchain Types & Sustainability

Openness

Openness in blockchain technology makes the blockchain accessible to anyone who intends to participate in the network. This implies that it is open for all and anyone can join the network, validate transactions, and can add new blocks to the blockchain, so long as they know the consensus rules. Openness promotes inclusivity, transparency, and innovation, as it allows for participation from various stakeholders.

Public Blockchain Networks

Bitcoin and other cryptocurrencies originated from public blockchains, which also played a role in popularizing distributed ledger technology (DLT). Public blockchains also help to eliminate certain challenges and issues, such as security flaws and centralization. With DLT, data is distributed across a peer-to-peer network, rather than being stored in a single location. A consensus algorithm is used for verifying information authenticity; proof of stake (PoS) and proof of work (PoW) are two frequently used consensus methods.