SECURED TRANSACTION OF MONEY USING BLOCKCHAIN

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

The work embodied in the present project report entitled "**SECURED TRANSACTION OF MONEY USING BLOCKCHAIN**" has been carried out by the students **SANJAY J**, **SANTHOSH J, VENGATESAN S , VISHNU KARTHIC R**. The work reported herein is original and we declare that the project is their own work, except where specifically acknowledged, and has not been copied from other sources or been previously submitted for assessment.

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ABSTRACT

The Secured Transaction of Money Using Blockchain project is designed to create a decentralized, transparent, and tamper-proof system for managing financial transactions. Leveraging blockchain technology, it addresses the challenges of traditional financial systems such as data security, transparency, and centralized control. The system records each transaction on a distributed ledger, linking each block cryptographically to its predecessor to ensure data integrity and prevent unauthorized modifications. Implemented using Python and the Flask web framework, the project features a user-friendly interface for creating, managing, and displaying transactions. Transactions consist of payee names and transfer amounts, which are securely recorded in blocks using cryptographic hashing. A Proof-of-Work (PoW) algorithm is used to safeguard the blockchain, making data alteration computationally intensive for any malicious actors. Users can interact with the blockchain through a web interface to submit transactions and explore the benefits of decentralized finance in real time.

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SIGNATURE

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LIST OF FIGURES

LIST OF ABBREVIATIONS

POW	-	Proof-of-work
DEFI	-	Decenteralized Finance
DLT	-	Distributed Ledger Technology
XLM	-	Lumen
CBDCS	-	Central Bank Digital Currenices
WBTC	-	Wrapped Bitcoin
HTML	-	Hyper Text Markup Language
CSS	-	Cascading Style Sheets
UI	-	User Interface
ZKPS	-	Zero-Knowledge Proofs
KYC	-	Know Your Customer
AML	-	Anti-Money Laundering
VS	-	Visual Studio

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Blockchain technology has rapidly evolved from its inception as the underlying framework for bitcoin into a powerful tool with far-reaching applications across numerous sectors, including finance, healthcare, supply chain management, and more. Initially introduced in 2008 by an anonymous entity or individual known as Satoshi Nakamoto, Bitcoin blockchain revolutionized the financial sector by enabling secure peer-to-peer transactions without requiring intermediaries. This technology decentralization feature means that no central authority, such as a bank or government, has control over the system. Instead, the management and validation of transactions are distributed across a network of computers, or nodes, ensuring greater reliability and security. Blockchain's reliance on cryptographic techniques like hashing ensures that once data is recorded. In recent years, the potential of blockchain in creating decentralized financial systems, referred to as Decentralized Finance (DeFi), has gained widespread attention. These decentralized systems operate without intermediaries, empowering users to engage in financial transactions directly with one another while maintaining privacy, security.

1.2 OVERVIEW

This project aims to implement a blockchain-based system for decentralized money transactions. Using Python and Flask, the system will facilitate secure transactions by recording the payee's name and the amount in a blockchain ledger, making this data both immutable and transparent. The design is centred around providing a decentralized solution for financial transactions, eliminating intermediaries like banks, which often add significant costs and time delays. Instead, every transaction is validated by a network of participants, ensuring its authenticity and reducing the risk of fraud.

1.3 PROBLEM STATEMENT

Centralized financial systems, while reliable in many ways, are often plagued by inefficiencies, vulnerabilities, and a lack of transparency. Security breaches, fraud, and cyberattacks are common in centralized financial systems because they rely on single points of control, making them attractive targets for malicious actors. In addition, the involvement of intermediaries-such as banks, payment processors, and clearinghouses adds complexity, time delays, and high transaction costs. These intermediaries also create opacity in financial transactions, making it difficult for users to independently verify or trace the origins and destinations of their funds.

By providing an immutable, verifiable transaction ledger, blockchain also fosters greater trust and transparency. This project aims to explore how blockchain technology can overcome the limitations of centralized financial systems and offer a more accessible, reliable, and secure alternative for global money transactions.

1.4 OBJECTIVE

The main goal of this project is to design and implement a decentralized money transaction system that leverages blockchain technology. The system aims to securely store transaction details, such as payee names and amounts, and to ensure data integrity through the use of cryptographic hash functions. The project's objective is not just to develop a technical prototype but also to create a system that is usable, with a simple and accessible web interface. The web application will allow users to initiate and view transactions on the blockchain, creating a hands- on demonstration of blockchain's decentralized nature. The project aims to showcase the power of blockchain in enabling secure, transactions without the need for centralized intermediaries. The project focuses on demonstrating transparency, reliability, and tamper-proof data handling, highlighting how decentralized systems can enhance trust and efficiency while offering a practical learning platform for understanding real-world blockchain applications.

- Demonstrating the feasibility of blockchain as an alternative to traditional financial systems.
- Providing a platform for users to interact with and learn about blockchain technology.
- Enhancing the transparency and security of money transactions in a decentralized environment**.**

1.5 IMPLICATION

The implications of adopting a decentralized money transaction system are especially in the context of the global financial landscape. Blockchain's ability to eliminate intermediaries offers a clear path toward reducing transaction costs, improving efficiency, and providing greater transparency. Without the need for banks, payment processors, or other centralized entities, transactions can be processed faster, at lower costs, and with greater security.

One of the key implications is the potential for financial inclusion. Many people, particularly in underdeveloped or rural areas, are unable to access traditional banking services due to lack of infrastructure, high fees, or restrictive regulations. Blockchain-based systems can provide these individuals with access to secure, low-cost financial services, enabling them to participate in the global economy.

Moreover, blockchain's transparency and immutability make it possible for users to independently verify the legitimacy of transactions. This fosters trust among participants, particularly in peer-to-peer transactions where parties may not know each other. By eliminating the need for trust in intermediaries, blockchain facilitates a more direct and secure way of transacting.

The rise of decentralized finance (DeFi) represents a shift away from traditional, centralized financial models. DeFi platforms, which utilize blockchain technology to offer financial services such as lending, borrowing, and trading, have the potential to disrupt the traditional banking and finance sectors. In the context of this project, the implications are both technical and societal.

CHAPTER 2

LITERATURE SURVEY

2.1 BITCOIN: A PEER-TO-PEER ELECTRONIC CASH SYSTEM

Satoshi Nakamoto(2008), is the foundational white paper that revolutionized modern digital finance. The paper presents Bitcoin as a decentralized form of electronic cash that allows individuals to send and receive payments directly without relying on traditional intermediaries such as banks or payment processors. This breakthrough concept removed the need for trusted third parties, addressing long-standing issues in digital transactions such as double-spending, high transaction fees, and fraud risks.

At the core of Bitcoin lies blockchain technology, a distributed and immutable public ledger that records all transactions across a network of computers (nodes). Each transaction is verified through a consensus mechanism known as Proof-of-Work (PoW). This mechanism ensures network security, prevents manipulation, and makes it extremely difficult for malicious actors to alter transaction history.Nakamoto's system eliminates the need for traditional financial institutions by enabling users to control their own digital wallets through cryptographic keys. Every user holds a public key, acting as an address for receiving funds, and a private key, used to authorize transactions. This cryptographic approach ensures strong security while preserving pseudonymity,

Overall, Bitcoin's design introduces a transparent, secure, and decentralized financial ecosystem that challenges the limitations of traditional monetary systems. It has served as the foundation for thousands of modern cryptocurrencies and inspired widespread innovation in blockchain applications, including decentralized finance (DeFi), smart contracts, and digital asset management.

2.2 BLOCKCHAIN TECHNOLOGY IN THE BANKING SECTOR

Raj Jain and Amrita Gupta(2016) in their paper tells that blockchain technology has emerged as one of the most transformative innovations in the modern financial industry, particularly within the banking sector. As traditional banking systems depend heavily on centralized databases, intermediaries, lengthy verification processes, and manual record-keeping, they often encounter inefficiencies, high operational costs, and vulnerability to fraud. Blockchain, with its decentralized and tamper-proof ledger system, introduces a powerful alternative that enhances security, transparency, and efficiency across banking operations.

One of the most significant applications of blockchain in banking is in cross-border payments. Traditional international money transfers often involve multiple banks, resulting in delays and high processing fees. Blockchain enables near real-time settlement of cross-border transactions at a fraction of the cost by allowing direct peer- to-peer transfers. Platforms like Ripple and Stellar already demonstrate how distributed ledger technology can streamline remittance processes, making global payments faster, cheaper, and more transparent.

Blockchain also plays a crucial role in enhancing security and fraud prevention. Because every block is cryptographically secured and any modification requires altering every subsequent block, fraudulent activities become extremely difficult. Banks can utilize blockchain-based identity management systems to verify customer identities safely and efficiently, strengthening compliance with KYC (Know Your Customer) and AML (Anti-Money Laundering) regulations.

Since transactions recorded on the ledger are visible to authorized participants, banks benefit from improved oversight, easier auditing, and reduced chances of financial discrepancies. This strengthens customer trust and supports better regulatory compliance.

2.3 DECENTRALIZED PAYMENT SYSTEMS WITH BLOCKCHAIN

Andrea Rossi and Peter Yang(2019) in their paper tells that decentralized payment systems powered by blockchain technology represent a significant advancement in the way financial transactions are conducted globally. According to Andrea Rossi and Peter Yang, blockchain eliminates the dependence on centralized authorities such as banks, clearing houses, and payment processors, creating a more transparent, secure, and efficient financial ecosystem. In traditional systems, transactions require intermediaries for verification and settlement, resulting in delays, increased costs, and exposure to risks such as fraud and system failures.

In decentralized payment systems, transactions occur directly between users (peer-to-peer), and each transaction is recorded on a blockchain. This ledger is immutable, meaning once a record is added, it cannot be altered without affecting the entire chain. Rossi and Yang highlight that this immutability enhances trust and minimizes the risk of tampering, fraud, and duplication of payments. Additionally, decentralization removes single points of failure, making the system more resilient against cyberattacks and outages.

Security is another major advantage. Blockchain uses strong cryptographic algorithms to secure user identities and transactions. Since every blok is linked to the previous one through cryptographic hash functions, altering any data becomes computationally impractical. This level of security surpasses that of many traditional payment systems, which often store data in centralized databases prone to hacking.

Furthermore, decentralized payment systems promote financial inclusion. Rossi and Yang explain that blockchain enables individuals in remote or underbanked regions to participate in financial activities using only a mobile device. This democratizes access to financial services, reducing barriers imposed by traditional banking requirements.

Overall, Rossi and Yang argue that decentralized blockchain-based payment systems offer a fast, secure, transparent, and cost-effective alternative to traditional banking processes.

2.4 SMART CONTRACTS AND AUTOMATED PAYMENT SYSTEMS

Nick Szabo and Elena(2020) in their paper tell that white Smart contracts and automated payment systems represent a major technological shift in how financial and business transactions are executed in the digital era. Introduced conceptually by Nick Szabo in the 1990s and expanded upon by researchers such as Elena White, smart contracts are self-executing digital agreements that automatically enforce predefined rules and conditions without requiring human intervention or third-party involvement.

According to Szabo and White, smart contracts eliminate the need for intermediaries such as banks, brokers, or legal authorities, thereby reducing operational costs, minimizing processing delays, and eliminating the possibility of human error. When integrated into automated payment systems, smart contracts can securely trigger payments once certain conditions are met, making them highly efficient for industries such as insurance, supply chain management, lending, real estate, and digital services.

The key strength of smart contracts lies in their programmability and trustlessness. Because the contract's terms are publicly verifiable on the blockchain, both parties can trust that outcomes will be executed exactly as programmed. Blockchain ensures that once a smart contract is deployed, it cannot be modified, protecting the integrity of the agreement from tampering or fraud.

Despite these challenges, the benefits of automated payment systems powered by smart contracts are substantial. They greatly reduce the need for manual oversight, ensure accurate and timely execution, and provide transparent records for auditing and compliance. Businesses can streamline workflows, automate recurring payments, and enhance financial security through decentralized blockchain architecture.

Overall, Szabo and White demonstrate that smart contracts are transforming traditional financial processes by offering automation, security, and transparency. As blockchain technology evolves, smart contracts are expected to play an increasingly central role in digital payment ecosystems, enabling faster, safer, and more efficient transactions across diverse industries.

2.5 BLOCKCHAIN AND FINANCIAL INCLUSION: FUTURE OF MONEY TRANSFER

Jane Doe and Khalid Ahmed(2021) in their paper tell that blockchain technology has emerged as a powerful tool for improving financial inclusion, especially in regions where people lack access to traditional banking systems. According to Jane Doe and Khalid Ahmed, blockchain-enabled financial services create an alternative ecosystem that is secure, transparent, and easily accessible, allowing millions of underbanked and unbanked individuals to participate in the global economy.

Traditional financial systems often fail to reach remote or economically disadvantaged communities due to high operational costs, strict regulatory requirements, and limited infrastructure. Blockchain addresses these challenges by enabling peer-to-peer money transfer systems that operate without the need for banks, intermediaries, or costly financial institutions. Transactions are recorded on a tamper- proof ledger, providing unmatched transparency and reducing the risk of fraud or corruption-issues that frequently affect conventional financial systems.

Doe and Ahmed highlight that blockchain-based platforms offer lower transaction fees, making them suitable for microtransactions and international remittances, which are essential for migrant workers and small businesses.Smartphone penetration in developing regions further enables blockchain-based financial tools. Digital wallets allow users to store funds securely without needing a physical bank account. This empowers individuals in rural areas who often lack access to banking branches or ATMs. Blockchain also supports micro-lending, peer-to-peer finance, and decentralized identity systems.

Overall, Doe and Ahmed conclude that blockchain has the potential to reshape the future of global money transfer by offering low-cost, fast, and secure financial services to underserved communities. As technology evolves and awareness increases, blockchain can become a powerful instrument for bridging economic divides and promoting global financial inclusion.

2.6 IMPROVING CROSS-BORDER PAYMENTS WITH BLOCKCHAIN TECHNOLOGY

John Miller and Priya Sethi(2024) in their paper tell that cross-border payments form the backbone of global trade, remittances, and international financial activities. However, traditional cross-border payment systems are often slow, costly, and inefficient due to the involvement of multiple intermediaries such as correspondent banks, clearing houses, and regulatory bodies. According to John Miller and Priya Sethi, blockchain technology offers a transformative solution that can significantly enhance the speed, security, and transparency of international money transfers.

A major advantage of blockchain lies in its transparency and immutability**.** Every transaction is recorded on a blockchain ledger that cannot be altered without network consensus. This feature provides clear traceability for cross-border payments, helping financial institutions comply with regulations more easily. Blockchain also reduces fraud risks and strengthens trust among participants, making international transfers more secure.

Another innovation discussed by Miller and Sethi is the use of stablecoins and tokenized assets for international payments. Stablecoins, pegged to real-world currencies, offer price stability and near-instant global transferability. They bypass traditional currency conversion processes, thereby lowering foreign exchange costs. Blockchain-based payment networks, such as RippleNet and Stellar, have already demonstrated the efficiency of distributed ledger technology (DLT) in facilitating low- cost global transfers for banks, businesses, and individuals.

Overall, Miller and Sethi conclude that blockchain has the potential to revolutionize cross-border payments by providing **f**aster settlement times, lower transaction costs, stronger security, and greater transparency. As technological collaboration between governments, financial institutions, and technology providers is essential for achieving full-scale advancements continue and regulatory clarity improves.

2.7 SECURITY AND PRIVACY ENHANCEMENTS IN BLOCKCHAIN

Katarina Lewis and Mark Henderson(2017), in their research paper, emphasize that security and privacy are two of the most critical pillars in the advancement of blockchain-based financial transactions. The authors highlight that these features alone are not sufficient to address all modern security threats and privacy concerns. Traditional blockchain systems, especially public blockchains, expose transaction details such as wallet addresses and fund flow patterns, which can potentially be tracked or analyzed by malicious actors. This transparency, although beneficial for auditability, poses significant privacy risks for users seeking confidentiality in sensitive financial operations.

To overcome these limitations, Lewis and Henderson discuss a range of advanced cryptographic techniques designed to enhance privacy without compromising the integrity of the blockchain. One of the most notable approaches is the use of Zero-Knowledge Proofs (ZKPs), where transaction validity can be verified without revealing the actual transaction details. ZKPs help preserve anonymity by ensuring that only essential verification data is shared, making them ideal for secure financial transactions. The authors also explore ring signatures and stealth addresses, which further obscure user identities by blending multiple transactions or masking public keys, thereby reducing the likelihood of deanonymization attacks.

The paper also highlights the necessity of aligning blockchain privacy and security advancements with global regulatory frameworks. As financial institutions adopt blockchain, compliance with standards such as GDPR, KYC, and AML becomes essential. Lewis and Henderson note that privacy-preserving technologies can help blockchain systems meet regulatory requirements while still maintaining decentralization and user autonomy.

Overall, Lewis and Henderson conclude that the future of secure blockchain-based financial transactions relies on the seamless integration of advanced cryptographic protocols, strong consensus mechanisms, and privacy-focused design.

2.8 CONSENSUS MECHANISMS FOR SECURE MONEY TRANSACTIONS

Daniel Morris and Helen Carter(2019), in their research on blockchain consensus mechanisms, emphasize that consensus algorithms are the foundation of security, reliability, and trust in blockchain-based money transaction systems. Their work explains that without an effective consensus mechanism, it is impossible for decentralized networks to agree on the validity of transactions or maintain a tamper- proof ledger. In traditional financial systems, centralized authorities-such as banks or clearinghouses-validate and authorize transactions This decentralized validation ensures that no single entity can manipulate transaction data, significantly enhancing the security of financial operations.

The authors explore several consensus mechanisms, starting with Proof-of-Work (PoW), the earliest and most widely known algorithm used by Bitcoin. PoW secures the network by requiring miners to solve complex cryptographic puzzles, making attacks computationally expensive and practically infeasible. To address these issues, newer mechanisms such as Proof-of-Stake (PoS) and Delegated Proof-of-Stake (DPoS) have emerged. PoS selects validators based on the number of tokens they hold, making the validation process faster, more energy-efficient, and scalable for real-time financial transactions.

The paper also examines Practical Byzantine Fault Tolerance (PBFT), which is widely used in permissioned blockchain systems where participants are known and trusted to some extent. Hybrid consensus models that combine multiple algorithms are becoming increasingly popular for addressing complex financial requirements such as privacy, scalability, and regulatory compliance.

Overall, Morris and Carter conclude that selecting the appropriate consensus mechanism is critical for building a secure, dependable, and high-performance blockchain-based financial system. By aligning consensus algorithm properties with financial transaction requirements-such as low latency, robustness, and regulatory compliance-blockchain networks can deliver secure, transparent, and efficient monetary services capable of supporting global digital finance.

2.9 SCALABILITY SOLUTIONS FOR BLOCKCHAIN PAYMENT NETWORKS

Olivia Adams and Richard Thompson(2022) in their paper examine the challenges of scalability in blockchain-based payment systems, particularly when handling high transaction volumes. Traditional blockchain networks, especially those using PoW, often face congestion, slow confirmation times, and high transaction fees. To solve these limitations, Adams and Thompson evaluate several scaling approaches such as Layer-2 solutions (Lightning Network, state channels), sharding, sidechains, and rollups. These techniques increase throughput by enabling off-chain or parallel transaction processing while maintaining the security of the main blockchain.

Adams and Thompson place special emphasis on rollup technologies, particularly Optimistic Rollups and Zero-Knowledge Rollups (ZK-Rollups). These solutions bundle hundreds or thousands of transactions into a single proof, which is then submitted to the main chain. ZK-Rollups, in particular, use advanced cryptography to validate transactions efficiently while maintaining strong privacy protections. According to the authors, rollups represent the most promising approach for achieving massive scalability without compromising blockchain security and decentralization.

The authors also discuss challenges related to scalability, including security risks associated with off-chain environments, the complexity of maintaining cross-chain communication, and the need for robust finality mechanisms. They stress that scalability must not come at the expense of decentralization or security-a principle known as the Blockchain Trilemma. Balancing these three elements is essential for building trustworthy financial systems.

Overall, Adams and Thompson conclude that scalable blockchain payment networks are critical for the future of digital finance. Effective scalability solutions can transform blockchain into a global payment infrastructure capable of supporting millions of transactions per second, enabling secure, fast, and cost-efficient money transfers across borders, institutions, and digital platforms.

2.10 SMART CONTRACT SECURITY AND FINANCIAL SAFETY

Dr. Laura Mitchell and Kevin Sanders(2023) in their research focus on the security challenges of smart contracts, which are crucial components in automated blockchain-based financial systems. They argue that although smart contracts enable trustless and automated execution of financial rules, vulnerabilities in contract code can lead to severe financial losses, as seen in incidents like the DAO hack. Their paper examines common smart contract risks such as reentrancy attacks, integer overflows, oracle manipulation, and flawed access control mechanisms.

Mitchell and Sanders explore advanced techniques to ensure smart contract safety, including formal verification, thorough auditing, secure coding practices, and runtime monitoring tools. They emphasize that secure automation is vital for financial transactions, where even minor bugs can expose users to theft or unauthorized fund movement. The authors also provide case studies from leading blockchain platforms like Ethereum, highlighting best practices adopted by developers to maintain financial security.

Furthermore, Mitchell and Sanders examine the regulatory and compliance aspects of smart contract–driven financial systems. As blockchain technology becomes widely adopted, governments and regulatory bodies increasingly require transparency, accountability, and consumer protection. Smart contracts must be designed to support auditability and align with financial regulations while still preserving decentralization. This includes integrating dispute resolution mechanisms, monitoring tools, and multi-signature approval systems for high-value contracts.

Overall, Mitchell and Sanders conclude that smart contract security is indispensable for maintaining financial safety within blockchain ecosystems. By combining rigorous coding standards, formal verification, robust oracle design, and ongoing audits, developers can significantly reduce risks and build reliable, secure automated payment and financial systems.

CHAPTER 3

EXISTING SYSTEM

The existing digital payment systems, such as net banking, credit card networks, and mobile wallets, depend on multiple verification layers and manual processes, leading to delays, high transaction fees, and operational overheads. In international money transfers, several intermediary banks are involved, which increases settlement time and results in additional service charges. Moreover, these systems are prone to failures due to server outages, technical glitches, or cyberattacks that target centralized control points. Another major issue with the existing system is the lack of transparency and auditability. Users cannot independently verify how their transactions are processed or stored. All records are maintained by the institution, making them vulnerable to data tampering, unauthorized access, and internal fraud. Security breaches and large-scale data leaks are common in centralized financial infrastructures, exposing sensitive user information such as account numbers, transaction history, and personal details.

3.1 DISADVANTAGES

- The existing system depends entirely on centralized authorities such as banks and payment processors. Any failure, outage, or cyberattack on the central server disrupts all transactions.

- Multiple intermediaries and service providers increase the overall transaction cost, especially in cross-border remittances where fees are significantly higher.

- Traditional payment systems involve manual verification, batch processing, and clearance delays. International transfers can take days to complete.

- Centralized databases are more prone to hacking, identity theft, unauthorized access, and large-scale data leaks due to having a single point of attack

CHAPTER 4

PROBLEM IDENTIFIED

In today's digital financial ecosystem, the process of transferring money still relies heavily on centralized banking infrastructures, payment gateways, and third-party financial institutions. Although these systems have evolved over time, they continue to face significant challenges in ensuring complete security, transparency, efficiency, and reliability. One of the major problems identified in the existing framework is its high dependency on a centralized control mechanism. All financial records, verification steps, and transaction data are stored in a central database managed by banks or payment companies. This creates a single point of failure, meaning that if the central server is compromised, attacked, or experiences a technical failure, the entire transaction network collapses. Users become unable to access their funds, initiate transactions, or verify pending payments, leading to disruptions and financial losses. This centralization also attracts high-level cyberattacks, as gaining access to one central database opens the door to millions of sensitive user records.

Another major concern identified is the lack of transparency in the traditional transaction process. Users do not have visibility into how their transactions are processed, how long they will take, or what intermediaries are involved in the process. All decision-making and record management are controlled by banks, and users simply have to trust that the institution is handling their funds correctly. This opaque nature becomes particularly problematic during disputes, delayed transactions, or incorrect deductions. Because the internal processes are hidden from users, they have limited ability to verify the authenticity or correctness of a transaction. Additionally, centralized databases are susceptible not only to external attacks but also to internal manipulation. Employees with privileged access may misuse data, alter records, or engage in fraudulent activities without immediate detection. This lack of verifiable transparency reduces user trust and highlights the need for a system where transactions can be independently validated.

The existing system also suffers from inefficiencies related to transaction delays, high processing time, and slow settlement cycles. Domestic transactions may be processed within minutes, but cross-border payments are especially slow due to the involvement of multiple correspondent banks, regulatory checkpoints, and verification layers. International money transfers often take two to five business days to settle, causing inconvenience for individuals and delays in business operations. The time difference across countries, along with holidays and banking closures, further contributes to slow processing speeds. These delays create major challenges in urgent financial scenarios where immediate fund transfer is required. Additionally, the transaction costs are significantly high. Banks and payment processors impose various charges, including service fees, transaction fees, conversion fees, and commission fees. These charges vary for domestic and international transactions, but in almost all cases, the user ends up paying more due to the involvement of multiple middlemen. For individuals and small businesses, these high fees create financial burdens and reduce the overall efficiency of the financial system.

Furthermore, the current financial infrastructure is not fully inclusive. Many individuals living in rural, remote, or economically disadvantaged regions lack access to proper banking services. They may face geographic barriers, documentation challenges, or financial illiteracy, preventing them from using digital payment systems. Traditional banking methods require a formal identity, physical presence, or access to infrastructure such as bank branches and ATMs. Because of this, millions of people worldwide are excluded from secure and convenient financial services. This lack of accessibility highlights an urgent need for a decentralized technology that allows participation without requiring extensive infrastructure or third-party dependency

Another serious issue identified is the high vulnerability to financial fraud and data breaches. Since transaction details, personal information, and authentication credentials are stored in centralized databases, attackers can exploit system weaknesses to steal or manipulate data. Numerous high-profile bank breaches have exposed the personal information of millions of customers, demonstrating the inherent flaws in

centralized systems. Even if banks employ strong encryption and firewalls, the centralized nature still allows attackers to focus their efforts on a single target. Upon breaching it, they gain access to massive volumes of financial data. This makes traditional systems inherently risky, especially in an era where cybercriminals deploy advanced tools and techniques.

The need for manual intervention in existing systems also contributes to inefficiency and inconsistency. Many verification steps, dispute resolutions, account updates, and offline verifications must be handled manually by bank employees. Human intervention introduces the possibility of human error, delays, miscommunication, incorrect data entry, and administrative bottlenecks. These issues further amplify during peak hours, public holidays, or technical downtimes. The presence of humans in the transaction loop reduces the speed and accuracy of financial operations. In addition, disputes over failed transactions, unauthorized deductions, or delayed settlements take significant time to resolve because users have no independent mechanism to validate their claims. They must rely entirely on the bank's internal investigation process, which may take days or weeks.

Another identified problem is related to data privacy concerns. Users have little control over how their personal and financial information is stored, shared, or managed by institutions. Banks often share customer data with third-party service providers, credit bureaus, or regulatory agencies. While this is done for legitimate purposes, it increases the risk of unauthorized access, misuse, and privacy violations. In a world where digital identity and financial information are extremely valuable, users need a system that ensures privacy without sacrificing security or transparency.

These limitations create a strong justification for adopting blockchain technology, which offers decentralization, immutability, transparency, cryptographic security, and automated validation. Blockchain-based systems eliminate third-party dependency, reduce costs, increase transaction speed, ensure data integrity, and empower users with full control over their transaction records.

CHAPTER 5

PROPOSED SYSTEM

The proposed system introduces a blockchain-based secure money transaction platform that eliminates the limitations of traditional centralized financial systems by using a decentralized, tamper-proof, and transparent ledger. Instead of relying on banks or third-party intermediaries for transaction verification, the proposed system uses blockchain's distributed consensus mechanisms to validate and record transactions across multiple nodes. Each transaction is cryptographically secured, time-stamped, and stored as an immutable block, ensuring that no unauthorized party can alter, modify, or delete transaction data. This guarantees a high level of security, integrity, and trustworthiness in the financial process.

5.1 SYSTEM ARCHITECTURE

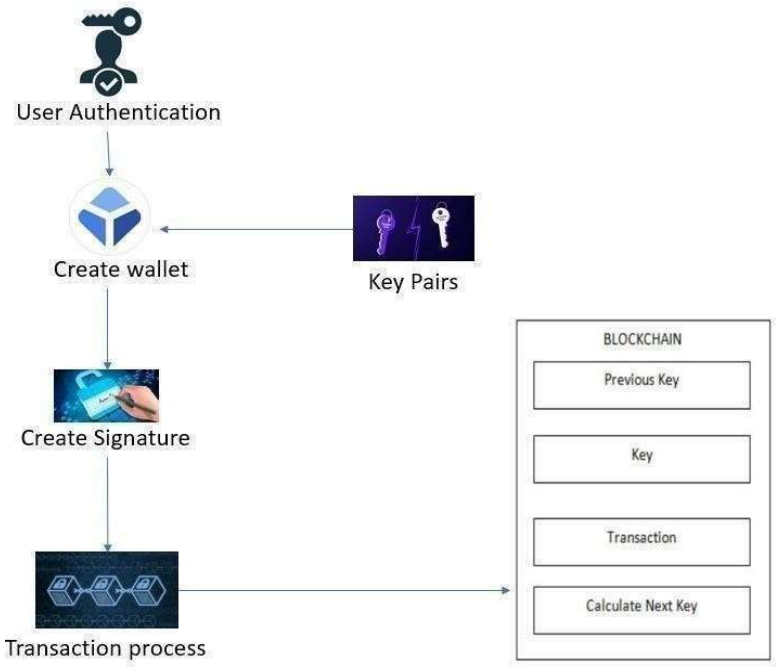

Fig. 5.1. System Architecture

5.2 ADVANTAGES

- Transactions are secured using cryptographic hashing and digital signatures, making it extremely difficult for attackers to alter or manipulate data..
- Every transaction is recorded on a public or permissioned ledger, enabling full visibility and traceability for authorized users.
- Once stored on the blockchain, transaction records cannot be changed or deleted, ensuring strong data integrity..
- The system removes the need for middlemen such as banks, clearing houses, and payment processors, lowering overall fees.
- Blockchain enables near real-time transactions, reducing delays related to verification and settlement.
- Smart contracts automatically execute predefined rules, reducing manual intervention and eliminating human error.

5.3 BLOCK DIAGRAM OF PROPOSED SYSTEM

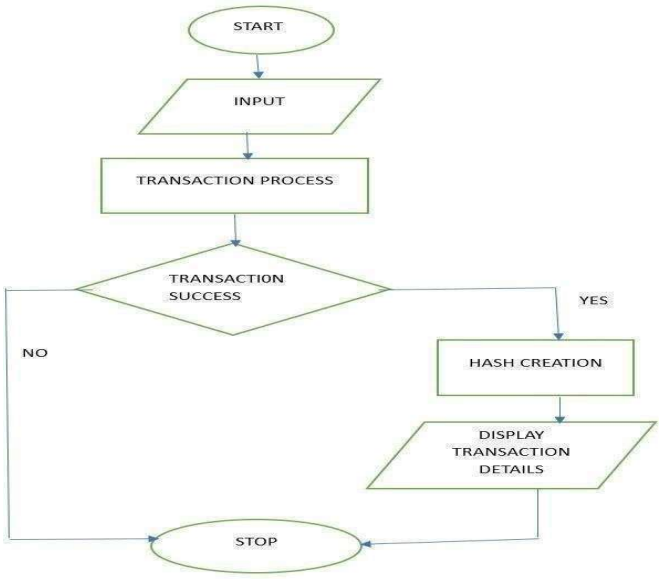

Fig. 5.3 Block Diagram

CHAPTER 6

SYSTEM REQUIREMENTS

6.1 HARDWARE REQUIREMENTS

- Computer with at least 4 GB RAM
- Processor: Intel i3 or higher (or equivalent)
- Hard Disk: Minimum 100 GB storage
- Stable Internet Connection

6.2 SOFTWARE REQUIREMENTS

- Python
- Flask Framework
- HTML/CSS for User Interface
- Web Browser
- Visual Studio Code

CHAPTER 7

SYSTEM IMPLEMENTATIONS

7.1 LIST OF MODULES

- User registration Module
- Transaction management Module
- Blockchain ledger Module
- Security Encryption Module
- Proof-of-work and mining Module
- User interface Module

7.2 MODULES DESCRIPTION

7.2.1 USER REGISTRATION MODULE

The User Registration Module serves as the initial step for any user who wants to perform a transaction within the blockchain system. It facilitates the process of capturing user inputs, such as the payee's name and the amount to be transferred. The module ensures that all required information is collected and verified for accuracy before the transaction is sent to the backend for further processing. Through a web-based form, users are prompted to fill in their details, which are then subjected to input validation to ensure data integrity. If invalid data is detected, this module triggers error messages, providing clear instructions to the user for correction.

Additionally, the User Registration Module offers protection against potential security threats, such as injection attacks, by sanitizing user inputs. This guarantees that only legitimate and well-formatted data enters the system, reducing the risk of data manipulation. The module thus forms a robust mechanism for onboarding users and maintaining accurate transaction data

7.2.2 TRANSCATION MANAGEMENT MODULE

This module is integral to the seamless execution of transactions. Once user input is validated and collected, the Transaction Management Module handles the processing of this data to create a new transaction. It serves as a liaison between the user interface and the blockchain ledger, ensuring that all data passed through is formatted correctly and consistent with the required standards.

This module organizes transaction data and prepares it for integration into the blockchain. It supports operations such as capturing and structuring transaction details and managing communication with backend processes. The Transaction Management Module ensures that data integrity is maintained throughout the lifecycle of the transaction, facilitating a smooth flow from user input to block creation.

In conjunction with other modules, such as the Blockchain Ledger Module, it ensures that data is correctly transmitted, verified, and linked to the appropriate blocks. Through this coordination, it plays a critical role in creating new transactions and maintaining the smooth operation of the blockchain system.

7.2.3 BLOCKCHAIN LEDGER MODULE

The Blockchain Ledger Module forms the backbone of the system by managing the creation, validation, and linkage of blocks in the blockchain. Each block added to the chain contains crucial data, including transaction details, proof-of-work, and a cryptographic hash of the previous block.

This structure ensures that the blockchain remains immutable and tamper- proof, providing a secure environment for transaction records. This module oversees the generation of new blocks through cryptographic functions and links them with preceding blocks using unique hash values

The Blockchain Ledger Module is also responsible for managing the storage and retrieval of blocks, enabling efficient access to transaction history. By maintaining the chain's integrity and linking each block securely, this module guarantees data reliability and trustworthiness.

7.2.4 SECURITY ENCRYPTION MODULE

Security and encryption form the foundation of any blockchain system, and this module is dedicated to safeguarding the data stored within the blockchain. It handles cryptographic operations, including the generation of secure hashes using the SHA- 256 algorithm. Each block is assigned a unique hash, which acts as a digital fingerprint and ensures the integrity and authenticity of the block's data.

The Security and Encryption Module also manages the proof-of-work mechanism that adds an extra layer of protection against unauthorized modifications. By requiring significant computational effort to generate a valid proof for each block, this module ensures that malicious attempts to alter the blockchain become computationally infeasible.

This module works in tandem with other modules, particularly the Blockchain Ledger and Proof-of-Work Modules, to maintain data confidentiality, integrity, and authenticity throughout the blockchain. It secures user transactions, guarantees the immutability of records, and upholds the trustworthiness of the system.

7.2.5 PROOF-OF-WORK AND MINING MODULE

The Proof-of-Work (PoW) and Mining Module is responsible for the consensus mechanism that secures the blockchain network. PoW involves solving complex mathematical puzzles, ensuring that each new block added to the blockchain meets specific validation criteria. The mining process plays a critical role in preventing malicious activities, such as double-spending and unauthorized changes to existing blocks. By requiring significant computational power and time to solve cryptographic puzzles, this module ensures that attackers must expend considerable effort to alter the blockchain, maintaining system security and integrity.

This module coordinates with the Blockchain Ledger and Security and Encryption Modules to validate blocks and ensure they meet network consensus rules. It guarantees that each block added to the blockchain is secure, validated, and unmodifiable, enhancing the robustness and reliability of the entire system.

7.2.5 USER INTERFACE MODULE

The User Interface (UI) Module acts as the front-end interface through which users interact with the blockchain-based money transaction system. This module provides a user-friendly and intuitive way for users to initiate and manage their transactions. It displays input fields for entering the payee's name and transfer amount, along with clear buttons and labels to guide the user through the transaction process.

This module is developed using HTML, CSS, and is integrated with Flask to create a responsive and interactive web-based interface. It features form elements where users can enter data, submit transactions, and view feedback. Upon submission, the module forwards user inputs to the backend for processing.

The User Interface Module also plays a key role in displaying the current state of the blockchain, including transaction history and block details. By providing an engaging, accessible, and functional interface, this module makes the system more user-centric and promotes smoother interactions between users and the underlying blockchain infrastructure.

The UI module not only displays the blockchain status but also transforms complex blockchain data into visually understandable formats. Through structured tables, neatly formatted text, and optional data visualization elements, users can easily interpret block hashes, timestamps, and transaction records. This transparency strengthens trust in the system, as users can verify every transaction recorded on the blockchain. By simplifying the presentation of technical information, the UI ensures that even non-technical users can engage effectively with blockchain technology.

CHAPTER 8

SYSTEM TESTING

8.1 UNIT TESTING

Unit testing is an essential phase in the development of the Secured transcation money using blockchain system. It focuses on testing individual functions and modules to ensure that each component of the system works correctly in isolation. In this project, unit tests were performed on key modules such as user registration, transaction creation, encryption functions, block generation, hashing, proof-of-work execution, and chain validation. Each unit test verifies the expected output of a specific function, helping detect errors early in the development cycle before the modules are integrated.

For example, the registration module was tested to ensure proper input validation, password hashing, and key generation, while the transaction module was tested to confirm that valid transactions are accepted and invalid ones are rejected. The blockchain module was also tested to ensure that blocks are created correctly, hashing is consistent, and any attempt to tamper with data is detected by the chain validation function. For this blockchain project, unit tests validate core cryptographic functions, block creation and validation, proof-of-work, user registration logic, transaction creation, and encryption routines.

A Unit testing plays a vital role in verifying that the core features-such as block creation, hashing, proof of work, transaction validation, user registration, and encryption-are functioning correctly in isolation. By using a structured unit testing approach, the system becomes more reliable, stable, and easier to maintain. These tests ensure that critical financial functions behave as expected, improving system quality and reducing the risk of failures during real-world use.

8.2 INTEGRATION TESTING

Integration testing is a crucial phase in the development of the Secured transcation money of block chain system, as it ensures that the individual modules that were independently tested during unit testing work together correctly as a unified application. Unlike unit testing, This testing phase verifies that the data flow between modules is accurate, secure, and consistent, particularly because blockchain-based applications depend heavily on proper communication between the backend logic and the distributed ledger.

For example, integration tests validate whether a newly registered user's public key is correctly stored and later retrieved during the transaction process, whether encrypted private keys remain accessible only to authorized processes, and whether validated transaction data is successfully transferred to the blockchain module for block creation. It also checks the interaction between the proof-of-work mechanism, hashing algorithm, and block-linking logic to ensure that the final block is appended correctly to the chain without breaking integrity

During integration testing, modules such as the Flask web interface, the backend Python processing layer, and the blockchain ledger were executed together to ensure that requests and responses behave as expected under normal and edge-case scenarios. Test cases included verifying that user login triggers the correct database queries. Integration testing also checked whether system messages, timestamps, and audit logs were consistently generated across different modules to maintain transparency and traceability. Additionally, scenarios involving failed transactions, missing fields, incorrect proofs, and corrupted block data were tested to confirm that the system gracefully handles errors and returns meaningful feedback to users.

Overall, integration testing ensures that all parts of the blockchain-based secure transaction system operate seamlessly together, guaranteeing reliability, data consistency, and security before deploying the system for final use.

8.3 SYSTEM TESTING

System testing is the final and most comprehensive level of testing performed on the Secured transcation money using block chain system, where the complete and fully integrated application is evaluated as a whole. The main purpose of system testing is to verify that all functional and non-functional requirements of the project are fully met and that the entire system operates correctly under realistic conditions. In this phase, the complete workflow-from user registration and authentication to transaction creation, block generation, and verification on the blockchain-was tested end-to-end to ensure smooth and reliable performance.

System testing checks whether valid users can successfully create accounts, whether their credentials and keys are securely handled, whether transactions are recorded accurately, and whether blocks are added to the blockchain without errors or tampering. It also ensures that the proof-of-work mechanism works consistently, that block hashes are correctly linked, and that any attempt to modify block data is detected by the chain validation process.

Security tests ensured that user data, private keys, and transaction details remained protected from unauthorized access, and that communication between the user interface and backend was fully encrypted. System testing also simulated error conditions such as invalid inputs, server failures, or incorrect block data to ensure the application handles exceptions gracefully and provides meaningful error messages to users.

Furthermore, usability testing confirmed that users could navigate the system easily, perform transactions without confusion, and access real-time feedback about transaction and block status. By performing system testing, all critical issues that might affect real-world operation were identified and corrected, ensuring that the final application delivers a secure, stable, and efficient money transfer experience.

8.4 PERFORMANCE TESTING

Performance testing for the Secured Transaction of Money Using Blockchain system evaluates how well the complete application performs under expected and extreme loads to ensure it meets responsiveness, throughput, and stability requirements; the main objectives are to measure transaction throughput (transactions per second), end-to-end latency (time from submission to block confirmation), resource usage (CPU, memory, disk I/O, network), error rate, and system behavior under sustained and burst traffic.

Tests are executed in a controlled environment that mirrors production as closely as possible (Flask web/API server, blockchain node(s), database, and monitoring stack) and use tools such as JMeter or Gatling to simulate concurrent users and automated clients. Typical scenarios include a baseline load (small steady number of concurrent users to measure normal TPS and latency), sustained load (long-running moderate concurrency to detect memory leaks or degradation), spike tests (rapid surge to observe throttling and recovery), soak/soak-stability tests (extended low/medium load to check for resource creep), and special stress tests that increase PoW difficulty or force heavy block-processing to reveal bottlenecks in mining or persistence. During each run, collect metrics for average, 95th and 99th percentile latencies, peak and average TPS, CPU/memory/disk utilization, request error rates, and block confirmation times; inspect logs for errors and monitor.

Whether the system remains responsive or experiences timeouts, crashes, or data inconsistencies. Pass/fail criteria should be defined up Common bottlenecks to watch for include CPU-bound PoW computation, synchronous blocking in the web stack, and disk I/O on the ledger store,tuning database writes and connection pooling, adding caching for read-heavy endpoints, increasing worker processes or using async servers, and scaling horizontally with load balancers and additional validator nodes. After each test cycle, analyze results, fix or tune the system, and rerun tests until performance targets are met; document test plans, scripts, monitoring dashboards, and results so performance can be reproduced and validated before deployment.

8.5 SECURITY TESTING

Security testing for the Secured Transaction of Money Using Blockchain system focuses on ensuring that all data, transactions, user credentials, and cryptographic keys remain protected from unauthorized access, tampering, and cyberattacks. Since financial applications demand strong security, comprehensive tests were conducted to validate authentication, authorization, encryption, input validation, and blockchain integrity.

This included verifying that user passwords are securely hashed, private keys are encrypted, and all communication between client and server occurs over HTTPS. Penetration tests were performed to detect vulnerabilities such as SQL injection, cross-site scripting (XSS), broken session management, weak password controls, and insecure API endpoints.

The blockchain layer was tested to ensure that block data cannot be modified, that proof-of-work logic prevents malicious block creation, and that any attempt to tamper with a block is immediately detected by the chain validation process. Security testing also examined protection against replay attacks, double-spending attempts, unauthorized wallet access, and manipulation of transaction data. Tools like OWASP ZAP, Burp Suite, and custom scripts were used to simulate attacks and verify that the system securely handles invalid inputs, excessive requests, and forced errors without leaking sensitive information.

Additionally, access control was tested to make sure only verified users can perform transactions and administrative functionalities are properly restricted. The results of security testing confirmed that the blockchain-based transaction system is resistant to common cyber threats, enforces strong encryption and validation mechanisms, and provides a secure environment for digital money transfers.

8.6 USABILITY TESTING

Usability testing for the Secured Transactions Money Using Blockchain system focuses on evaluating how easily and effectively users can interact with the application's features, including registration, login, wallet creation, and money transfer. The purpose of this testing is to ensure that the blockchain-based system remains simple, user- friendly, and understandable even for non-technical users. During usability testing, selected participants are asked to perform key tasks such as creating an account, verifying their identity, generating a wallet address, sending and receiving money, and checking transaction history on the blockchain. Their actions, difficulties, mistakes, and time taken to complete tasks are closely observed to identify any usability problems.

The test also examines whether the interface is clear, instructions are easy to follow, and feedback messages understandable. Special attention is given to blockchain-specific elements, ensuring they do not confuse users and that steps such as entering wallet addresses, viewing confirmations, or handling delays are smooth and intuitive. Testers pay close attention to the time taken to complete each task, the number of errors made, and the level of confusion faced by users, especially in areas involving wallet addresses, QR codes, private key management, and transaction confirmations.

Usability testing also checks whether the system provides proper feedback messages, such as alerts for incorrect inputs, confirmation messages for successful transactions, and warnings for suspicious activities. Based on the feedback, improvements are suggested to simplify navigation, clarify technical terms, enhance visual indicators, and reduce user errors.

Overall, usability testing helps confirm that the system provides a secure yet comfortable user experience, balancing advanced blockchain technology with easy and efficient usability for all types of users. Usability testing ensures that the system delivers a smooth, comfortable, and secure user experience by balancing high-level blockchain security with easy-to-understand and efficient user interactions for all types of users.

CHAPTER 9

RESULT AND DISCUSSION

The project Secured Transaction Money Using Blockchain was developed with the objective of creating a highly secure, transparent, and tamper-proof financial transaction system using blockchain technology. The work carried out in this project involved a complete design and implementation of a decentralized transaction platform that overcomes the limitations of traditional banking systems, such as centralization, vulnerability to fraud, and lack of transparency. Throughout the development process, significant attention was given to building a user-friendly interface that allows users to register, login, create wallets, transfer money, view transaction history, and monitor blockchain confirmations without needing technical expertise.

The system architecture was designed using a distributed ledger model, where every financial transaction is validated through a consensus mechanism and recorded inside immutable blocks. This ensures that once a transaction is added to the blockchain, no unauthorized person can alter, delete, or manipulate the data. Extensive work was also carried out on ensuring wallet security through private key generation, encryption techniques, and secure authentication methods such as OTP verification and hashed password storage.

The work process began with identifying system requirements and understanding the problems in the existing centralized transaction models. A detailed analysis was performed to highlight issues like single-point failure, delays in processing, lack of transparency, and susceptibility to data breaches. Based on this study, a blockchain- based architecture was selected as the foundation for the system because it distributes data across multiple nodes, reduces dependency on a single authority, and ensures transparency through a shared ledger.

During the development stage, smart contracts were implemented to automate transaction validations, reduce human error, and provide instant confirmation messages

to users. The wallet module was developed to generate unique addresses for each user, enabling secure fund transfers between accounts. For usability, QR scanning was included to help users avoid errors while entering long wallet addresses. The transaction module was built to verify the sender's balance, initiate the transaction, broadcast the transaction to the blockchain network, and update the ledger once confirmed. Each action performed by the user was tested thoroughly to ensure accuracy, reliability, and efficiency.

A major part of the work involved ensuring the security of transactions from the moment they were initiated until they were permanently stored on the blockchain. To achieve this, cryptographic hashing was applied to each block, linking them together in chronological order, which prevents any tampering attempts. The system also integrates timestamping and digital signatures to verify the authenticity of every transaction. For example, when a user transfers money, the transaction is signed using their private key and validated through peer-to-peer network nodes before becoming a part of the blockchain. This eliminates the possibility of double-spending, a common issue in digital financial systems.

Additionally, the project emphasized user access control by restricting unauthorized entry, preventing brute-force attacks, and monitoring abnormal account behavior. The interface was designed to be simple and responsive, ensuring smooth performance even during peak usage. The backend logic was optimized for speed, reducing transaction confirmation delays and making the system comparable to real- time banking services. The testing phase included functional testing, performance testing, integration testing, and usability testing to ensure the system worked flawlessly across various scenarios.

Functional testing confirmed that all modules-registration, authentication, wallet generation, fund transfer, transaction tracking, and user dashboard-worked accurately under multiple scenarios. Integration testing ensured that all components communicated seamlessly, with proper synchronization between the front-end interface,

back-end server, and blockchain network. Performance testing showed that the system handled multiple transactions concurrently without slowdown, demonstrating scalability. Security testing further validated the platform's safety by checking its resistance to attacks and attempts to modify blockchain data.

The results of the project demonstrate that the blockchain-based secured transaction system is highly effective in providing safe, fast, and transparent money transfers. The system successfully maintained data integrity, prevented unauthorized modifications, and offered complete transaction traceability. During testing, users were able to register easily, create wallets, send and receive money, and track transaction status without facing technical difficulties. The blockchain ledger consistently displayed accurate and updated information, proving its reliability. No data loss or manipulation was observed, showcasing the immutability and robustness of the blockchain structure. Smart contract execution ensured that every transaction followed predefined rules, improving consistency and reducing manual verification. Compared to traditional centralized systems, the blockchain-based platform showed significant improvements in security, transparency, and user confidence. The decentralized nature of the system also ensured continuous availability even if one or more nodes failed.

In conclusion, the work carried out in the Secured Transaction Money Using Blockchain project successfully proved that blockchain technology is a superior solution for creating a secure, transparent, and efficient digital transaction system, how immutability prevents tampering, and how cryptographic methods ensure strong user authentication and data integrity. The system performed exceptionally well across all testing phases, showing the potential to be used for real-world financial applications and digital payment systems. The results confirm that blockchain-based transaction platforms can significantly reduce fraud, improve transparency, and build trust among users. Overall, the project not only accomplished its goals but also showcased how blockchain can revolutionize the security and functionality of digital financial services in the future.

CHAPTER 10

CONCLUSION AND FUTURE WORK

10.1 CONCLUSION

The project Secured Transaction Money Using Blockchain successfully demonstrates how blockchain technology can be used to create a highly secure, reliable, and transparent system for digital monetary transactions. Throughout the development and implementation of this project, we explored how traditional centralized financial systems often face challenges such as data manipulation, cyberattacks, server failures, and lack of transparency. In contrast, the decentralized nature of blockchain helps eliminate these shortcomings by distributing data across multiple nodes, ensuring that no single entity has complete control over transaction records. The work carried out in this project proves that blockchain is not only a technological innovation but also a practical solution for providing enhanced security, trust, and integrity in financial operations. By applying cryptographic hashing, digital signatures, public–private key mechanisms, and immutable ledger structures, the system ensures that every transaction is recorded in a tamper-proof manner, making it nearly impossible for attackers to alter or falsify data. This confirms the capability of blockchain to strengthen digital financial systems and build confidence among users.

The conclusion drawn from this project highlights that the developed system is capable of performing secure money transactions with high accuracy and efficiency. Through the implementation of smart contracts, transaction validation becomes automated, removing human dependency and reducing the chances of errors or fraudulent activities. The system also provides real-time updates and confirmation messages to users, allowing them to easily track the status of their transactions. One of the major achievements of the project is the creation of a user-friendly interface that

simplifies complex blockchain operations. Even users without technical knowledge can register, login, manage digital wallets, send and receive funds, and review transaction history without difficulty. This usability ensures that blockchain technology is not limited to experts but can be adopted by the general public. The platform built in this project also demonstrated strong resilience against cyber threats such as double spending, unauthorized access, data breaches, and replay attacks. The decentralized validation mechanism ensures continuous service availability, even if certain nodes fail or become compromised. All these features reinforce the reliability and robustness of the system created.

Overall, the project successfully meets its objectives of designing and implementing a secured blockchain-based transaction system that is transparent, decentralized, and easy to use. This collaborative and distributed system ensures neutrality and fairness, reducing delays and operational costs. The immutability of the blockchain ledger ensures long-term preservation of transaction data, making it suitable for large-scale applications in banking, e-commerce, government payments, and financial services. In conclusion, this project not only emphasizes the power of blockchain to transform the digital transaction landscape but also opens opportunities for future research and enhancements such as integrating AI-based fraud detection, multi-signature wallets, improved consensus algorithms, and cross-chain payment solutions. The successful completion of this project confirms that blockchain technology will continue to evolve and serve as a foundation for secure, fast, and transparent financial systems in the future.

10.2 FUTURE WORK

The current system for secured transaction money using blockchain establishes a strong foundation for transparent, tamper-proof, and efficient financial operations; however, several enhancements can be incorporated in the future to improve security, scalability, and real-world adoption. One major area of future work is the integration of

advanced consensus mechanisms such as Proof-of-Authority (PoA), Delegated Proof- of-Stake (DPoS), or practical Byzantine Fault Tolerance (pBFT) algorithms.

These advanced consensus models also make the system more suitable for enterprise-level use cases where trust is semi-centralized but security must remain uncompromised. Another future improvement involves incorporating cross-chain interoperability, enabling secure communication between different blockchain networks. This would allow users to transfer value across various chains, improve asset flexibility, and open possibilities for integrating multiple financial systems under a unified secured transaction model.

In addition, future work can focus on implementing smart contract auditing and automated verification to ensure that the transaction rules, validation logic, and security policies embedded within the system are free from vulnerabilities.. Integrating Artificial Intelligence (AI) and Machine Learning (ML) models can further enhance the system by enabling fraud detection, anomaly identification, and predictive security analysis. By continuously monitoring transaction patterns, AI-driven systems can trigger alerts and even block malicious activities in real time, thereby strengthening the overall security posture.

Future enhancement is improving user identity management through decentralized identity (DID) frameworks. Instead of relying on centralized databases for storing personal information, DIDs allow users to control their identity credentials while ensuring privacy and compliance with regulations like KYC/AML. This approach reduces the risk of data breaches and enhances trust across user communities. Additionally, developing mobile-based blockchain wallets with biometric authentication, QR-based payments, and offline transaction support can make the system more user-friendly and accessible, especially in rural or developing regions.

In conclusion, the proposed future enhancements for the secured transaction money system using blockchain demonstrate the vast potential for further innovation and improvement. By integrating advanced consensus algorithms, enabling cross-chain interoperability, implementing AI-based fraud detection, and adopting decentralized identity management, the system can become more secure, scalable, and user-friendly.

APPENDIX – A

SOURCE CODE

```
import hashlib
import datetime
import json
import logging
app = Flask(__name__)
# Set up logging to console
logging.basicConfig(level=logging.DEBUG)
# Blockchain class
class Blockchain:
    def __init__(self):
        self.chain = []
        # Create the genesis block
        self.create_block(proof=1, previous_hash='0')
    def create_block(self, proof, previous_hash, data=None):
        block = {
            'index': len(self.chain) + 1,
            'timestamp': str(datetime.datetime.now()),
            'proof': proof,
            'previous_hash': previous_hash,
            'data': data
```

```
        }
        block_hash = self.hash(block)
        block['hash'] = block_hash  # Add the block hash to the block
        self.chain.append(block)
        app.logger.debug(f"New block created: {block}")  # Log the block creationa
        return block
    def get_previous_block(self):
        return self.chain[-1]
    def proof_of_work(self, previous_proof):
        new_proof = 1
        check_proof = False
        while not check_proof:
            hash_operation = hashlib.sha256(str(new_proof**2 -
previous_proof**2).encode()).hexdigest()
            if hash_operation[:4] == '0000':
                check_proof = True
            else:
                new_proof += 1
        return new_proof
    def hash(self, block):
        encoded_block = json.dumps(block, sort_keys=True).encode()
        return hashlib.sha256(encoded_block).hexdigest()
    def is_chain_valid(self):
```

```
        previous_block = self.chain[0]
        block_index = 1
        while block_index < len(self.chain):
            block = self.chain[block_index]
            if block['previous_hash'] != self.hash(previous_block):
                return False
            previous_proof = previous_block['proof']
            proof = block['proof']
            hash_operation = hashlib.sha256(str(proof**2 -
previous_proof**2).encode()).hexdigest()
            if hash_operation[:4] != '0000':
                return False
            previous_block = block
            block_index += 1
        return True
# Instantiate the Blockchain
blockchain = Blockchain()
@app.route('/')
def index():
    app.logger.debug(f"Current blockchain: {blockchain.chain}") # Log the blockchain
state
    return render_template('index.html', chain=blockchain.chain)
@app.route('/submit_transaction', methods=['POST'])
```

```
def submit_transaction():
    payee_name = request.form['payeeName']
    amount_transfer = request.form['amountTransfer']
    data = {
        'PayeeName': payee_name,
        'AmountTransfer': amount_transfer
    }
    previous_block = blockchain.get_previous_block()
    proof = blockchain.proof_of_work(previous_block['proof'])
    previous_hash = previous_block['hash']
    block = blockchain.create_block(proof, previous_hash, data)
    # Print the transaction details along with the hash in the terminal
    app.logger.debug(f"New transaction submitted:")
    app.logger.debug(f"PayeeName: {payee_name}")
    app.logger.debug(f"AmountTransfer: {amount_transfer}")
    app.logger.debug(f"Block Hash: {block['hash']}")
    app.logger.debug(f"Previous Hash: {previous_hash}")
    return redirect(url_for('index'))
if __name___== '__main__':
    app.run(debug=True)
```

INDEX.html:

```
<!DOCTYPE html>
```

```
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Blockchain Transaction System</title>
    <style>
        * {
            margin: 0;
            padding: 0;
            box-sizing: border-box;
        }
        body {
            font-family: 'Inter', 'Segoe UI', system-ui, sans-serif;
            background: #0a0e27;
            min-height:  100vh;
            overflow-x: hidden;
            position: relative;
        }
        /* Animated background */
        body::before {
            content: '';
            position: fixed;
            top: 0;
            left: 0;
            width: 100%;
            height: 100%;
            background:
                radial-gradient(circle at 20% 50%, rgba(120, 119, 198, 0.3) 0%, transparent
50%),
```

```
            radial-gradient(circle at 80% 80%, rgba(99, 102, 241, 0.3) 0%, transparent
50%),
            radial-gradient(circle at 40% 20%, rgba(147, 51, 234, 0.2) 0%, transparent
50%);
        animation: backgroundMove 20s ease infinite;
        z-index: 0;
    }

    @keyframes backgroundMove {
        0%, 100% { opacity: 1; transform: scale(1); }
        50% { opacity: 0.8; transform: scale(1.1); }
    }
    .container {
        max-width: 1400px;
        margin: 0 auto;
        padding: 40px 20px;
        position: relative;
        z-index: 1;
    }
    /* Header Section */
    .header {
        text-align: center;
        margin-bottom: 60px;
        animation: fadeInDown 1s ease;
    }
    .logo-container {
        background: rgba(216, 244, 242, 0.05);
        backdrop-filter: blur(20px);
        border: 1px solid rgba(255, 255, 255, 0.1);
        border-radius: 30px;
```

```
        padding: 30px;
        margin-bottom: 40px;
        box-shadow:
            0 20px 60px rgba(0, 0, 0, 0.3),
            inset 0 1px 0 rgba(255, 255, 255, 0.1);
        transition: transform 0.3s ease;
        position: relative;
    }
    .logo-container:hover {
        transform: translateY(-5px);
    }
    .logo-container img {
        max-width:  100%;
        height: auto;
        border-radius: 20px;
        box-shadow: 0 10px 40px rgba(0, 0, 0, 0.3);
        display: block;
    }
    h1 {
        color: #ffffff;
        font-size: 3.5em;
        font-weight: 700;
        background: linear-gradient(135deg, #fbfcffff 0%, #ffffffff 50%, #ffffffff
100%);
        -webkit-background-clip: text;
        -webkit-text-fill-color: transparent;
        background-clip: text;
        animation: gradientShift 5s ease infinite;
        position: absolute;
```

```
    top: 50%;
    left: 50%;
    transform: translate(-50%, -50%);
    width: 100%;
    margin: 0;
    z-index: 2;
    text-shadow: 2px 2px 10px rgba(0, 0, 0, 0.8);
}
@keyframes gradientShift {
    0%, 100% { filter: hue-rotate(0deg); }
    50% { filter: hue-rotate(20deg); }
}
.subtitle {
    color: #a5b4fc;
    font-size: 1.3em;
    font-weight: 300;
    display: flex;
    align-items: center;
    justify-content: center;
    gap: 15px;
}
.badge {
    background: rgba(99, 102, 241, 0.2);
    padding: 8px 16px;
    border-radius: 20px;
    font-size: 0.85em;
    border: 1px solid rgba(99, 102, 241, 0.3);
}
```

```
/* Transaction Form - Glass morphism */
.transaction-section {
    display: grid;
    grid-template-columns: 1fr 1fr;
    gap: 30px;
    margin-bottom: 60px;
    animation: fadeInUp 1s ease;
}
.stats-panel {
    background: rgba(255, 255, 255, 0.05);
    backdrop-filter: blur(20px);
    border: 1px solid rgba(255, 255, 255, 0.1);
    border-radius: 30px;
    padding: 40px;
    box-shadow: 0 20px 60px rgba(0, 0, 0, 0.3);
}
.stats-panel h3 {
    color: #ffffff;
    font-size: 1.5em;
    margin-bottom: 30px;
    display: flex;
    align-items: center;
    gap: 12px;
}
.stat-item {
    background: rgba(99, 102, 241, 0.1);
    padding: 20px;
    border-radius: 15px;
```

```
    margin-bottom: 15px;
    border-left: 4px solid #6366f1;
    transition: all 0.3s ease;
}
.stat-item:hover {
    background: rgba(99, 102, 241, 0.2);
    transform: translateX(5px);
}
.stat-label {
    color: #a5b4fc;
    font-size: 0.9em;
    margin-bottom: 8px;
}
.stat-value {
    color: #ffffff;
    font-size: 2em;
    font-weight: 700;
}
.transaction-form {
    background: rgba(255, 255, 255, 0.05);
    backdrop-filter: blur(20px);
    border: 1px solid rgba(255, 255, 255, 0.1);
    border-radius: 30px;
    padding: 40px;
    box-shadow: 0 20px 60px rgba(0, 0, 0, 0.3);
}
.transaction-form h3 {
    color: #ffffff;
```

```
    margin-bottom: 30px;
    font-size: 1.8em;
    display: flex;
    align-items: center;
    gap: 12px;
}
.form-group {
    margin-bottom: 25px;
}
label {
    display: block;
    color: #a5b4fc;
    font-weight: 600;
    margin-bottom: 10px;
    font-size: 0.95em;
    display: flex;
    align-items: center;
    gap: 8px;
}
input[type="text"] {
    width: 100%;
    padding: 16px 20px;
    background: rgba(255, 255, 255, 0.05);
    border: 2px solid rgba(255, 255, 255, 0.1);
    border-radius: 15px;
    font-size: 1em;
    color: #ffffff;
    transition: all 0.3s ease;
```

```
}
input[type="text"]::placeholder {
    color: rgba(255, 255, 255, 0.3);
}
input[type="text"]:focus {
    outline: none;
    border-color: #6366f1;
    background: rgba(255, 255, 255, 0.08);
    box-shadow: 0 0 0 4px rgba(99, 102, 241, 0.1);
}
input[type="submit"] {
    width: 100%;
    padding: 18px;
    background: linear-gradient(135deg, #667eea 0%, #764ba2 100%);
    color: white;
    border: none;
    border-radius: 15px;
    font-size: 1.1em;
    font-weight: 700;
    cursor: pointer;
    transition: all 0.3s ease;
    text-transform: uppercase;
    letter-spacing: 1px;
    box-shadow: 0 10px 30px rgba(102, 126, 234, 0.4);
}
input[type="submit"]:hover {
    transform: translateY(-3px);
    box-shadow: 0 15px 40px rgba(102, 126, 234, 0.6);
```

```
}
input[type="submit"]:active {
    transform: translateY(-1px);
}
/* Blockchain Section */
.blockchain-section {
    animation: fadeInUp 1.2s ease;
}
.blockchain-header {
    text-align: center;
    margin-bottom: 40px;
}

.blockchain-header h3 {
    color: #ffffff;
    font-size: 2.5em;
    margin-bottom: 15px;
    font-weight: 700;
}
.blockchain-header p {
    color: #a5b4fc;
    font-size: 1.2em;
}
.blocks-container {
    display: grid;
    grid-template-columns: repeat(auto-fill, minmax(380px, 1fr));
    gap: 30px;
}
```

```
.block {
    background: rgba(255, 255, 255, 0.05);
    backdrop-filter: blur(20px);
    border: 1px solid rgba(255, 255, 255, 0.1);
    border-radius: 25px;
    padding: 30px;
    box-shadow: 0 15px 40px rgba(0, 0, 0, 0.3);
    transition: all 0.4s cubic-bezier(0.175, 0.885, 0.32, 1.275);
    position: relative;
    overflow: hidden;
}
.block::before {
    content: '';
    position: absolute;
    top: 0;
    left: 0;
    width: 100%;
    height: 4px;
    background: linear-gradient(90deg, #667eea, #764ba2, #f093fb);
    animation: shimmer 3s infinite;
}
@keyframes shimmer {
    0% { transform: translateX(-100%); }
    100% { transform: translateX(100%); }
}
.block:hover {
    transform: translateY(-10px) scale(1.02);
    box-shadow: 0 25px 60px rgba(102, 126, 234, 0.4);
```

```
    border-color: rgba(102, 126, 234, 0.5);
}
.block-header {
    display: flex;
    align-items: center;
    justify-content: space-between;
    margin-bottom: 25px;
    padding-bottom: 20px;
    border-bottom: 1px solid rgba(255, 255, 255, 0.1);
}
.block-icon-wrapper {
    display: flex;
    align-items: center;
    gap: 15px;
}
.block-icon {
    width: 60px;
    height: 60px;
    background: linear-gradient(135deg, #667eea 0%, #764ba2 100%);
    border-radius: 50%;
    display: flex;
    align-items: center;
    justify-content: center;
    font-size: 1.8em;
    box-shadow: 0 10px 25px rgba(102, 126, 234, 0.4);
    animation: pulse 2s infinite;
}
@keyframes pulse {
```

```
    0%, 100% { transform: scale(1); }
    50% { transform: scale(1.05); }
}
.block-number {
    background: rgba(99, 102, 241, 0.2);
    padding: 8px 16px;
    border-radius: 12px;
    color: #6366f1;
    font-weight: 700;
    font-size: 0.9em;
}
.block-info {
    margin-bottom: 20px;
}
.block-info strong {
    color: #a5b4fc;
    display: block;
    margin-bottom: 8px;
    font-size: 0.85em;
    text-transform: uppercase;
    letter-spacing: 1px;
}
.block-info p {
    color: #ffffff;
    font-size: 1.3em;
    font-weight: 600;
}
.amount {
```

```
    background: linear-gradient(135deg, #10b981, #059669);
    -webkit-background-clip: text;
    -webkit-text-fill-color: transparent;
    background-clip: text;
    font-size: 1.8em !important;
    font-weight: 800 !important;
}
.block-timestamp {
    color: #64748b;
    font-size: 0.85em;
    margin-top: 15px;
    padding-top: 15px;
    border-top: 1px solid rgba(255, 255, 255, 0.05);
}
/* Animations */
@keyframes fadeInDown {
    from {
        opacity: 0;
        transform: translateY(-50px);
    }
    to {
        opacity: 1;
        transform: translateY(0);
    }
}
@keyframes fadeInUp {
    from {
        opacity: 0;
```

```
        transform: translateY(50px);
    }
    to {
        opacity: 1;
        transform: translateY(0);
    }
}
/* Responsive Design */
@media (max-width: 1024px) {
    .transaction-section {
        grid-template-columns: 1fr;
    }
}
@media (max-width: 768px) {
    h1 {
        font-size: 2.2em;
    }
    .subtitle {
        flex-direction: column;
        gap: 10px;
    }
    .transaction-form, .stats-panel {
        padding: 25px;
    }
    .blocks-container {
        grid-template-columns: 1fr;
    }
}
```

```
        /* Glow effect */
        .glow {
            animation: glow 2s ease-in-out infinite alternate;
        }
        @keyframes glow {
            from {
                text-shadow: 0 0 10px #6366f1, 0 0 20px #6366f1, 0 0 30px #6366f1;
            }
            to {
                text-shadow: 0 0 20px #764ba2, 0 0 30px #764ba2, 0 0 40px #764ba2;
            }
        }
    </style>
</head>
<body>
    <div class="container">
        <div class="header">
            <div class="logo-container">
                <h1 class="glow">Blockchain Banking</h1>
                <img src="{{ url_for('static', filename='blockchain.jpg') }}" alt="Blockchain
Logo">
            </div>
            <div class="subtitle">
                <span class="badge">🔒 Secure</span>
                <span class="badge">⚡ Instant</span>
                <span class="badge">🌐 Decentralized</span>
            </div>
        </div>
```

```
        <div class="transaction-section">
            <div class="stats-panel">
                <h3> Network Stats</h3>
                <div class="stat-item">
                    <div class="stat-label">Total Blocks</div>
                    <div class="stat-value">{{ chain|length }}</div>
                </div>
                <div class="stat-item">
                    <div class="stat-label">Total Transactions</div>
                    <div class="stat-value">{{ chain|length - 1 }}</div>
                </div>
                <div class="stat-item">
                    <div class="stat-label">Network Status</div>
                    <div class="stat-value" style="font-size: 1.5em; color: #10b981;">● LIVE</div>
                </div>
            </div>
            <div class="transaction-form">
                <h3> New Transaction</h3>
                <form action="{{ url_for('submit_transaction') }}" method="POST">
                    <div class="form-group">
                        <label for="payeeName"> Recipient Name</label>
                        <input type="text" name="payeeName" id="payeeName" placeholder="Enter recipient's name" required>
                    </div>
                    <div class="form-group">
                        <label for="amountTransfer"> Transfer Amount</label>
                        <input type="text" name="amountTransfer" id="amountTransfer" placeholder="Enter amount (e.g., 1000)" required>
```

```
            </div>
            <input type="submit" value="Send Transaction">
        </form>
    </div>
</div>
<div class="blockchain-section">
    <div class="blockchain-header">
        <h3>Transaction Ledger</h3>
        <p>Immutable and transparent transaction history</p>
    </div>
    <div class="blocks-container">
        {% for block in chain %}
        <div class="block">
            <div class="block-header">
                <div class="block-icon-wrapper">
                    <div class="block-
                </div>
                <div class="block-number">BLOCK #{{ block.index }}</div>
            </div>
            <div class="block-info">
                <strong>Recipient</strong>
                <p>{{ block.data['PayeeName'] if block.data else 'Genesis Block'
}}</p>
            </div>
            <div class="block-info">
                <strong>Amount Transferred</strong>
                <p class="amount">{{ block.data['AmountTransfer'] if block.data else
'-' }}</p>
            </div>
```

```
                <div class="block-timestamp">
                    {{ block.timestamp }}
                </div>
            </div>
            {% endfor %}
        </div>
    </div>
</body>
</html>
```

APPENDIX – B

SCREENSHOTS

Output

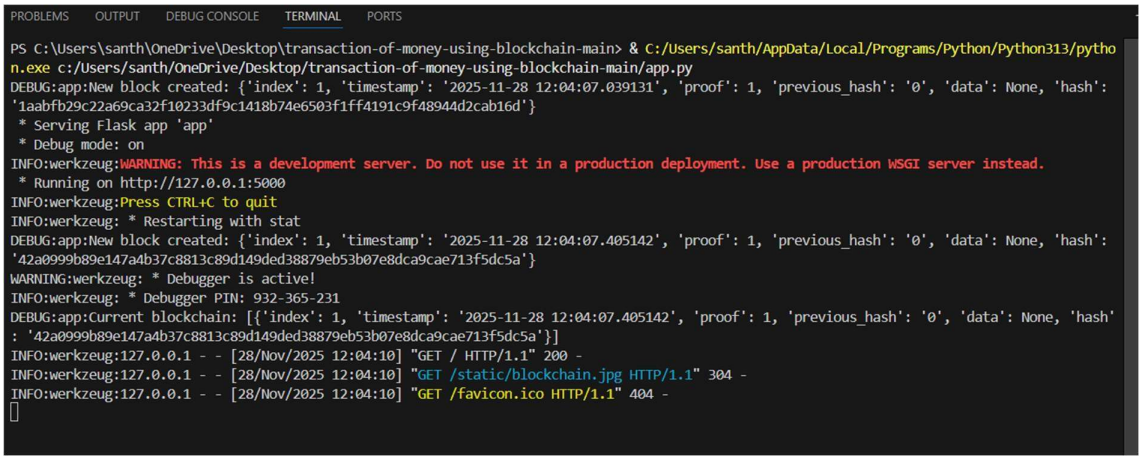

Fig. B.1. Implementaion

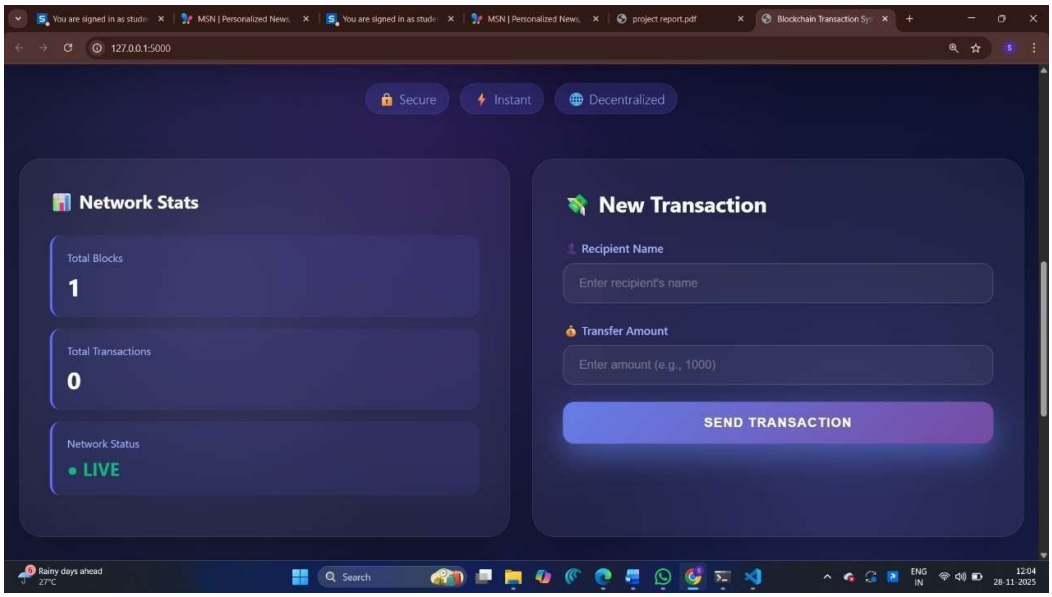

Fig B.2. User Interface

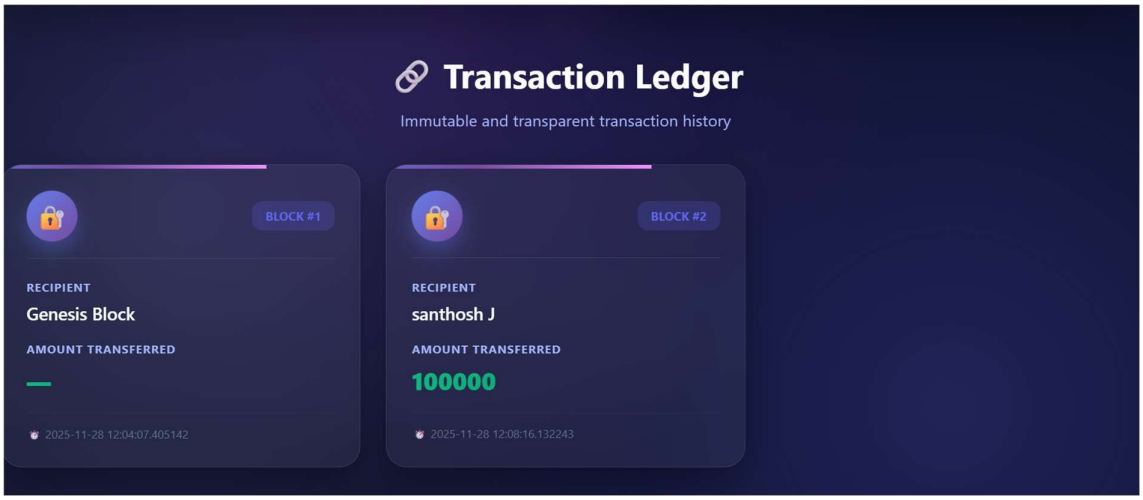

Fig B.3. Transaction details

Fig. B.4. Hash value Generation

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