A PROJECT REPORT
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BONAFIDE CERTIFICATE

Certified that this project report titled **"Secure Banking System using Blockchain Technology"** is the bonafide work of **Akshat Nigam (18BCY10010), Alkesh Gupta (18BCY10012), Shreyansh Saxena(18BCY10093),** and **Fardeen Ahmed (18BCY10034)** who carried out the project work under my supervision. Certified further that to the best of my knowledge the work reported at this time does not form part of any other project/research work based on which a degree or award was conferred on an earlier occasion on this or any other candidate.

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ABSTRACT

When payment systems were first computerized, the underlying processes were not significantly changed. While records and ledgers have been converted from paper to electronic form, the basic structure of centralized payment systems remained. The Indian banking industry today is struggling with issues such as rising costs of operations, increasing susceptibility to fraudulent attacks on centralized servers, and challenges in ensuring transparency.

We aimed to create a web 3.0 compliant application built on top of a cloud-based architecture hence overcoming the current challenges which the conventional financial systems are facing i.e. lack of transparency, delay in fund settlement, and reducing the chances of fraudulent activities.

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1. PROJECT DESCRIPTION AND OUTLINE

1.1. Introduction

When payment systems were first computerized, the underlying processes were not significantly changed. While records and ledgers have been converted from paper to electronic form, the basic structure of centralized payment systems remained.

Blockchain technology introduces a fundamentally different, decentralized structure into payment systems, with cryptography rather than a central clearing institution as to its very basis, and without intermediaries such as banks.

1.2. Motivation for the work

The Indian banking industry today is struggling with issues such as rising costs of operations, increasing susceptibility to fraudulent attacks on centralized servers, and challenges in ensuring transparency.

All this, primarily because most of the banking transactions may require intensive manual processing and documentation, involve costly intermediaries, and are time-consuming as these transactions need to be validated by various participants at various points in time causing delay thereby resulting in almost no fraud-proof real-time solution.

1.3. Introduction to the project

The goal is to create a web 3.0 compliant application built on top of a cloud-based architecture using NEAR protocol. It's a virtualization application

that aims to provide a distributed system through which a user can transmit a token and also features to ease out its transaction process will also be provided.

1.4. Problem Statement

To overcome the drawbacks of conventional financial systems, like lack of transparency, higher security risks because of centralized servers, delays in fund settlements due to complex internal processes, also the issue of higher transaction costs due to a global customer base.

1.5. Objective of the work

To create a decentralized blockchain-based banking system that can bring in transparency, proper security methods for user authentication and in turn reduce the transaction settlement time. The banking application will be based on blockchain technology providing features such as transactions, token requests, QR payments, etc.

1.6. Summary

Most banking transactions may require intensive manual processing and documentation, involve costly intermediaries, and are time-consuming as these transactions need to be validated by various participants at various points in time causing delay thereby resulting in almost no fraud-proof real-time solution.

Blockchain technology introduces a fundamentally different, decentralized structure into payment systems, with cryptography rather than a central clearing institution as to its very basis, and without intermediaries such as banks. The Indian banking industry today is struggling with issues such as rising costs of

operations, increasing susceptibility to fraudulent attacks on centralized servers, and challenges in ensuring transparency.

2. RELATED WORK INVESTIGATION

2.1. Introduction

Blockchain technology is a core, underlying technology with promising application prospects in the banking industry. On one hand, the banking industry is facing the impact of interest rate liberalization and profit decline caused by the narrowing interest-rate spread[1].

2.2. Existing Work

Blockchain application and outlook in the banking industry, Ye Guo and Chen Liang, 2016

In this paper, Ye Guo and Chen Liang had presented their idea by examining the Chinese Banking sector. They said that Blockchains could revolutionize the underlying technology of the payment clearing and credit information systems in banks, thus upgrading and transforming them.

Blockchain Technology and the Financial Services Market, Krause, et al., 2017

The technology could remove trusted third parties, decrease costs and ultimately increase profits for various players within the industry. Although public blockchains provide high data security and transparency, they are relatively slow if a high number of transactions need to be processed. In the field of payment transactions, it could reshape the current correspondent banking processes and lead to cost savings.

BlockChain & Financial Inclusion, Prof. Reena Aggrawal, 2017

A world bank report, 2014 said that around 2 billion individuals who don't have access to banking services. From which 20.6% of unbanked individuals are from India. This paper discussed that blockchain can play a significant role in the financial Inclusion process. It says that F.I. using blockchain for internal and cross-border payments can lower costs, shorten settlement time, and provide a better user experience.

Blockchain in banking, Deloitte, 2017

As transactions are being done up on Blockchain, Blockchain DLT and all the relevant parties can view and verify the processes. There is only one source of truth and transactions cannot be processed further unless all the relevant parties agree and authenticate it.

2.3. Pros and cons of the conventional financial system

Pros

I. Higher customer trust.
II. Transactions are private to the bank and customer.
III. Interests in deposits.

Cons

I. A centralized approach increases the security risk
II. Lack of transparency
III. Increased transactional cost due to higher internal processes.

2.4. Issues/observations from the investigation

After studying the conventional financial system we observed that customer trust is much higher than in the newer blockchain-based financial system because of its complex nature of working. We also discovered that the cost of establishment of the conventional banking system is much higher than it will take to set up a blockchain-based decentralized banking system.

2.5. Summary

We discovered a requirement to develop a system that can solve the challenges they confront after examining the existing work and finance systems. We believe that a decentralized system will be able to tackle these issues. Blockchain is a borderless entity that allows for banking at any time, anywhere, and in any way. When compared to traditional banking services, this provides us with all of the features and numerous benefits. Controls that might minimize or eliminate the identified risks, as applicable to the organization's activities, are offered during this phase of the process. The purpose of the proposed controls is to decrease the amount of risk to an acceptable level for the IT system and its data.

3. REQUIREMENT ARTIFACTS

3.1. Hardware Requirements

1. System for development

3.2. Software requirements

Frameworks	Languages	IDE
1. React	JavaScript	VS Code
2. Material UI	HTML & CSS	-
3. NEAR Blockchain	AssemblyScript	-

3.3. Specific Project requirements

3.3.1. Data requirement:

No such Data Requirement

3.3.2. Functions requirement

1. Users can create their account in our application
2. Users can transfer funds from one account to another.
3. Users can use QR to easily transact funds from one account to another.
4. Users can request money from other users on the network.
5. Users can view their entire transaction history.

3.3.3. Performance and security requirements

1. Users can use passphrases for secure login and transaction purposes.
2. System validates the user input for account, phone numbers & email-id.

3.3.4. Look and Feel Requirements

1. Responsive design
2. Easy to use features

4. DESIGN METHODOLOGY AND ITS NOVELTY

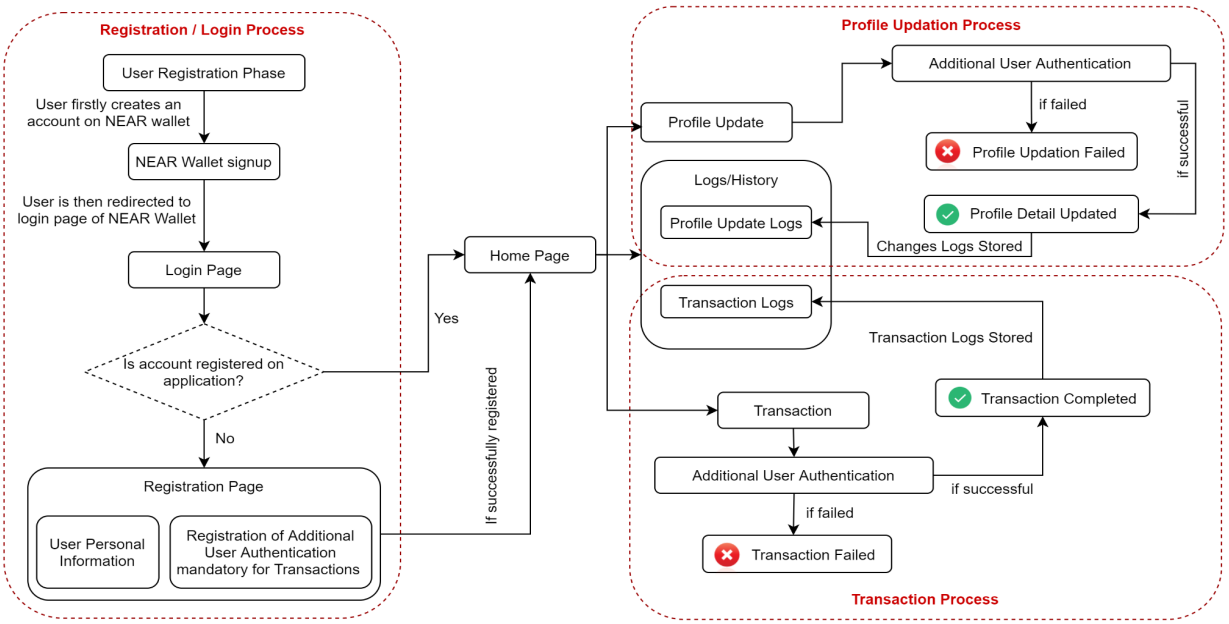
4.1. Methodology and goal

We aim to develop a web-based serverless application which works on a decentralized system for handling transactions between users ruling out the utilization of any centralized database. All the transactions are to be verified by smart contract and stored in the NEAR Blockchain. The application will be built on the top of a cloud-based infrastructure which will be a community-operated cloud instead of a company-operated cloud. Appropriate additional levels of security measures will be implemented for the user authentication before any transactions occur.

4.2. Functional modules design and analysis

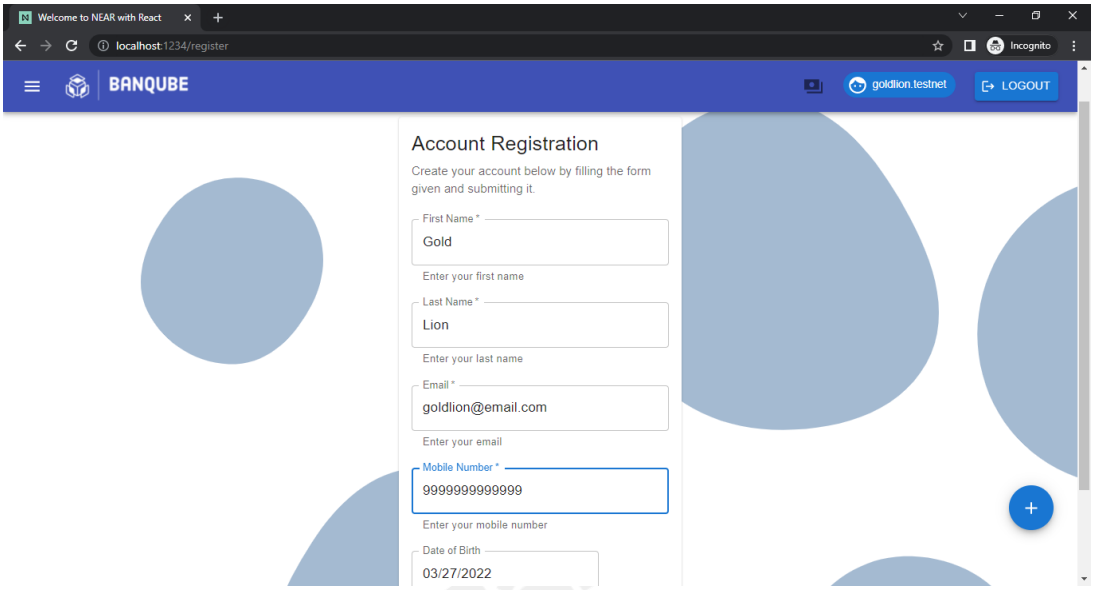
1. **Authentication Module :** User Registration & Login Process will be implemented under this module using NEAR wallet authentication. If a user provides information that meets the authentication criteria, the user is validated. If the user provides information that does not meet the authentication criteria, the user is not validated and denied.
2. **Profile Details Module :** New users need to fill details including email, mobile number, DOB etc, will be handled by this module.
3. **Transaction Module :** Money Transaction process between user accounts is accomplished using this module the user can send or receive/ request a token from other users on the network. This module also facilitates fast payment for users with the help of QR methodology.
4. **Logs & History Module :** User transaction history will be managed under this module where users can view their entire transaction details including transaction type(Send/Received), transacted to/from, amount, date-time and message.

4.3. Software Architectural design

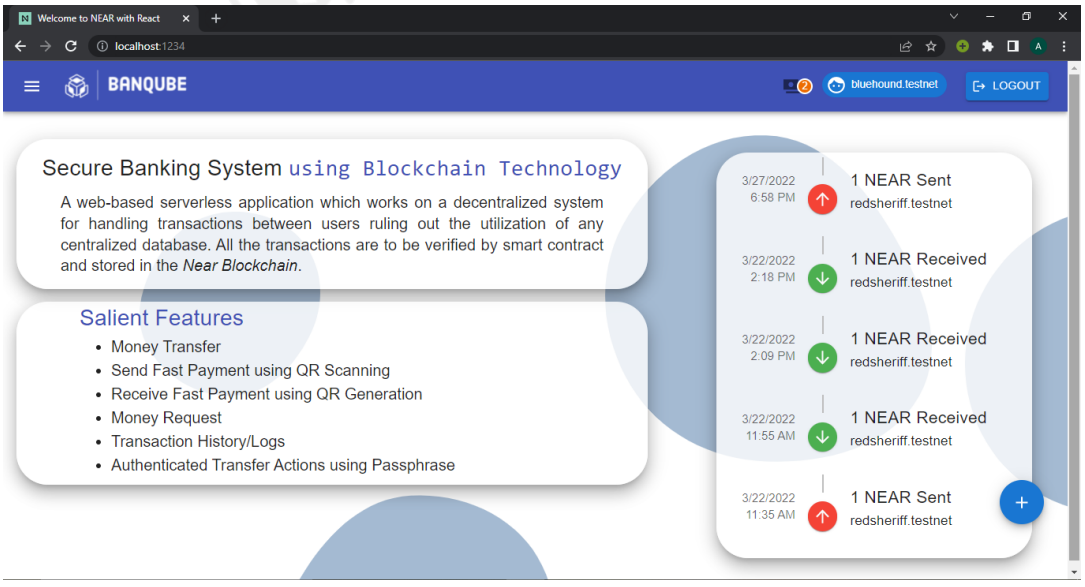


4.4. User Interface designs

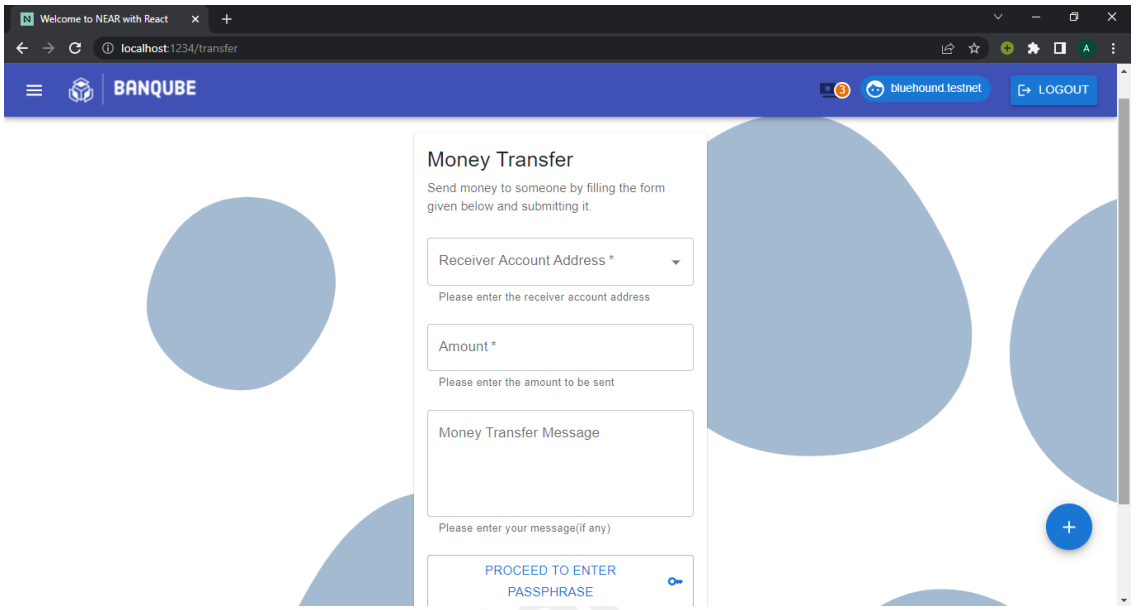
1. Registration Page :



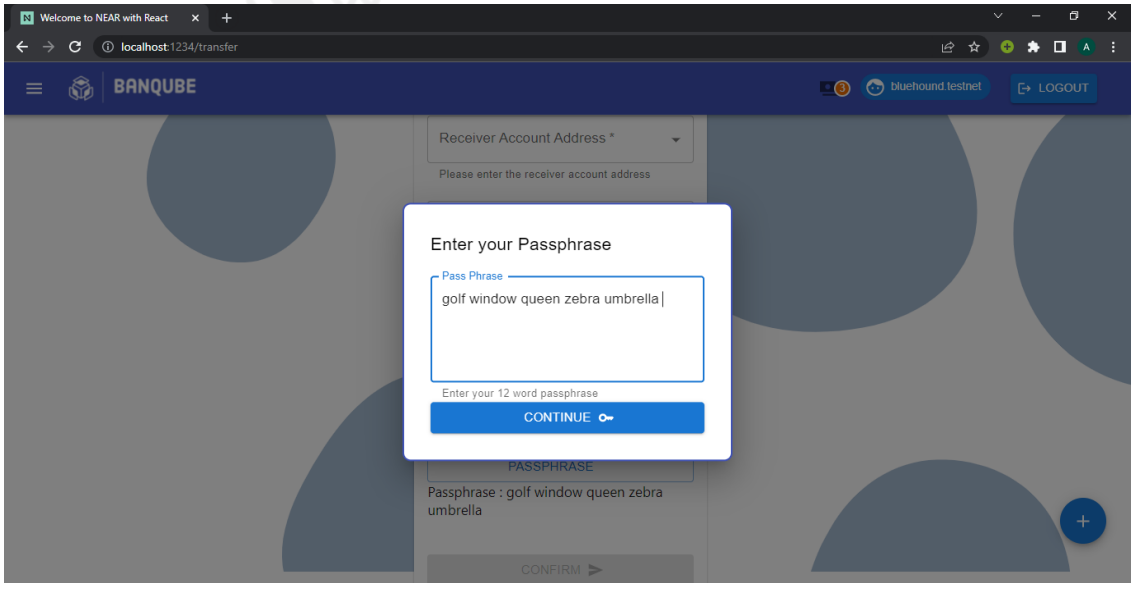
2. Home Screen :



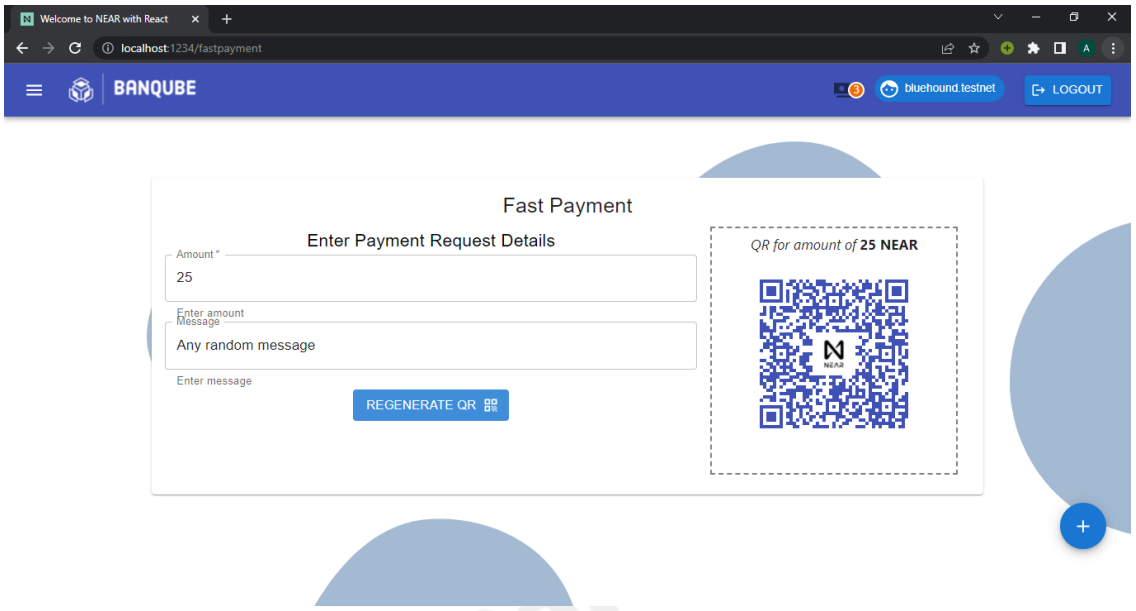
3. Money Transfer Page :



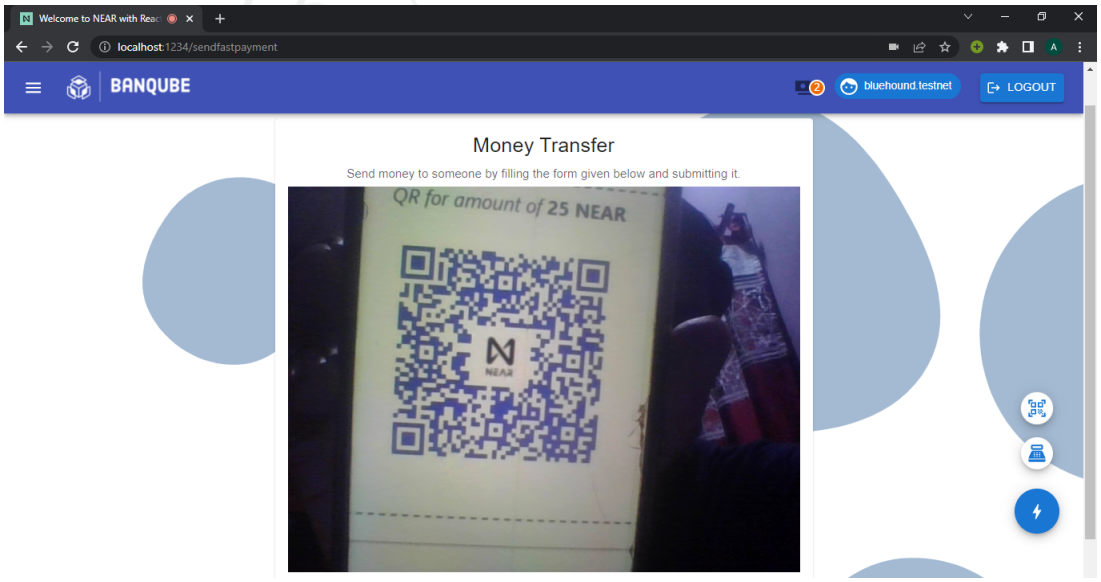
4. Passphrase Security



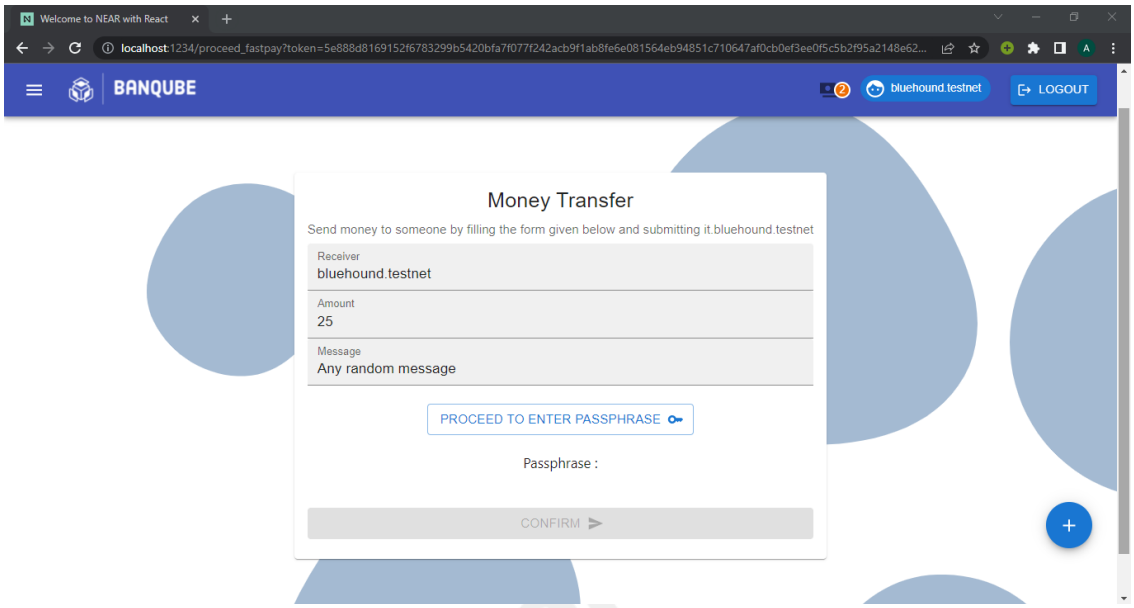
5. Receive Fast Payment through QR Generation



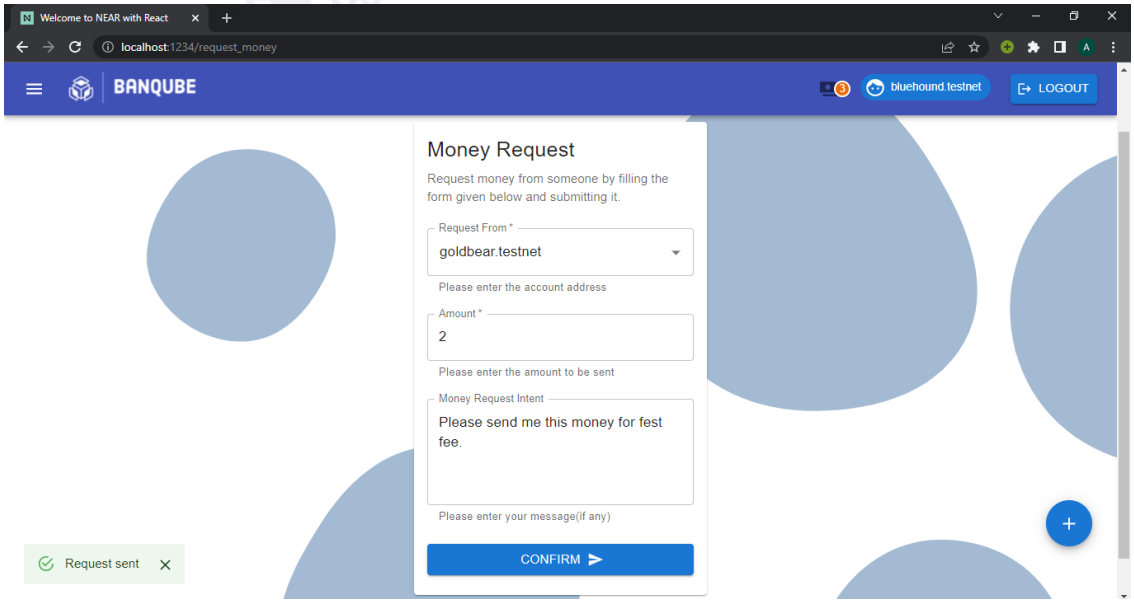
6. Send Fast Payment through QR Scanning



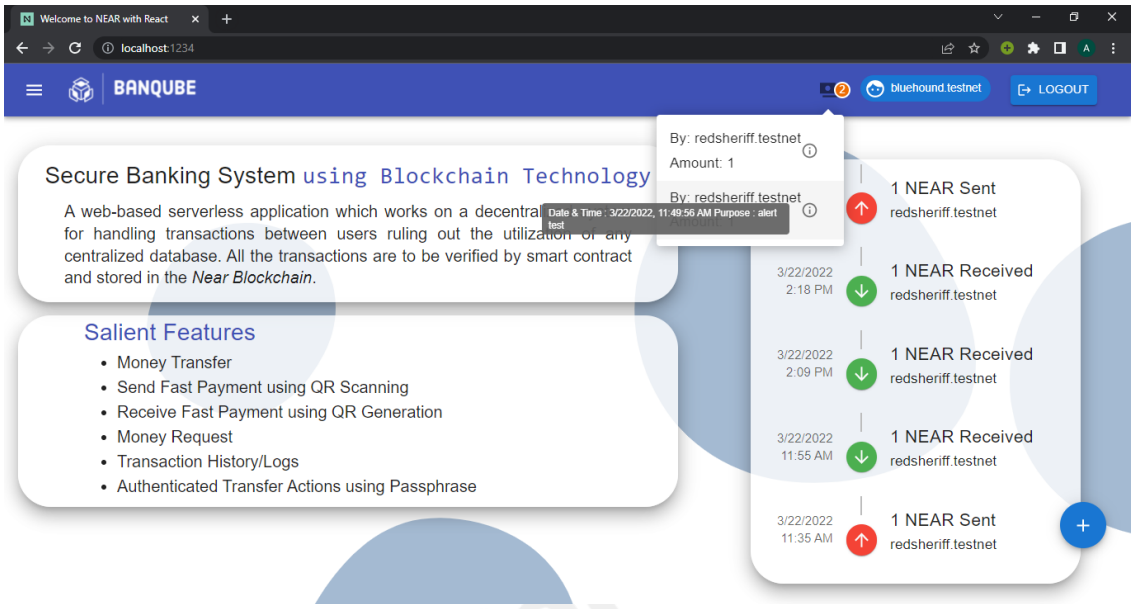
7. Form auto fill up through QR Scanning



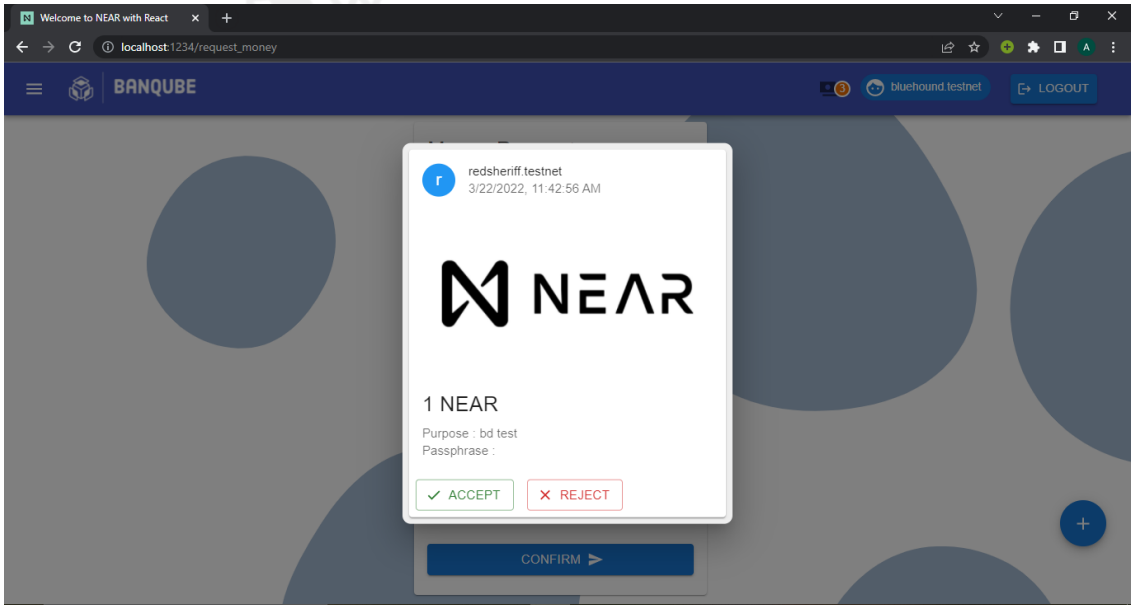
8. Money Request



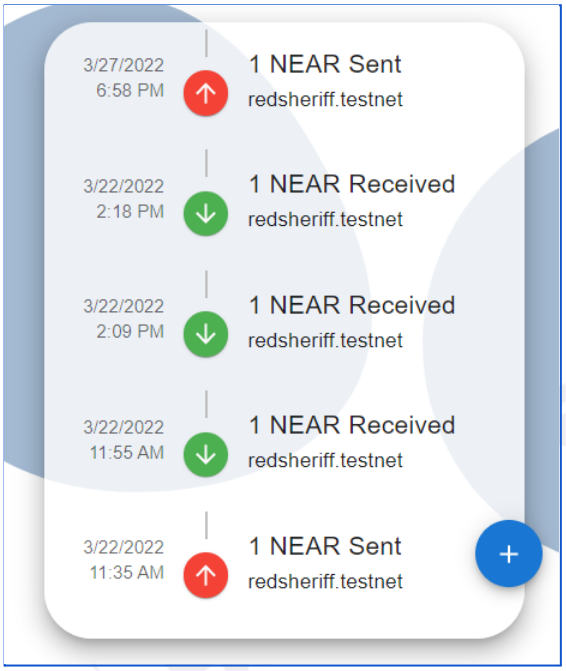
9. New Money Request Notification



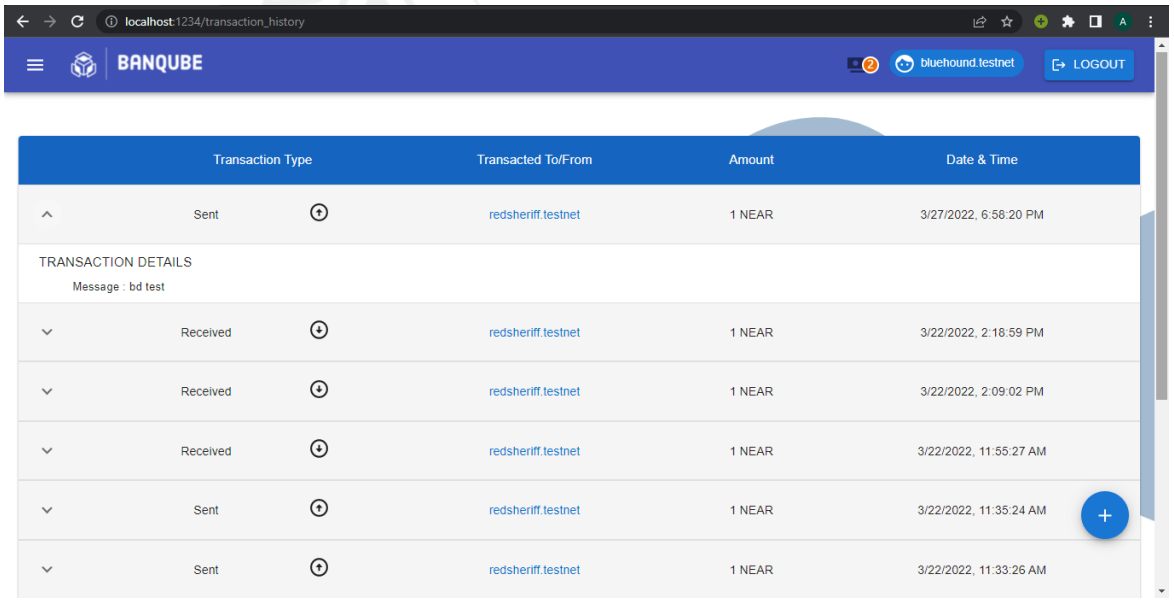
10. Accept / Reject New Money Requests



11. Recent Transactions



12. Transfer History



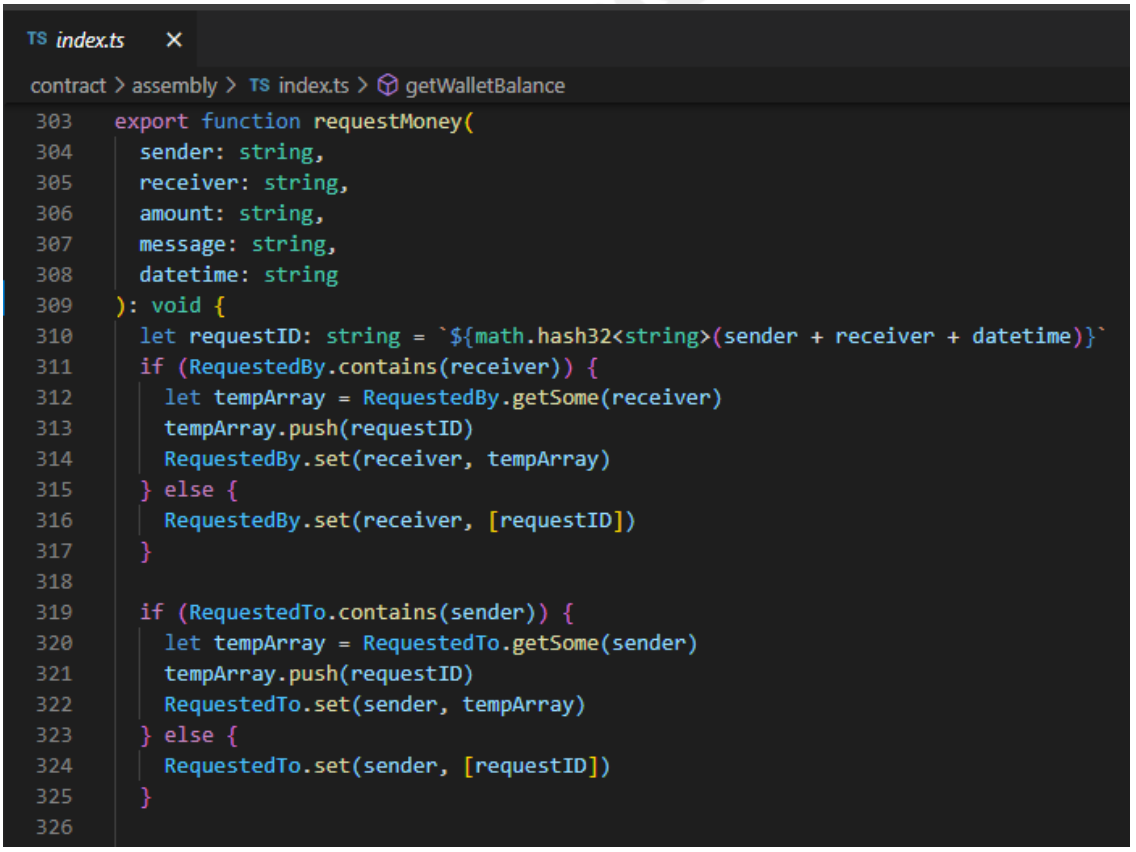
5. TECHNICAL IMPLEMENTATION & ANALYSIS

5.1. Outline

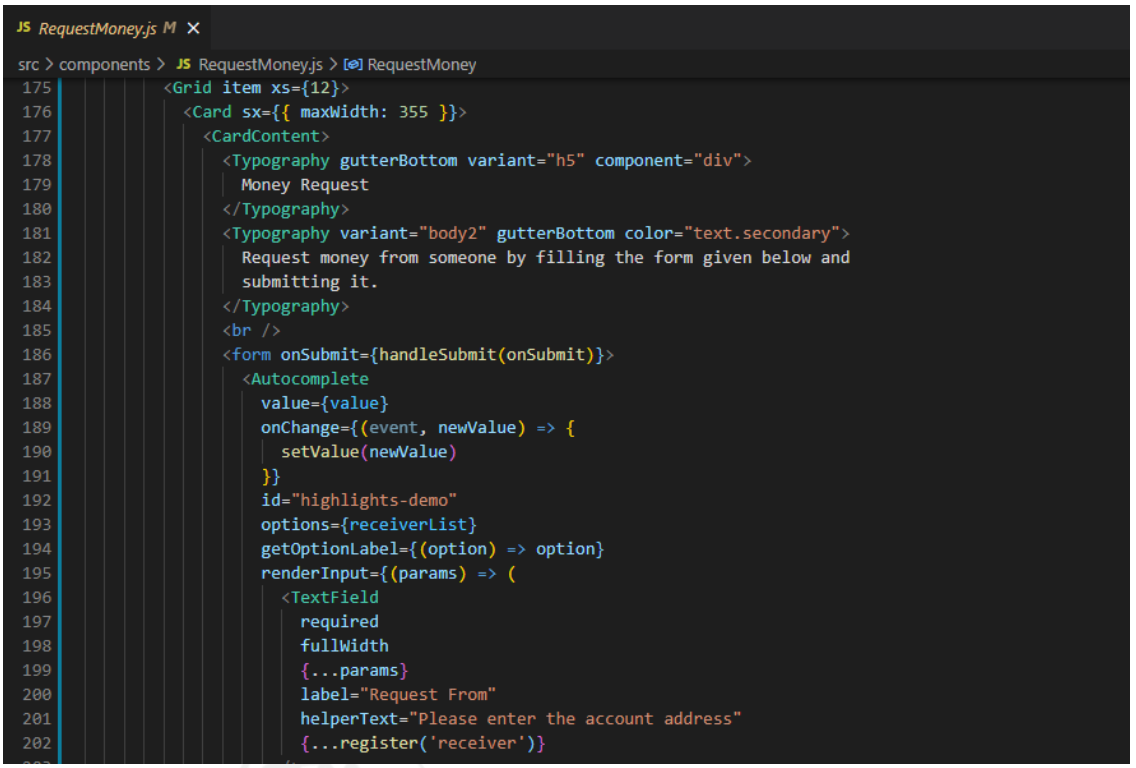
The project emcompasses various technical modules making the entire workflow and outline, NEAR Blockchain acts as the ledger for our transaction processes. The Registration Module serves the purpose to register new users in the network, once the user is registered they can transact tokens with other users on the network with the help of Transfer Token module. The QR module makes the process of transaction faster for the users through which they use the generated QR to send/receive payments and payment requests respectively.

5.2. Technical coding and code solutions

AssemblyScript :



React :



5.3. Prototype submission

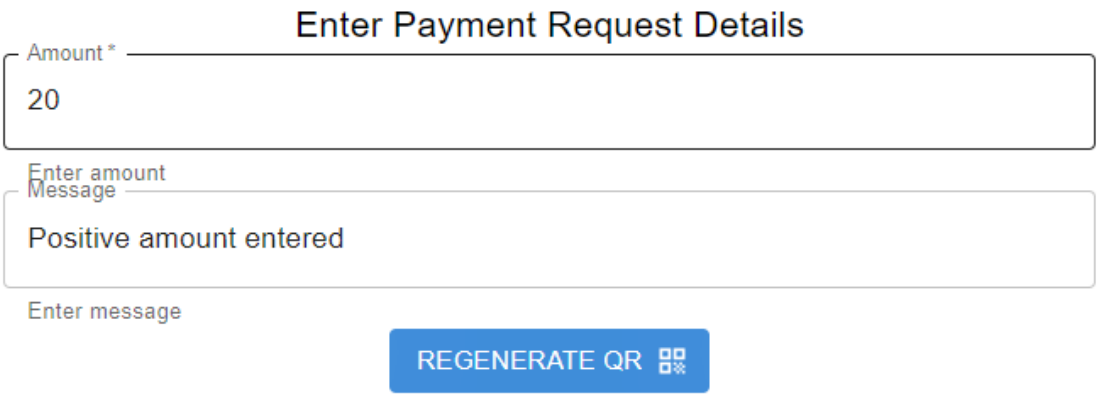
GITHUB REPO LINK : [Github Link]

5.4. Test and validation

1. Wrong Amount Value

a. Positive Amount

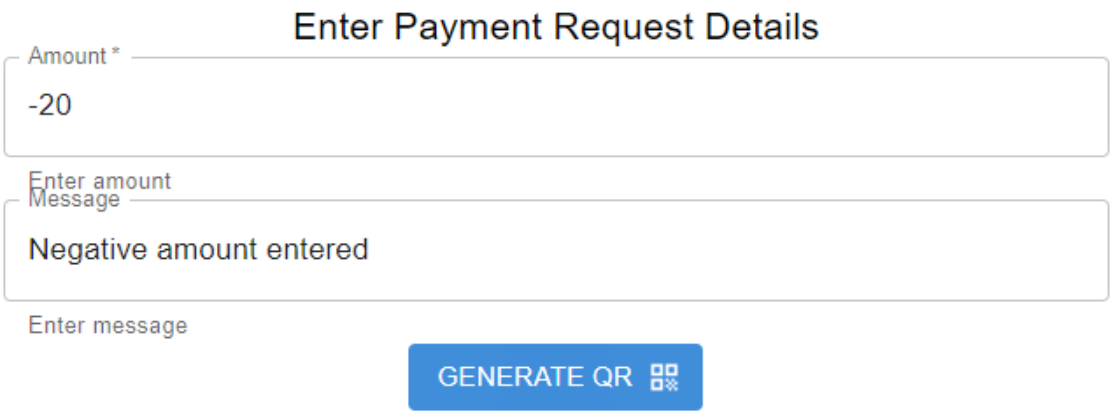
Correct Input :



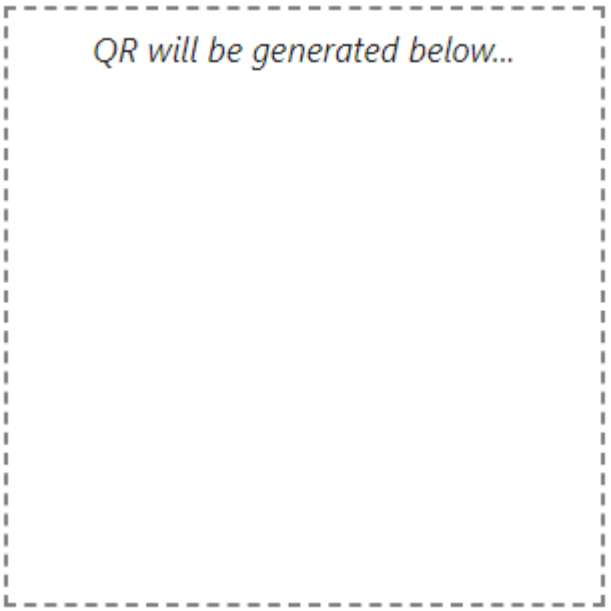
Output :

b. Negative Amount

Incorrect Input :



Output : (No output generated)



2. **Passphrase Length**
    a. **12 Word Long Passphrase**

    Input : (Example) pectioniela fowarten proationizes hoddlen convold perchery pate forminsting adowniferta winfirn lusplamao onizes

    Output : pectioniela fowarten proationizes hoddlen convold perchery pate forminsting adowniferta winfirn lusplamao onizes

    b. **Less than 12 Word Long Passphrase**

    Input : (Example) roationizes pate forminsting adowniferta winfirn lusplamao onizes

    Output : roationizes pate forminsting adowniferta winfirn lusplamao onizes (Invalid Input)

    c. **More than 12 Word Long Passphrase**

    Input : (Example) pectioniela fowarten proationizes hoddlen convold perchery pate forminsting adowniferta winfirn lusplamao onizes proationizes perchery

    Output : pectioniela fowarten proationizes hoddlen convold perchery pate forminsting adowniferta winfirn lusplamao onizes (sliced 12 words)

6. PROJECT OUTCOME AND APPLICABILITY

6.1. Outline

The banking industry is transitioning from traditional securities to high-tech securities. By duplicating existing asset transactions on the blockchain, industry has begun to experiment with blockchain. In terms of infrastructure, Blockchain is open source software that enables the real-time movement of digital assets between users on a network.

6.2. Key implementations outlines of the System

We have taken into consideration the NEAR blockchain to implement transactions features for users that demonstrate a significant reduction in asset transfer costs and timeframes on its counterpart conventional banking system.

6.3. Significant project outcomes

A blockchain based banking system which works on the principle of immutable distributed ledger we aim to improve the current financial system by incorporating blockchain features in our project. By inclusion of a decentralized structure a higher security is ensured making the financial system more secure.

6.4. Project applicability on Real-world applications

Our project is based on blockchain and finds its applicability in the field of banking sector. The key benefits of Blockchain technology in the banking sector are that it increases efficiency, improves security, provides immutable records, allows for faster transaction times, and eliminates the need for third-party participation, lowering costs. Some of the advantages of using replacing the traditional banking system are:

1. **Faster payments:**

   By offering higher security and lower cost of sending payments, banks could introduce this blockchain service to bring new products to the market.

2. **Clearance and settlement systems**

   A simple bank transfer needs to bypass a complicated system of intermediaries. Whereas with blockchain enables banks to keep track of all the transactions publicly and transparently.

3. **Blockchain in banking as digital identity verification**

   With blockchain, consumers and companies will benefit from accelerated verification processes. Also users will be able to choose how they wish to identify themselves and with whom they agree to share their identity. They will need to register their identity on the blockchain only once.

6.5. Inference

The problems faced by conventional banks are huge investments that are being made to establish a system to ensure the process of transactions as per an article by businessworld[5] . But blockchain allows all the information to be stored in one location. This guarantees the dignity and non-repudiation of the stored data. It allows organizations to access the verification information of a specific customer from another organization and thus avoids duplication of data. A simple bank transfer needs to bypass a complicated system of intermediaries such as custodial services before it reaches its destination; this problem is also resolved by the inclusion of blockchain in banking services.

7. CONCLUSIONS AND RECOMMENDATION

7.1. Limitation/Constraints of the System

This application runs on NEAR testnet and hence needs added passphrase input for each transaction made. This constraint can be sorted out by running the application on NEAR mainnet.

7.2. Future Enhancements

1. Inclusion of Multi-factor authentication inorder of increase the security of the system.
2. User Validation via OTP will be implemented to verify the email and mobile number of users.
3. Email and message notification implemented to notify the user about the activity happening in the account.

7.3. Conclusion

We were able to implement blockchain technology to develop a decentralized, distributed financial system with a transparent token exchange system whilst playing a significant role in accelerating financial inclusion by providing a fast and transparent settlement of transactions. Our system can provide a supportive ecosystem for the private and public banking sector.

We were able to properly execute NEAR token transfers across accounts, as well as their pass security. We also designed a mechanism to request tokens from other users and notify them about the same. Moreover, we also designed an easy-to-use token transfer system using QR code creation and scanning. Lastly, we provided users with an interactive user interface and complete transaction logs for its record.

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1. [Blockchain application and outlook in the banking industry, Ye Guo and Chen Liang, 2016

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