Rayat Shikshan Sanstha's

KARMAVEER BHAURAO PATIL COLLEGE OF ENGINEERING, SATARA

Approved By AICTE, New Delhi, Govt. of Maharashtra(DTE: EN-6270), Affiliated to DBATU, Lonere.

Accredited With 'B++' Grade By 'NAAC'

Department of Computer Science and Engineering

A Project Report

On

Blockchain Based Certificate Generation & Validation System

By

1) Jadhav Omraj Manoj [2062701242033]

2) Dange Akhilesh Vilas [2062701242007]

3) Bhosale Prasenjit Indrajit [2062701242037]

4) Chavan Aniket Sanjay [2062701242013]

5) Deshmukh Yashashri Sandip [2062701242094]

6) Dhumal Akshata Ashok [2062701242008]

Of

Final Year B. Tech Computer Science & Engineering

Under the guidance of

Prof. Shabina Sayyad-Modi

(Department of Computer Science & Engineering)

Academic Year 2023-24

Rayat Shikshan Sanstha's
KARMAVEER BHAURAO PATIL COLLEGE OF ENGINEERING, SATARA
Approved By AICTE, New Delhi, Govt. of Maharashtra(DTE: EN-6270), Affiliated to DBATU, Lonere.
Accredited With 'B++' Grade By 'NAAC'

Department of Computer Science and Engineering

Certificate

This is to certify that this project report entitled "**Blockchain Based Certificate Generation & Validation System**" by

1. Jadhav Omraj Manoj (2062701242033)
2. Dange Akhilesh Vilas (2062701242007)
3. Bhosale Prasenjit Indrajit (2062701242037)
4. Chavan Aniket Sanjay (2062701242013)
5. Deshmukh Yashashri Sandip(2062701242094)
6. Dhumal Akshata Ashok(2062701242008)

Submitted in fulfillment of the requirements for the degree of Bachelor of Technology in Program of the Dr. Babasaheb Ambedkar Technological University, Lonere, during the academic year 2023-24 is a bonafide record of work carried out under our guidance and supervision.

Date:

Place: Satara

Project Guide — Dr Shabina Modi

Head of the Department — Prof. Ganesh D. Dangat

ACKNOWLEDGMENT

We take this opportunity to express our gratitude to “Karmaveer Bhaurao Patil College of Engineering, Satara” and the Computer Science & Engineering Department for sanctioning us the project topic “Blockchain Based Certificate Generation and Validation”” & for allowing access to various Facilities.

We sincerely wish to express hearty thanks to our Project Guide Prof. Shabina Sayyad-Modi for her encouraging & inspiring guidance. her valuable suggestions were a constant source of inspiration for us.

We wish to express our thanks to our Head of Department Prof. Ganesh D. Dangat for encouragement & providing us with the best facilities for our project work. We would also like to thank the other teaching & non-teaching staff.

Last but not the least we would like to thank all our friends, who helped us directly or indirectly. Helpful hand rendered by all of them will remain for a long time in our memory. Finally we admit that cooperation, coordination & hard work are our keywords for success.

Thanking,

1. Jadhav Omraj Manoj
2. Dange Akhilesh Vilas
3. Bhosale Prasenjit Indrajit
4. Chavan Aniket Sanjay
5. Deshmukh Yashashri Sandip
6. Dhumal Akshata Ashok

List of figures

Index

ABSTRACT

The "Online Blockchain-Based Certificate Generation and Validation" project stands at the forefront of revolutionizing traditional certificate management methodologies in the contemporary digital era. Traditional systems have proven vulnerable to security breaches, fraudulent activities, and inefficiencies in the process of certificate issuance and verification. In response to these challenges, the project, named "Blockchain Innovator," proposes an innovative online certificate management system built on the Ethereum blockchain.

This groundbreaking initiative is driven by a commitment to address not only the prevalent security issues but also the inefficiencies inherent in existing systems, particularly in the context of India. The project seeks to provide a comprehensive solution that encompasses the entire certificate lifecycle. By leveraging blockchain technology, the system ensures a heightened level of security, immutability, and transparency in certificate generation and validation processes.

The proposed system is positioned to significantly enhance the integrity of digital certificates by eliminating the risks associated with unauthorized access, forgery, and alterations. The adoption of unique identifiers, smart contracts, and decentralized storage on the Ethereum blockchain underpins a sophisticated yet user-friendly approach. This project strives to establish a new paradigm in certificate management, fostering trust, efficiency, and accessibility for individuals, educational institutions, and organizations alike in the digital age.

In addition to strengthening security measures, the "Blockchain Based Certificate Generation and Validation System" project introduces a significant paradigm shift in the velocity and reliability of certificate issuance and validation. Traditional systems often encounter challenges with protracted processes, thereby impeding the expeditious acquisition and verification of certificates. The proposed system addresses this challenge by seamlessly integrating smart contracts on the Ethereum blockchain. This automated approach not only expedites the certificate issuance process but also ensures prompt and precise verification of certificates. By amalgamating advanced technology with a user- centric design, the project endeavours to establish a novel standard for certificate management systems, offering a swift, secure, and user-friendly experience to align with the demands of the contemporary digital landscape.

1. INTRODUCTION

1.1 Background

In today's swiftly evolving digital era, the necessity for secure and efficient methods of certificate generation and validation has escalated significantly. This project, dubbed "Blockchain Innovator," is crafted to confront the inherent security challenges prevalent in conventional certificate management systems.

The absence of a robust and secure system for certificate generation and validation poses a notable challenge in India, characterized by cumbersome procedures, susceptibility to fraud, and inadequate secure storage for users' certificates. Our proposed online certificate management system, constructed on the Ethereum blockchain, not only confronts these challenges head-on but also resonates with the shifting digital landscape.

Moreover, the project recognizes the paramount importance of trust and transparency in certificate validation. By meticulously recording all certificate-related activities on the blockchain, the system aims to inspire confidence among users, educational institutions, and employers alike. The introduction underscores the project's commitment to furnishing a seamless and secure platform that not only bolsters security but also streamlines the entire certificate validation process, thereby contributing to the broader advancement of digital certification.

As we navigate through an era defined by rapid technological advancements and increasing digitization, the demand for reliable and tamper-proof certification mechanisms has become more pronounced. Traditional paper-based certificates are not only vulnerable to damage or loss but also lack the essential security features needed to counter forgery and manipulation. Recognizing this pressing need, the "Blockchain Innovator" project aims to revolutionize certificate management by harnessing blockchain technology's power. Through this innovative approach, we strive to ensure the integrity, authenticity, and accessibility of digital certificates. By embracing decentralized ledgers and pioneering solutions, our project endeavours to establish a new standard of trust and efficiency in certificate validation, catering to the evolving requirements of individuals, institutions, and industries in the digital age.

2. LITERATURE REVIEW

1) Blockchain Technology in Education:

Blockchain technology has gained significant attention in the education sector for its potential to secure and streamline certificate generation and validation processes.

2) Decentralized Identity and Self-Sovereign Identity:

Many projects and research papers focus on the concept of self-sovereign identity using blockchain, which allows individuals to have control over their digital certificates and credentials.

3) Tamper-Proof Certificates:

Blockchain's immutability ensures that certificates are tamper-proof, and this feature is essential for the security of educational credentials.

4) Smart Contracts for Certificate Issuance:

Smart contracts on blockchain platforms can automate the certificate issuance process, ensuring that certificates are only issued when certain criteria are met.

5) Interoperability and Standards:

Initiatives like the Blockcerts standard aim to create common protocols for issuing and exchanging digital credentials across platforms and organizations.

3. OBJECTIVES

3.1 Problem Statement:

The traditional methods of certificate issuance and verification suffer from significant drawbacks. Certificates are susceptible to damage, theft, and forgery, leading to reliability issues. One major issue is that it's too easy for people to make fake certificates, and this can lead to false claims about their qualifications. Also, it's hard to be sure if a certificate is real or fake because there's no reliable and standard way to check. This affects not only individuals but also educational institutions and employers. Our project, "Online Blockchain-Based Certificate Generation and Validation," aims to solve these important problems. We use blockchain technology to make certificates secure and unchangeable. Our goal is to provide a trustworthy and transparent solution that ensures certificates are real and valuable in our digital world.

3.2 OBJECTIVES:

3.2.1 PROJECT OBJECTIVES:

- **Enhance Document Security:** Develop a highly secure system to protect digital certificates from unauthorized access, forgery, or alterations.
- **Simplify Certificate Issuance:** Establish an efficient process for organizations to issue digital certificates directly on the Ethereum blockchain, reducing paperwork and administrative complexity.
- **Streamline Verification:** Make it easy for individuals and businesses to verify certificate authenticity using unique URLs or QR codes, saving time and effort.
- **Ensure Trust and Transparency**: Record all certificate-related activities on the blockchain to create a transparent and unchangeable audit trail, fostering trust and accountability.
- **Standardize Validation:** Introduce a reliable and standardized method for certificate validation, making it easier to distinguish genuine certificates from counterfeits.

- **Prevent Fraudulent Claims:** Minimize the risk of fraudulent claims by providing a strong and trustworthy system that ensures only legitimate certificates are accepted, benefiting educational institutions, employers, and individuals.

3.2.2 Academic Objectives:

- To gain a deep understanding of Blockchain Technology and its Practical Application in Real-world problems.
- Develop proficiency in smart contract development on the Ethereum blockchain to create a secure and transparent certificate storage solution.
- Develop a comprehensive understanding of the ethical considerations and potential societal impacts of implementing blockchain technology in certificate management.
- Gain proficiency in evaluating the scalability and sustainability of blockchain- based solutions in real-world scenarios.

4. PROJECT OVERVIEW

4.1 Scope:

The scope of the project involves addressing the limitations and challenges of traditional certificate management systems. The focus is on providing a secure and efficient solution for both certificate issuers and verifiers.

4.2 Architecture:

The project's architecture utilizes the Ethereum blockchain, ensuring not only the security of certificates but also interoperability and future adaptability. The interaction between modules, driven by smart contracts, guarantees a seamless and tamper- resistant flow of data.

4.3 Project Modules:

The project comprises several modules, each serving a specific purpose in the certificate generation and validation process. These modules include:

1. **Issuing User Certificate:**
   Users receive their certificates from their respective Institutions, such as universities or government agencies.
2. **Digital Lockers and Blockchain Storage:**
   Each user has a digital locker to securely store their certificates on the Ethereum blockchain using smart contracts, ensuring immutability and security.
3. **Unique Certificate Identifier:**
   Each certificate is associated with a unique hash number that serves as a secure identifier.
4. **Generate unique URL/QR Code:**
   A unique URL or QR code is automatically generated for each certificate, serving as a reference to the certificate stored on the blockchain.
5. **Share Certificates:**
   Users share the URL or generated QR code with organizations and individuals requesting verification.

6. **Organization Verification:**

   Organizations access the **"Blockchain Innovator"** website and use the URL or QR code provided by the user to initiate the authentication process

7. **Validation:**

   The validation process ensures the authenticity of the certificate. The system authenticates certificates by verifying data stored on the blockchain associated with the provided URL or QR code.

5. REQUIREMENT ANALYSIS

5.1 Hardware Requirements:

For the implementation of the project, no specific hardware components are required beyond standard computing equipment. A personal computer with internet connectivity is sufficient for developing and deploying the blockchain-based certificate generation and validation system.

5.2 Software Requirements:

The Software requirements encompass essential tools and technologies vital for the secure and efficient operation of the certificate management system. These tools collectively serve as the backbone of the project, enabling various functionalities and ensuring seamless integration with blockchain technology:

• **Node.js**: As the foundation of our project, Node.js provides a robust runtime environment for executing JavaScript code on the server-side. Its asynchronous and event-driven architecture facilitates high-performance and scalable web applications.

• **Django:** This is a tool that helps in creating web applications and making our project user-friendly.

• **MetaMask:** A browser extension facilitating secure communication with the Ethereum blockchain and providing a user-friendly interface for managing Ethereum accounts.

• **Truffle:** Streamlines smart contract development, testing, and deployment on Ethereum with its suite of tools.

• **Ethereum:** Offers a decentralized ledger for storing certificates and executing smart contracts.

• **Solidity:** The primary programming language for developing secure smart contracts on the Ethereum platform.

6. APPLICATION DESIGN

Project Work Flow Diagram

Data Flow Diagram:

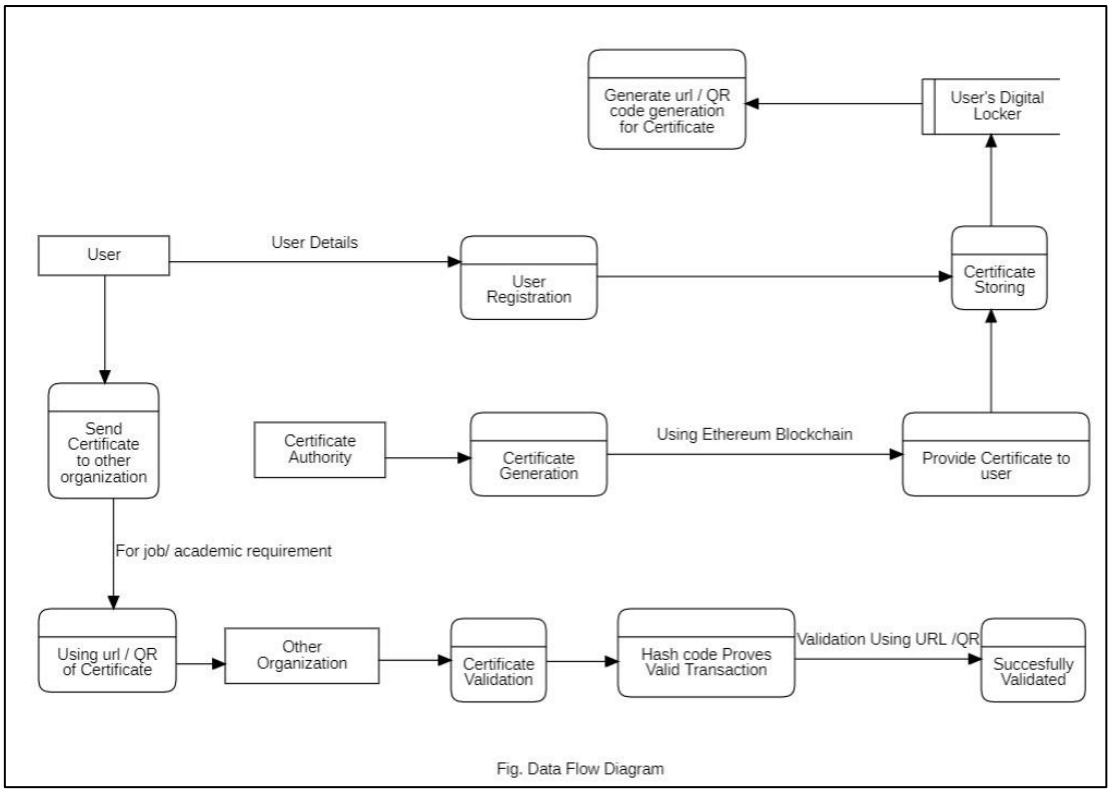
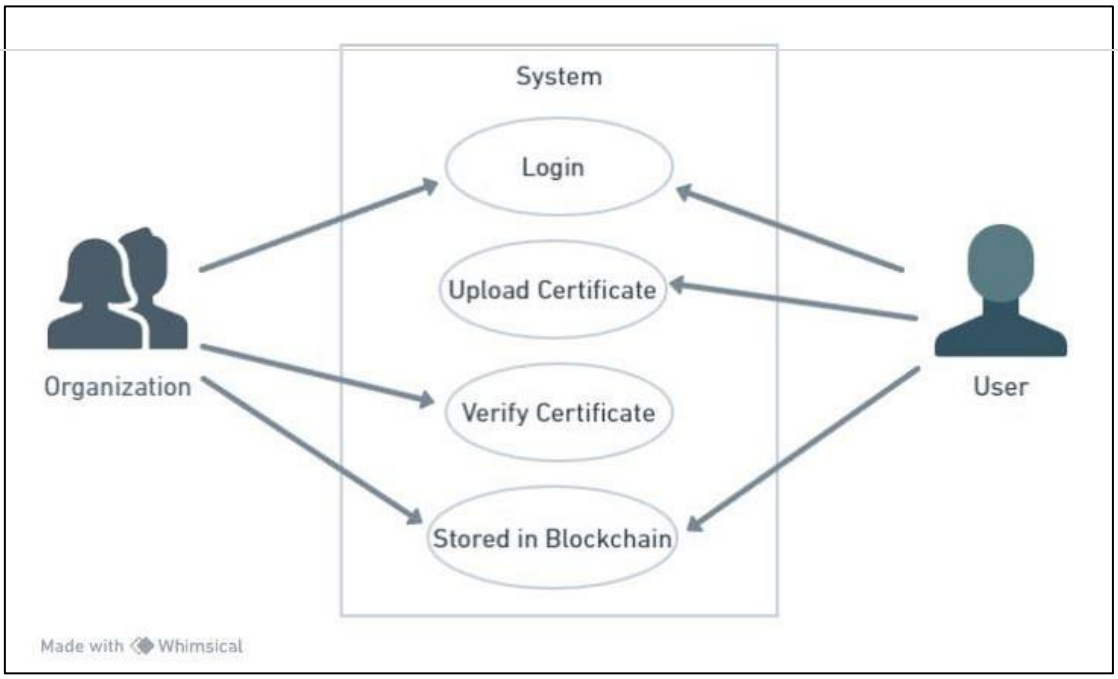


Fig. Data Flow Diagram

6.2 Use Case Diagram:



6.3 Activity Diagram:

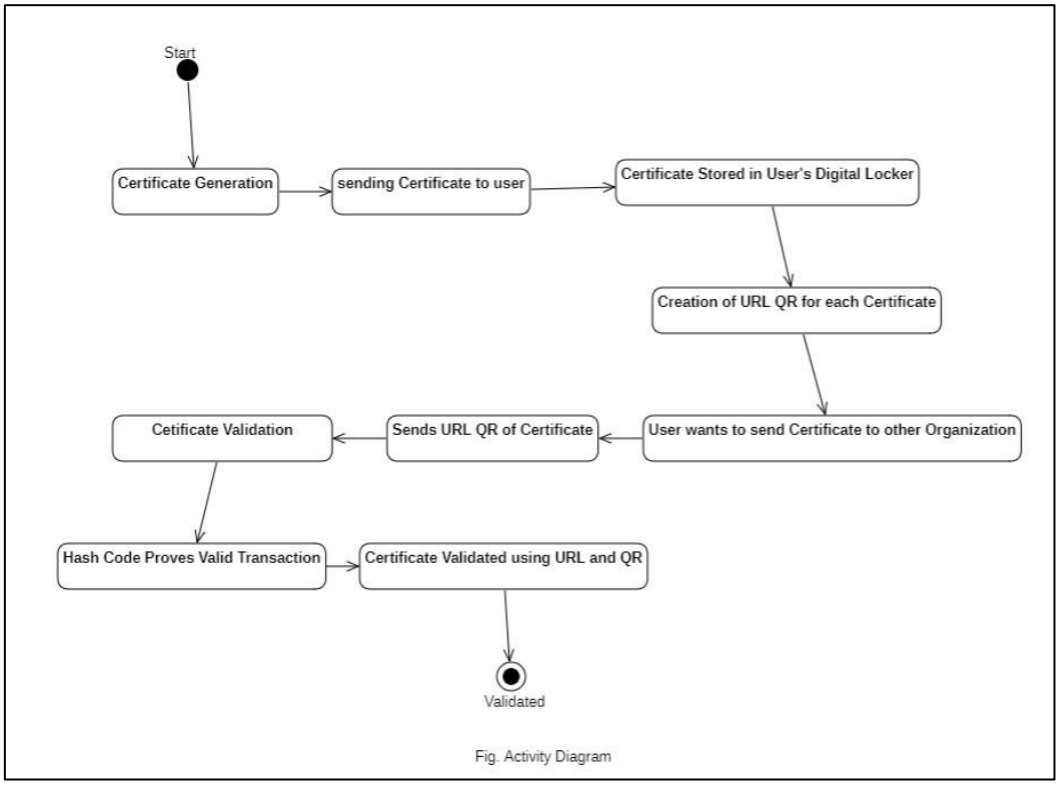
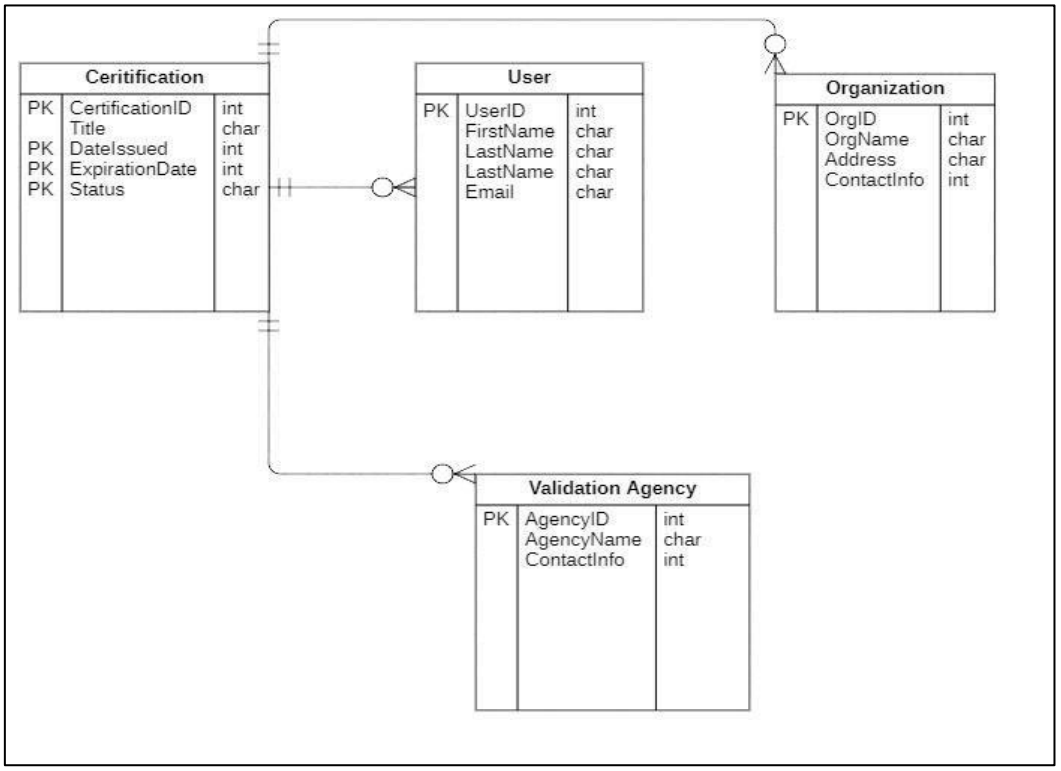
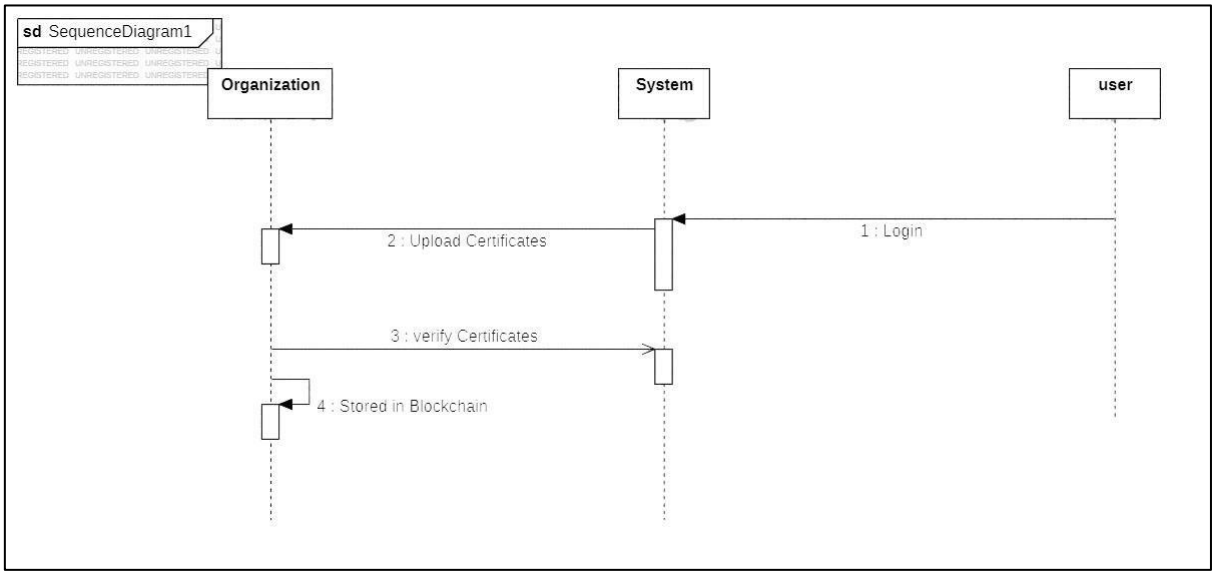


Fig. Activity Diagram

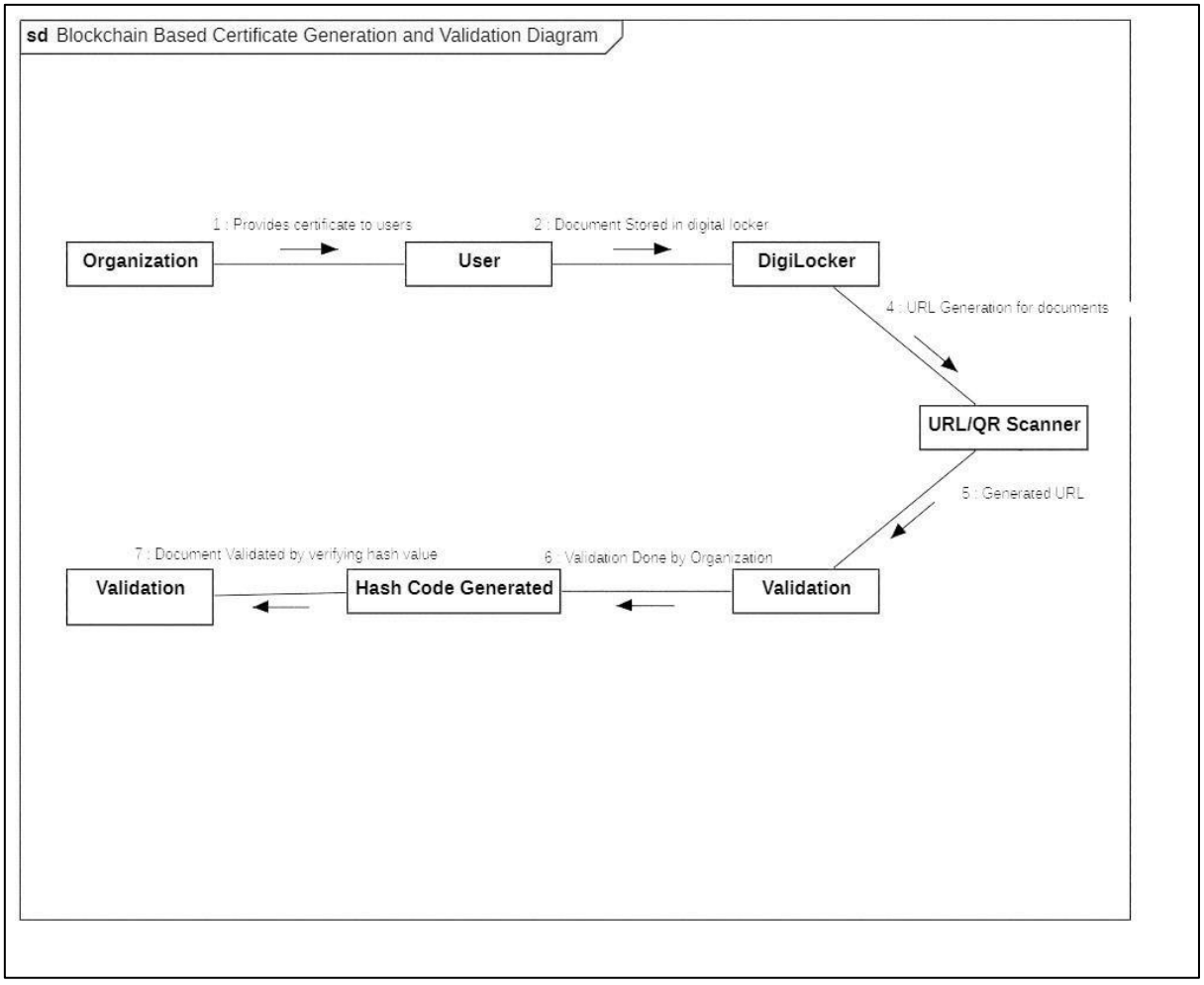
6.4 Class Diagram:



6.5 Sequence Diagram:

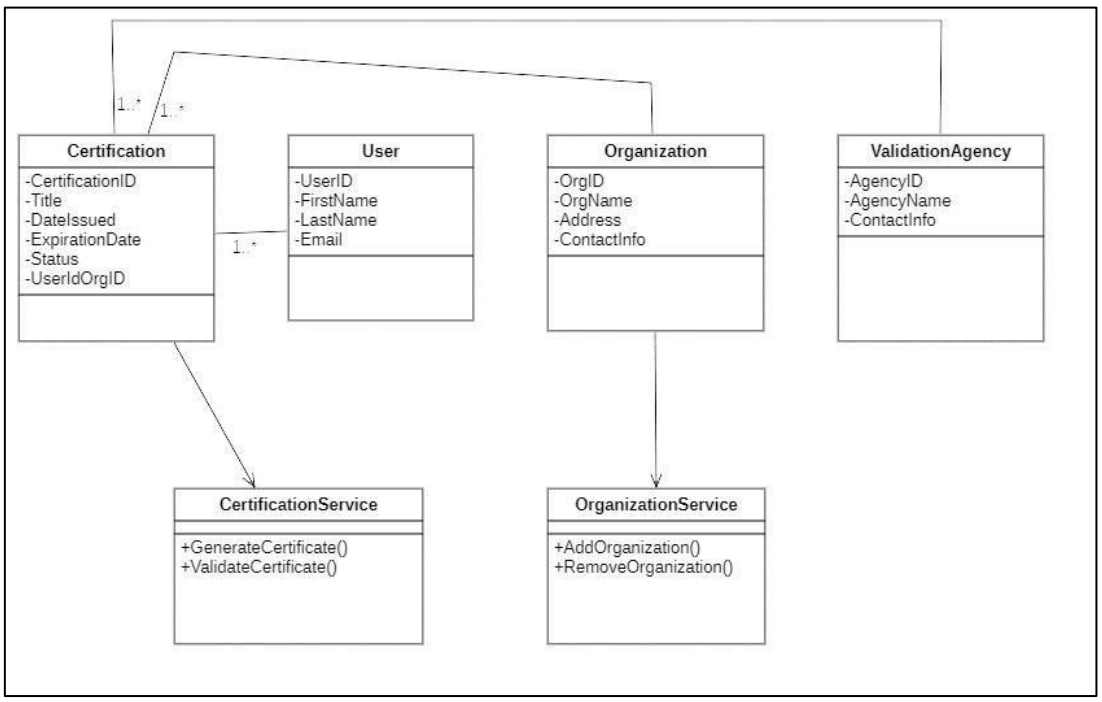


6.6 Collaboration Diagram:



6.7 Database Diagram

6.7.1 ER Diagram:



7. METHODOLOGY

1. **Research:**

First, we'll study and understand blockchain technology and smart contracts.System Design: We'll make a detailed plan for how our system will work, including how certificates are stored and checked.

2. **Development:**

We'll create the actual system using software tools like Node.js, Django, and Solidity.

3. **Testing:**

We'll check and test everything to make sure it works correctly and is safe.

4. **Deployment:**

Once we're sure it works well, we'll make it available for people to use.

5. **Training:**

We'll teach users and organizations how to use the system effectively.

6. **Feedback and Improvement:**

We'll gather feedback from users and organizations and use it to make the system even better.

8. IMPLEMENTATION

8.1 Technology:

The technology stack chosen for the implementation of the "Online Blockchain-Based Certificate Generation and Validation" project includes:

- **Blockchain Platform:** Ethereum
- **Smart Contract Language:** Solidity
- **Web Application Framework:** Django
- **Frontend Framework:** React, Nodejs
- **Version Control:** Git
- **Development Environment:** Visual Studio Code

8.2 Steps to be Taken Towards Project Completion

The project will be completed in several well-defined steps, including:

- **Requirement Analysis:** Finalizing the specific requirements of the project.
- **Design and Architecture:** Creating a detailed design and architecture plan.
- **Development:** Implementing the various modules and functionalities.
- **Testing:** Rigorous testing to ensure the reliability and security of the system.
- **Deployment:** Deploying the system for initial use.
- **User Feedback:** Collecting user feedback for any necessary adjustments.
- **Optimization:** Optimizing the system for performance and efficiency.
- **Documentation:** Preparing comprehensive documentation for future reference.

8.3 Project Scheduling:

8.3.1 Plan of Action:

The project will follow a well-structured timeline:

Month 1: Requirement analysis and system design. Month 2: Development of core functionalities. Month 3: Initial testing and feedback collection. Month 4: System optimization and final testing. Month 5: Deployment and user training. Month 6: Documentation and finalization.

8.4 Cost Estimation:

Cost estimation focuses on publication expenses and team member time allocation, as the project doesn't require significant monetary investment in development tools or infrastructure. The detailed analysis will cover publication costs and potential licensing fees for proprietary resources.

8.5 Team Structure:

The project team consist of skilled professionals with expertise in the various fields:

Team Leader – **Omraj Manoj Jadhav Group**

Members :

- Akhilesh Vilas Dange.
- Aniket Sanjay Chavan.
- Akshata Ashok Dhumal.
- Yashashri Sandip Deshmukh.
- Prasenjit Indrajit Bhosale.

9.ADVANTAGES & LIMITATIONS

ADVANTAGES :

1. **Better Security:**
   - Our system uses blockchain technology, which is super secure and nearly impossible to hack. This means certificates are safe from forgery and unauthorized access.
2. **Certificates Can’t Be Altered:**
   - Once certificates are on the blockchain, they can't be changed or faked. This makes sure certificates are always genuine.
3. **Faster Certificate Issuance:**
   - By directly issuing certificates on the blockchain, the project reduces the time required for paperwork, providing a quicker way to obtain certificates.
4. **Easy Verification:**
   - Special links or QR codes allow swift and hassle-free verification of certificate authenticity, benefiting both individuals and organizations.
5. **Transparency and Trust:**
   - Everything about certificates, from creating them to checking them, is recorded securely. This builds trust and keeps everyone accountable.
6. **Reliable Validation:**
   - Our system brings a consistent and dependable way to check certificates, making it easier for organizations to spot real ones from fakes
7. **Saves Money:**
   - Educational institutions and companies can save costs by reducing paperwork and manual checks, and manual checks. Over time, this can add up to big savings.
8. **Modern and Relevant:**
   - In our digital world, our project keeps certificates up to date and valuable. It's aligned with modern practices.

9. **User-Friendly:**
   - The system is designed with simplicity in mind, ensuring ease of use for both certificate holders and those who verify them.

LIMITATIONS

- **Needs Internet:**

The system depends on internet connectivity for both certificate issuance and verification.

Limited or slow internet access may impact functionality.

- **Initial Setup Is Tricky:**

The initial setup, including creating smart contracts and connecting the system to existing frameworks, can be complex and time-consuming.

11.APPLICATIONS

The "Online Blockchain-Based Certificate Generation and Validation" project has various real-world applications, including:

1. **Educational Institutions:**

- Universities and schools can use the system to issue and verify academic certificates securely.

2. **Government Agencies:**

- Government bodies can adopt the technology for issuing and authenticating official certificates and licenses.

3. **Corporate Sector:**

- Companies can streamline the process of issuing and verifying employee certifications, ensuring the validity of qualifications.

4. **Online Courses and Training Programs:**

- Platforms offering online courses can leverage the system to issue verifiable certificates upon course completion.

5. **Professional Associations:**

- Credential Management: Professional associations can issue and validate certifications and memberships, ensuring the authenticity of professional credentials.

6. **Healthcare Sector:**

- Medical Certifications: Healthcare institutions can use the system to issue and verify medical licenses, certifications, and continuing education credits for medical professionals.

7. **Human Resources:**

- Employee Records: HR departments can use the blockchain system to verify educational qualifications and professional certifications of potential hires, streamlining the hiring process.

8. **Legal and Compliance:**

- Legal Documents: Law firms and regulatory bodies can use blockchain for issuing and verifying legal documents and compliance certificates, enhancing trust and reducing fraud.

9. **Financial Services:**

- Compliance Certifications: Banks and financial institutions can issue and verify compliance and regulatory certifications, ensuring adherence to industry standards.

10. **Trade and Industry:**

- Skills Certification: Trade organizations and industry groups can issue skills certifications, ensuring that workers have the necessary qualifications and training.

12. FUTURE SCOPE

The project has promising future avenues for enhancement and expansion:

1. **Integration of AI and Machine Learning:**

- Implementing AI and machine learning can enhance the system's capability to identify and prevent fraudulent certificates more effectively.

2. **Mobile Application Support:**

- Developing mobile applications will provide users with a convenient way to manage and verify certificates using smartphones and tablets.

3. **Integration with Additional Blockchains:**

- Exploring integration with other blockchain platforms beyond Ethereum to offer users more choices and flexibility.

4. **Interoperability with Legacy Systems:**

- Seamless Integration: Developing compatibility with existing legacy systems used by educational institutions, corporations, and government agencies to ensure a smooth transition and broader adoption.

5. **Smart Contract Automation:**

- Automated Processes: Leveraging smart contracts to automate certificate issuance and validation workflows, reducing manual intervention and enhancing efficiency.

6. **Enhanced User Interface and Experience:**

- User-Centric Design: Continuously improving the user interface and experience to make the system more intuitive and accessible for all users, including those with limited technical expertise.

7. **Customization and Personalization:**

- Tailored Solutions: Offering customizable features to meet the specific needs of different institutions and organizations, allowing them to personalize the certificate design and issuance process.

8. Scalability Improvements:

- Handling Growth: Enhancing the system's scalability to handle an increasing number of users and certificates without compromising performance.

13. CONCLUSION

In conclusion, the integration of blockchain technology in the "Online Blockchain- Based Certificate Generation and Validation" project represents a groundbreaking initiative in the field of certificate management. This innovative approach not only addresses existing challenges but also sets the stage for a future where digital certificates are secure, transparent, and easily accessible. By leveraging blockchain's cryptographic security and decentralized ledger, the project significantly reduces the likelihood of certificate forgery while enhancing data security and integrity in educational contexts.

Furthermore, the project's commitment to enhancing trust, accountability, and efficiency positions it as a transformative force in the evolution of certificate management systems. Through automated certificate issuance and application processes, the project ensures transparency and openness, streamlining administrative procedures and reducing manual intervention. As the project progresses, ongoing collaboration with stakeholders and continuous refinement will be crucial to ensuring its long-term success and further advancing the credibility and value of digital credentials in today's digital age.

14. REFERENCES

I. **"Blockchain-Based Verification of Academic Credentials"** by Kimberly Davies (2021): This paper discusses the use of blockchain technology to verify academic credentials and explores its potential benefits for educational institutions and students.

II. **"Blockchain Technology: Principles and Applications"** by Marc Pilkington, which is a part of the Research Handbook on Digital Transformations edited by F. Xavier Olleros and Majlinda Zheng, the author gives a detailed overview of blockchain technology and its applications. This includes conversations on certificate creation and validation.

III. **"Blockchain in Education: Introduction and Critical Review of the State of the Art"** by Alexander Grech and Andréia Inamorato dos Santos, published in Publications, MDPI. This paper explores diverse applications of blockchain technology in education, encompassing certificate issuance and verification among others.

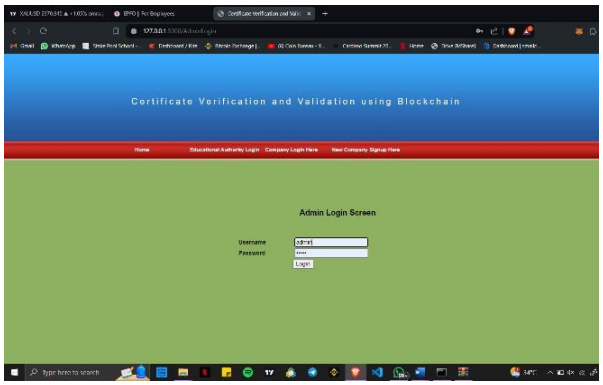
IV. **"Towards Blockchain-based Digital Certificates for Learning:** Technical Issues and Future Directions" by H. Drachsler, D. Bogers, M. Vuorikari, and S. Kalz, published in the International Journal of Educational Technology in Higher Education, the authors delve into the technical aspects and hurdles involved in deploying blockchain-based digital certificates within the realm of learning.

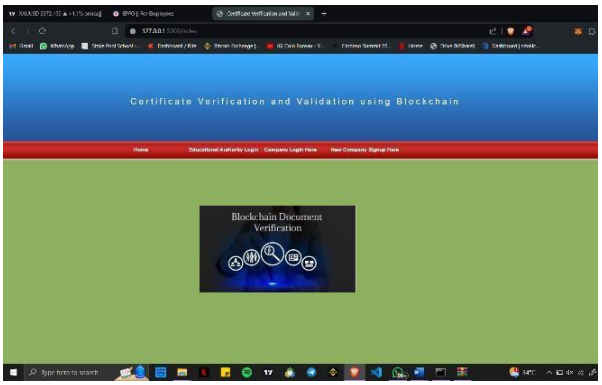
V. **"Blockcerts: An Open Infrastructure for Academic Credentials on the Blockchain"** authored by M. Sporny, D. Longley, and M. Allen, appears in IEEE Security & Privacy. This paper introduces Blockcerts, an open standard designed for blockchain-based digital certificates, detailing its implementation and exploring potential applications.

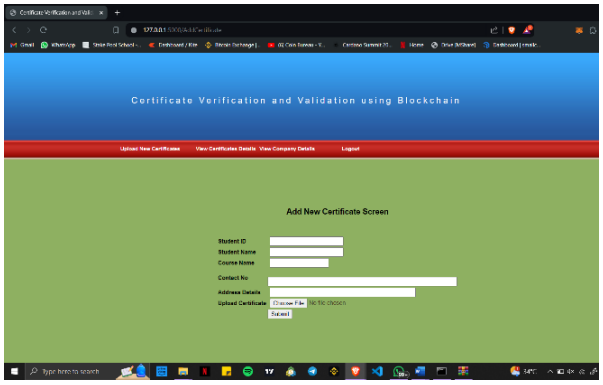
VI. **"Blockchain Solutions for Credentials and Certificates: Examples and Challenges from the European Perspective"** by Pauline van Mourik, published in European Journal of Education. This paper discusses examples of blockchain solutions for credentials and certificates in Europe and examines the challenges associated with their implementation.

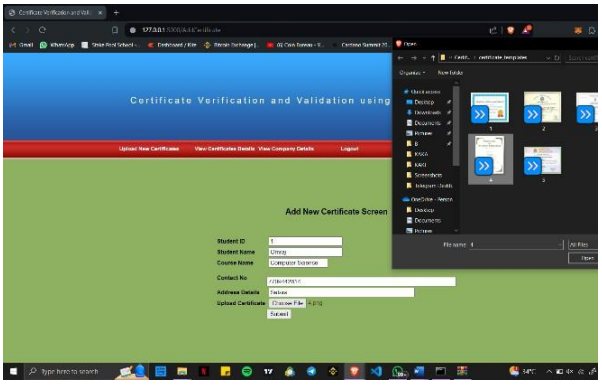
VII. **"Designing Blockchain-Based Systems for Secure and Trustworthy Credentials" published in IEEE Transactions on Dependable and Secure Computing by** K. Ren, A. Yu, X. Wang, and W. Lou. The architecture for developing blockchain-based systems for reliable and safe credentials, that involve certificate creation and validation, is presented in this paper.

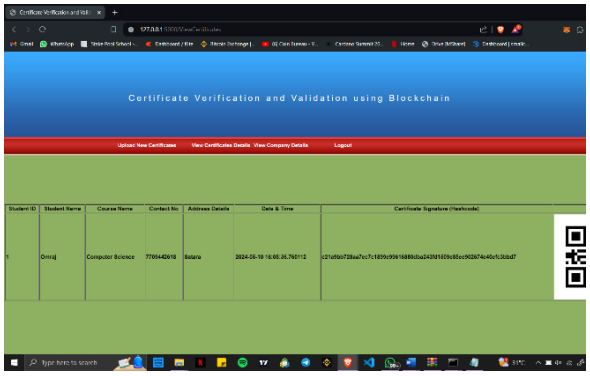
15. Frontend Modules

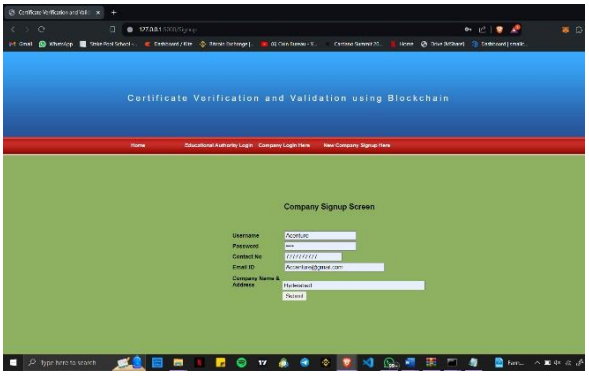


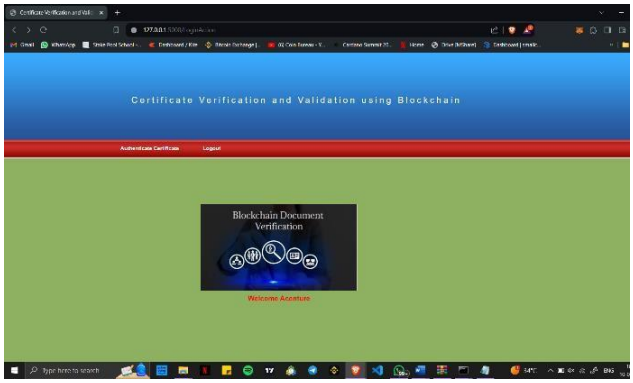


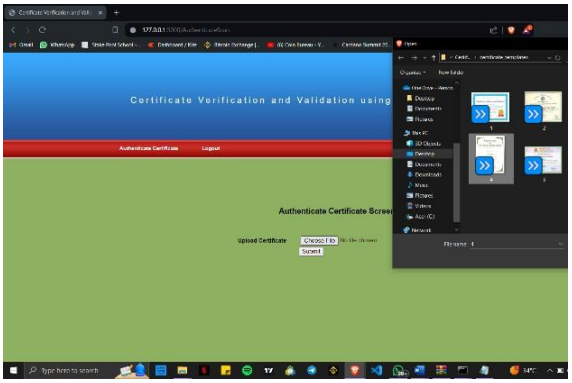


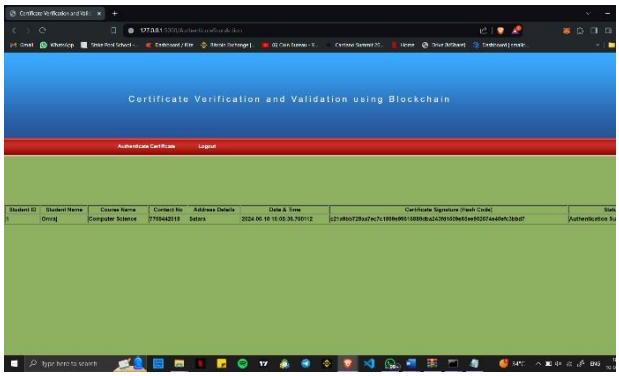


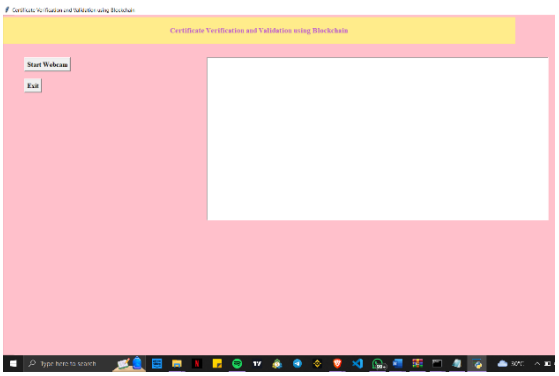


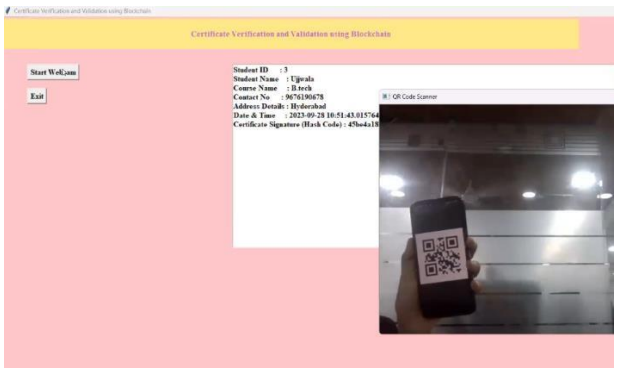



Certificate Verification and Validation using Blockchain
Authenticate Certificate
Logout
Blockchain Document Verification
Welcome Accenture


Certificate Verification and Validation using
Authenticate Certificate
Logout
Upload Certificate
Choose File
Submit


Certificate Verification and Validation using Blockchain
Authenticate Certificate
Logout


Certificate Verification and Validation using Blockchain
Start Webcam
Exit


Certificate Verification and Validation using Blockchain
Start Webcam
Exit
Student ID : 3
Student Name : Ujjwala
Course Name : B.tech
Contact No : 9676190678
Address Details : Hyderabad
Date & Time : 2023-09-28 10:51:43.015764
Certificate Signature (Hash Code) : 45bedc18
QR Code Scanner

List of Publications

Publication Name	Project Name	Author Name
International Journal of Innovative Research in Computer and Communication Engineering	Blockchain Based Certificate Generation And Validation	Omraj Jadhav Akhilesh Dange Presenjit Bhosale Aniket Chavan Yashshri Deshmukh Akshata Dhumal


International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)
(A Monthly, Peer Reviewed, Referred, Scholarly Indexed, Open Access Journal Since 2013)
IJIRCCE
Impact Factor 8.379
CERTIFICATE
OF PUBLICATION
The Board of IJIRCCE is hereby awarding this certificate to
PRANSENJIT BHOSALE
U.G. Student, Department of Computer Engineering, Karmaveer Bhaurao Patil College of Engineering Satara, Maharashtra, India
in Recognition of Publication of the Research Paper Entitled
"Blockchain Based Certificate Generation and Validation"
in IJIRCCE, Volume 12, Issue 5, May 2024
Google Crossref Mendeley doi INNO SPACE
e-ISSN: 2320-9801
p-ISSN: 2320-9798
Editor-in-Chief
www.ijircce.com ijircce@gmail.com


International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)
(A Monthly, Peer Reviewed, Referred, Scholarly Indexed, Open Access Journal Since 2013)
IJIRCCE
Impact Factor 8.379
CERTIFICATE
OF PUBLICATION
The Board of IJIRCCE is hereby awarding this certificate to
ANIKET CHANVAN
U.G. Student, Department of Computer Engineering, Karmaveer Bhaurao Patil College of Engineering Satara, Maharashtra, India
in Recognition of Publication of the Research Paper Entitled
"Blockchain Based Certificate Generation and Validation"
in IJIRCCE, Volume 12, Issue 5, May 2024
Google Crossref Mendeley doi INNO SPACE
e-ISSN: 2320-9801
p-ISSN: 2320-9798
Editor-in-Chief
www.ijircce.com ijircce@gmail.com


International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)
(A Monthly, Peer Reviewed, Referred, Scholarly Indexed, Open Access Journal Since 2013)
IJIRCCE
Impact Factor 8.379
CERTIFICATE
OF PUBLICATION
The Board of IJIRCCE is hereby awarding this certificate to
YASHSHRI DESHMUKH
U.G. Student, Department of Computer Engineering, Karmaveer Bhaurao Patil College of Engineering Satara, Maharashtra, India
in Recognition of Publication of the Research Paper Entitled
"Blockchain Based Certificate Generation and Validation"
in IJIRCCE, Volume 12, Issue 5, May 2024
Google Crossref Mendeley doi INNO SPACE
e-ISSN: 2320-9801
p-ISSN: 2320-9798
Editor-in-Chief
www.ijircce.com ijircce@gmail.com


International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)
(A Monthly, Peer Reviewed, Referred, Scholarly Indexed, Open Access Journal Since 2013)
IJIRCCE
Impact Factor 8.379
CERTIFICATE
OF PUBLICATION
The Board of IJIRCCE is hereby awarding this certificate to
AKSHANTA DHUMAL
U.G. Student, Department of Computer Engineering, Karmaveer Bhaurao Patil College of Engineering Satara, Maharashtra, India
in Recognition of Publication of the Research Paper Entitled
"Blockchain Based Certificate Generation and Validation"
in IJIRCCE, Volume 12, Issue 5, May 2024
Google Crossref Mendeley doi INNO SPACE
e-ISSN: 2320-9801
p-ISSN: 2320-9798
Editor-in-Chief
www.ijircce.com ijircce@gmail.com

International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET)

|e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 8.423| A Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 12, December 2023 ||

| DOI:10.15680/IJIRSET.2023.1212001 |

Blockchain Based Certificate Generation and Validation

Omraj Jadhav, Akhilesh Dange, Pransenjit Bhosale, Aniket Chanvan, Yashshri Deshmukh, Akshanta Dhumal

U.G. Student, Department of Computer Engineering, Karmaveer Bhaurao Patil College of Engineering Satara, Maharashtra, India

Dr. Shabina Modi

Associate Professor, Department of Computer Engineering, Karmaveer Bhaurao Patil College of Engineering Satara, Maharashtra, India

ABSTRACT: This paper proposes a blockchain-based digital certificate system to tackle the issue of fraudulent educational certificates. Traditional certificate issuance and verification methods lack transparency and are susceptible to counterfeiting, damaging credibility. The proposed system leverages blockchain's immutability to issue verifiable, anti-counterfeit digital certificates. Electronic certificate files are generated, and their hash values are stored on the blockchain, with unique QR codes or URLs for authentication. Users store certificates in Ethereum blockchain digital lockers using smart contracts.

Organizations verify certificates by cross-checking provided QR codes or URLs against blockchain data. All transactions are recorded on the blockchain, ensuring transparency. The system reduces certificate forgery risks through automated, open processes. It offers a reliable, user-friendly solution for educational institutions, employers, and individuals, enhancing certificate management integrity while minimizing risks associated with fraudulent credentials.

KEYWORDS: Blockchain, Ethereum, Smart Contracts, Security, Certificate Generation.

I. INTRODUCTION

Document verification is a challenging process fraught with obstacles and time-consuming procedures, as indicated by statistics from the Indian Ministry of Education. Instances of forged graduation certificates are frequently encountered due to insufficient anti-forgery measures. To address this issue of counterfeit certificates, we propose implementing a digital certificate system based on blockchain technology. Educational institutions issue certificates as the most significant documents to their students. However, the lack of transparency and verifiability in the issuance process makes it relatively easy to create counterfeit certifications that can be difficult to detect and may even appear identical to genuine ones. Document forgery damages the credibility of the issuing entity and the document holder. Our objective is to establish a blockchain-based digital certificate system to tackle the problem of certificate forgeries, leveraging the immutability of blockchain technology to issue digital certificates with embedded verifiability and anti-counterfeit features.

II. LITERATURE REVIEW

Blockchain technology is revolutionizing the management of digital certificates by addressing key issues of forgery, transparency, and revocation. Traditional systems often fall short in preventing certificate fraud due to weak anti-counterfeit measures, leading to frequent instances of forgery. Blockchain's immutable nature enables the creation of tamper-proof digital certificates, with QR codes and hash values stored on the blockchain for easy and secure verification. This system enhances the reliability and authenticity of certificates, making it difficult for counterfeit ones to go undetected. Moreover, blockchain facilitates certificate transparency and revocation by recording the issuance and status of certificates on a public ledger, ensuring that only valid and officially issued certificates are recognized. This approach improves the security of web communications, particularly through protocols like SSL/TLS, by ensuring that public keys are distributed securely. Various implementations, such as those utilizing IBM's

|e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 8.423| A Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 12, December 2023 ||

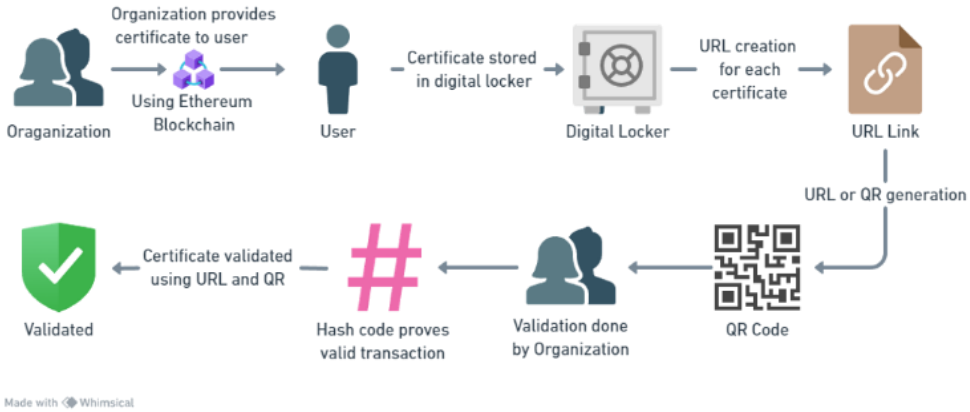
| DOI:10.15680/IJIRSET.2023.1212001 |

Hyperledger Fabric and consortium blockchains, demonstrate the practicality and effectiveness of these solutions. They provide a decentralized, collaborative framework for managing certificate revocation lists (CRLs) across multiple certification authorities (CAs), enhancing trust, access reliability, and data synchronization. This innovative use of blockchain technology not only safeguards against fraudulent certificates but also expands the potential applications of digital certificates in various sectors.

III. METHODOLOGY

The proposed system involves the following steps:

1. Issuing User Certificates: Users can obtain their certificates from colleges or government agencies through the Ethereum network.
2. Digital Lockers and Blockchain Storage: Each user has a secure digital locker on the Ethereum blockchain, where they can store their certificates using smart contracts, ensuring immutability and security.
3. Unique Certificate Identifier: Every certificate is assigned a distinct hash number for safe identification.
4. Generate Unique URL/QR Code: An automatically generated unique URL or QR code is linked to each blockchain-stored certificate.
5. Share Certificates: Users share the generated QR code or URL with organizations or entities requesting verification.
6. Organization Verification: Organizations initiate the verification process by visiting the website and providing the URL or QR code obtained from the user.
7. Validation: The system authenticates certificates by verifying the blockchain data associated with the provided URL or QR code, ensuring legitimacy.
8. Record Keeping and Inspection: All certificate-related transactions, including issuance and validation, are recorded on the Ethereum blockchain, maintaining transparency and security.



IV. PRELIMINARY DATA

A. Existing System:
Traditional certificate issuance and verification processes often lack robust anti-forgery measures, enabling the creation of counterfeit documents.

B. Proposed System:
The proposed blockchain-based solution aims to reduce the possibility of certificate forgery. The automated certificate issuance and application processes ensure transparency and openness, allowing organizations or entities to verify the authenticity of certificates through the system.

C. Advantages of proposed system:

|e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 8.423| A Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 12, December 2023 ||

| DOI:10.15680/IJIRSET.2023.1212001 |

The possibility of certificate forgery is decreased by the suggested blockchain-based solution. The automated certificate issue process in the system is open and transparent, as is the certificate application process.

FUNCTIONAL REQUIREMENTS:

- Modeling
- Data preprocessing
- Prediction
- Data collection
- Training and testing

NON-FUNCTIONAL REQUIREMENTS:

Non-functional requirements (NFRs) outline a software system's quality attributes. They evaluate the software system based on non-functional criteria like usability, security, portability, and responsiveness that are essential to its success. An example of a nonfunctional need might be "how quickly can I load the website?" Systems that don't fulfill user demands might be the consequence of not meeting non-functional criteria.

- Scalability
- Availability
- Usability
- Capacity
- Interoperability
- Security
- Environmental
- Reliability
- Manageability
- Recoverability
- Serviceability
- Data integrity

V. DISCUSSION

A. Blockchain Technology:

Blockchain is a decentralized, immutable ledger that offers potential for various applications. It consists of a distributed database where multiple users can add, modify, and remove entries, but once data is input, it cannot be altered or removed. Hashing is a crucial aspect of blockchain technology, where a message digest or hash value is generated from a text string, ensuring data integrity during transmission.

B. Smart Contracts:

Self-executing contracts, known as smart contracts, explicitly incorporate the terms of an agreement into the code. Running on blockchain platforms like Ethereum, smart contracts automatically execute and enforce the terms once predefined conditions are met, revolutionizing industries like finance, supply chain management, and legal procedures due to their tamper-proof, secure, and decentralized nature

C. Advantages of Proposed System:

- Modern and relevant: Aligns with contemporary digital practices.
- Certificates cannot be altered: Ensures authenticity once stored on the blockchain.
- Cost savings: Reduces resources required for paperwork and manual checks.
- Faster certificate issuance: Enables direct issuance on the blockchain.

|e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 8.423| A Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 12, December 2023 ||

| DOI:10.15680/IJIRSET.2023.1212001 |

- Transparency and trust: Secure records maintain accountability.
- Easy verification: Individuals can quickly verify certificates using URLs or QR codes.
- Reliable validation: Provides a uniform and reliable method for certificate verification.
- User-friendly: Designed for ease of use by both credential holders and verifiers.
- Better security: Utilizes the highly secure and nearly impossible-to-hack blockchain technology.

D. Statement of Limitation:

- Internet dependency: The system requires internet connectivity for distribution and verification.
- Initial setup complexity: The setup, smart contract development, and system integration can be challenging and time-consuming.

VI. IMPLEMENTATION

The proposed system aims to prevent certificate forgery by introducing a blockchain-based certificate verification method. It consists of three modules:

A. Company Module:

- A company user needs to register and log in to the system.
- They can then upload a certificate for verification.
- The system compares the digital signature of the uploaded certificate with the signatures stored in the Blockchain.
- If the digital signature matches the original certificate, the authentication is successful.

B. Admin Module:

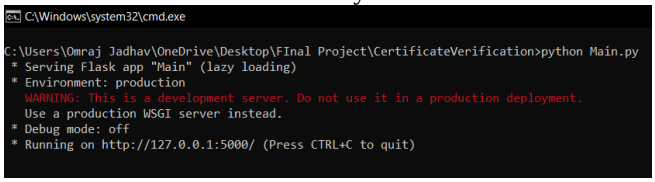
- The admin, acting as an educational authority, logs in with the username "admin" and password "admin."
- Upon login, the admin uploads the student's information and certificate to the blockchain.
- Each certificate is assigned a unique hash code that serves as a digital signature.
- The hash code is used to generate a QR code linked to the student's certificate.
- Scanning the QR code with a smartphone allows retrieval of information from the blockchain.
- If the QR code is found in the blockchain, it confirms the successful validation of the certificate.

C. Scanner Module:

- Educational institutions and companies will maintain this stand-alone module.
- Users can scan a QR code to retrieve information from the blockchain.

The implementation process is as follows:

1. Run the run.bat file to start the Python server.

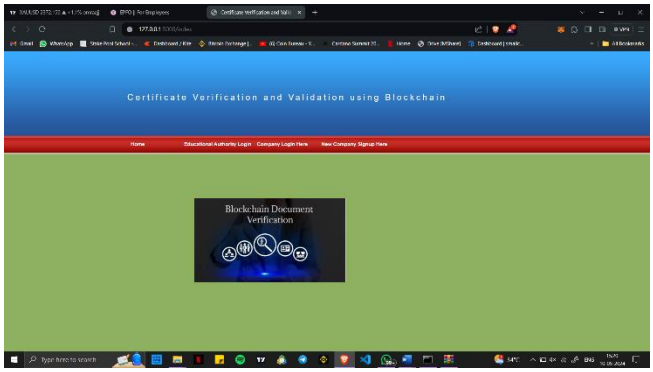


2. Open a web browser and navigate to http://127.0.0.1:5000/index.

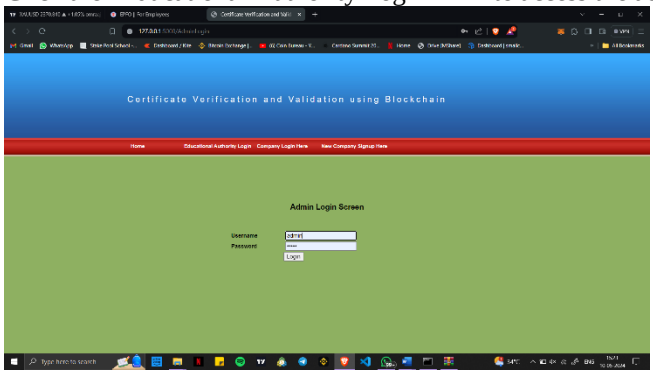
|e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 8.423| A Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 12, December 2023 ||

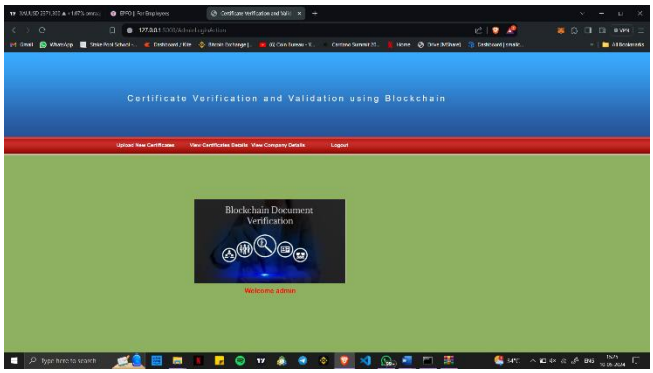
| DOI:10.15680/IJIRSET.2023.1212001 |



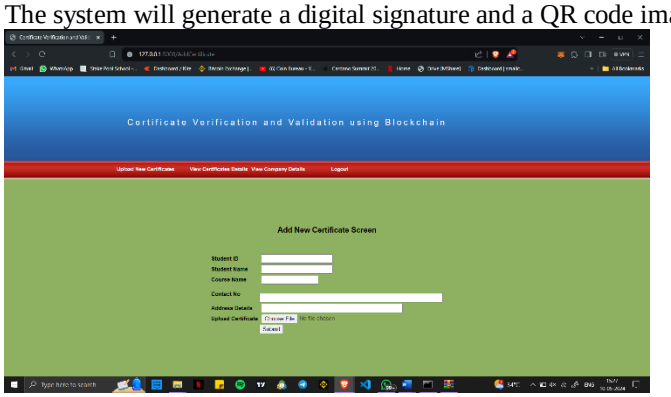
3. Click the "Educational Authority Login" link to access the admin login page.



4. After logging in as an admin, you can upload new certificates by providing student information and the certificate file.



5. The system will generate a digital signature and a QR code image for each uploaded certificate.

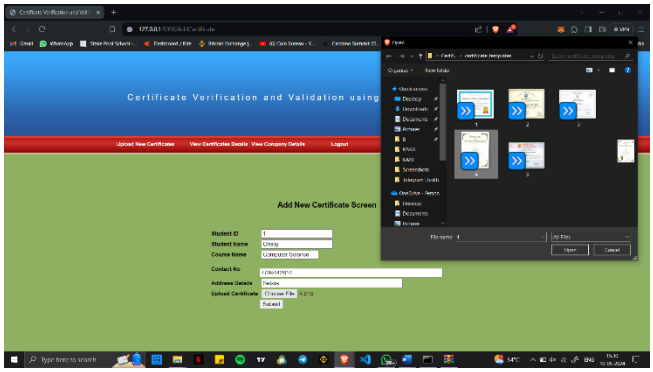


6. Admins can view registered companies and their details.

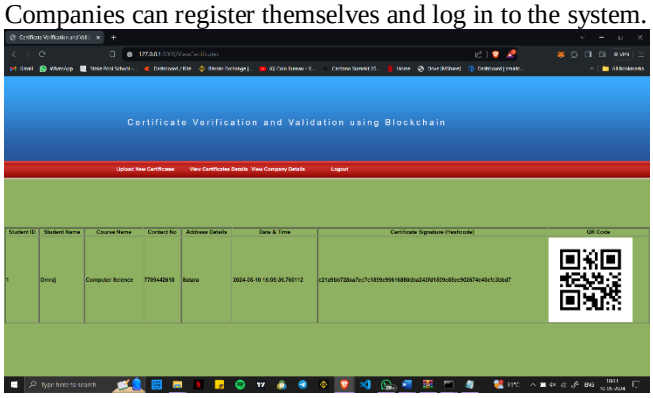
|e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 8.423| A Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 12, December 2023 ||

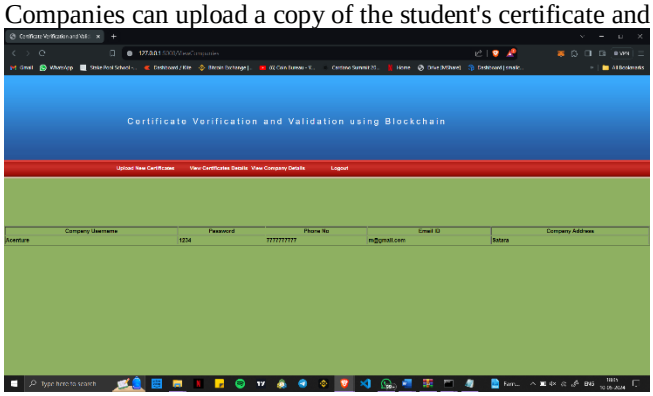
| DOI:10.15680/IJIRSET.2023.1212001 |



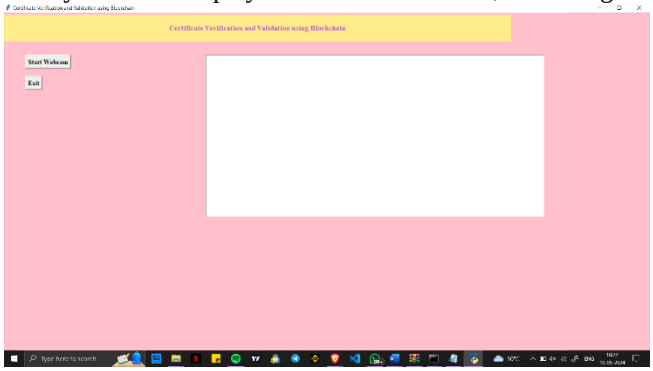
7. Companies can register themselves and log in to the system.



8. Companies can upload a copy of the student's certificate and initiate the verification process.



9. The system will display the verification result, indicating whether the certificate is authentic or not.

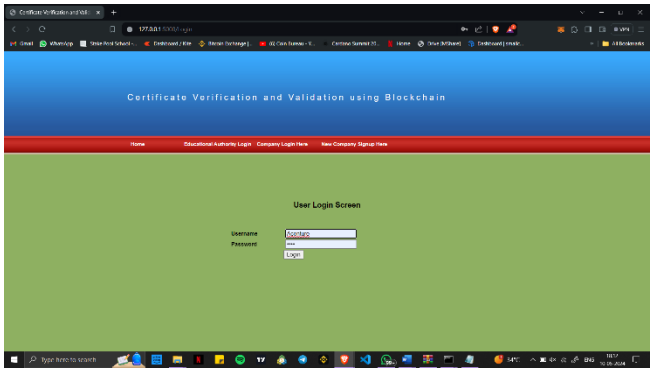


10. To validate certificates using QR codes, run the RunWebCam.bat file.

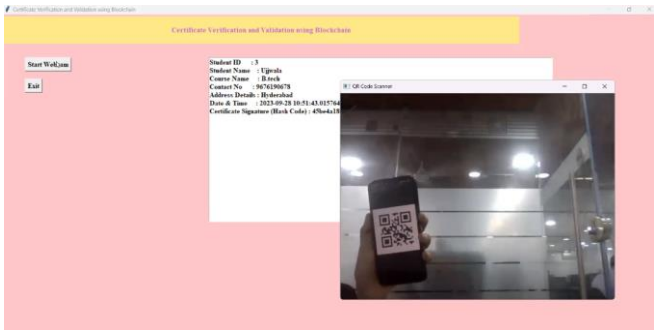
|e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 8.423| A Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 12, December 2023 ||

| DOI:10.15680/IJIRSET.2023.1212001 |



11. Click "Start Webcam" to activate the camera.



12. Scan the QR code, and the system will retrieve and display the corresponding certificate information from the Blockchain.

The implementation section provides a step-by-step guide to using the blockchain-based certificate verification system, including the roles and functionalities of the admin, company, and scanner modules.

VII. CONCLUSION

The proposed blockchain-based method significantly reduces the likelihood of certificate forgery. The system's automated certificate issuance and application processes ensure transparency and openness, allowing companies or groups to verify the authenticity of any certificate. The information is accurate and secure, thanks to the immutable and decentralized nature of blockchain technology. Potential future work could explore further enhancements, such as integrating additional security measures or expanding the system to other domains beyond educational certificates.

|e-ISSN: 2319-8753, p-ISSN: 2347-6710| www.ijirset.com | Impact Factor: 8.423| A Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 12, December 2023 ||

| DOI:10.15680/IJIRSET.2023.1212001 |

REFERENCES

[1] "Blockchain Technology: Principles and Applications" by Marc Pilkington, which is a part of the Research Handbook on Digital Transformations edited by F. Xavier Olleros and Majlinda Zhegu, the author gives a detailed overview of blockchain technology and its applications. This includes conversations on certificate creation and validation.

[2] "Blockchain in Education: Introduction and Critical Review of the State of the Art" by Alexander Grech and Andréia Inamorato dos Santos, published in Publications, MDPI. This paper explores diverse applications of blockchain technology in education, encompassing certificate issuance and verification among others.

[3] "Towards Blockchain-based Digital Certificates for Learning: Technical Issues and Future Directions" by H. Drechsler, D. Bogers, M. Vuorikari, and S. Kalz, published in the International Journal of Educational Technology in Higher Education, the authors delve into the technical aspects and hurdles involved in deploying blockchain-based digital certificates within the realm of learning.

[4] "Blockcerts: An Open Infrastructure for Academic Credentials on the Blockchain" authored by M. Sporny, D. Longley, and M. Allen, appears in IEEE Security & Privacy. This paper introduces Blockcerts, an open standard designed for blockchain-based digital certificates, detailing its implementation and exploring potential applications.

[5] "Blockchain Solutions for Credentials and Certificates: Examples and Challenges from the European Perspective" by Pauline van Mourik, published in European Journal of Education. This paper discusses examples of blockchain solutions for credentials and certificates in Europe and examines the challenges associated with their implementation.

[6] "Designing Blockchain-Based Systems for Secure and Trustworthy Credentials" published in IEEE Transactions on Dependable and Secure Computing by K. Ren, A. Yu, X. Wang, and W. Lou. The architecture for developing blockchain-based systems for reliable and safe credentials, that involve certificate creation and validation, is presented in this paper.

Participation in Competitions

Competition Name	Project Name	Participants Name
Exibited Models of project innovation & Researchin Engineering, National Level Innovation Project Exhibition & Competition At Sanjay Bhokare Group Of Institutes , Miraj	Block Chain Base Certificate Generation And Validation	Omraj Jadhav Akhilesh Dange Presenjit Bhosale Aniket Chavan Yashshri Deshmukh Akshata Dhumal

Shri Ambabai Talim Sanstha's

SANJAY BHOKARE GROUP OF INSTITUTES, MIRAJ.

(Approved by AICTE New Delhi, Govt. of Maharashtra & Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere for Engineering, Shivaji University, Kolhapur for Management & MSBTE, Mumbai for Diploma Courses)

Tilaknagar, Miraj-Sangli Road, Miraj , Dist. Sangli - 416414

EMPIRE - 2024

EXHIBITED MODELS OF PROJECT INNOVATION & RESEARCH IN ENGINEERING

National Level Innovative Project Exhibition & Competition

Certificate

It is our pleasure to Certify that Mr./Miss./Ms. Omraj Manoj Jadhav

from Department of Computer Engg. of KBPCOE, Satara

has participated as Participant / Co-ordinator for the event Project Competition

and declared as Winner / Runner - up / Participant / Co-ordinator in EMPIRE - 2024,

held on 31st May 2024.

Department Co-Convener | Mr. S. M. Gramopadhye Convener | Prof. Dr. P. D. Madhale Dean MBA | Prof. Dr. S. N. Hublikar Dean Engineering | Prof. Dr. A. C. Bhagali Director

Shri Ambabai Talim Sanstha's

SANJAY BHOKARE GROUP OF INSTITUTES, MIRAJ.

(Approved by AICTE New Delhi, Govt. of Maharashtra & Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere for Engineering, Shivaji University, Kolhapur for Management & MSBTE, Mumbai for Diploma Courses)

Tilaknagar, Miraj-Sangli Road, Miraj , Dist. Sangli - 416414

EMPIRE - 2024

EXHIBITED MODELS OF PROJECT INNOVATION & RESEARCH IN ENGINEERING

National Level Innovative Project Exhibition & Competition

Certificate

It is our pleasure to Certify that Mr./Miss./Ms. Akhilesh vilas Dange

from Department of Computer Engg. of KBPCOE, Satara

has participated as Participant / Co-ordinator for the event Project Competition

and declared as Winner / Runner - up / Participant / Co-ordinator in EMPIRE - 2024,

held on 31st May 2024.

Department Co-Convener | Mr. S. M. Gramopadhye Convener | Prof. Dr. P. D. Madhale Dean MBA | Prof. Dr. S. N. Hublikar Dean Engineering | Prof. Dr. A. C. Bhagali Director

Shri Ambabai Talim Sanstha's

SANJAY BHOKARE GROUP OF INSTITUTES, MIRAJ.

(Approved by AICTE New Delhi, Govt. of Maharashtra & Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere for Engineering, Shivaji University, Kolhapur for Management & MSBTE, Mumbai for Diploma Courses)

Tilaknagar, Miraj-Sangli Road, Miraj , Dist. Sangli - 416414

EMPIRE - 2024

EXHIBITED MODELS OF PROJECT INNOVATION & RESEARCH IN ENGINEERING

National Level Innovative Project Exhibition & Competition

Certificate

It is our pleasure to Certify that Mr./Miss./Mrs. Prasenjit Indrajit Bhosale from Department of Computer Engg. of KBPCOE, Satara has participated as Participant / Co-ordinator for the event Project Competition and declared as Winner / Runner - up / Participant / Co-ordinator in EMPIRE - 2024, held on 31st May 2024.

Department Co-Convener | Mr. S. M. Gramopadhye Convener | Prof. Dr. P. D. Madhale Dean MBA | Prof. Dr. S. N. Hublikar Dean Engineering | Prof. Dr. A. C. Bhagali Director

Shri Ambabai Talim Sanstha's

SANJAY BHOKARE GROUP OF INSTITUTES, MIRAJ.

(Approved by AICTE New Delhi, Govt. of Maharashtra & Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere for Engineering, Shivaji University, Kolhapur for Management & MSBTE, Mumbai for Diploma Courses)

Tilaknagar, Miraj-Sangli Road, Miraj , Dist. Sangli - 416414

EMPIRE - 2024

EXHIBITED MODELS OF PROJECT INNOVATION & RESEARCH IN ENGINEERING

National Level Innovative Project Exhibition & Competition

Certificate

It is our pleasure to Certify that Mr./Miss./Mrs. Aniket Sanjay Chavan from Department of Computer Engg. of KBPCOE, Satara has participated as Participant / Co-ordinator for the event Project competition and declared as Winner / Runner - up / Participant / Co-ordinator in EMPIRE - 2024, held on 31st May 2024.

Department Co-Convener | Mr. S. M. Gramopadhye Convener | Prof. Dr. P. D. Madhale Dean MBA | Prof. Dr. S. N. Hublikar Dean Engineering | Prof. Dr. A. C. Bhagali Director

Shri Ambabai Talim Sanstha's

SANJAY BHOKARE GROUP OF INSTITUTES, MIRAJ.

(Approved by AICTE New Delhi, Govt. of Maharashtra & Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere for Engineering, Shivaji University, Kolhapur for Management & MSBTE, Mumbai for Diploma Courses)

Tilaknagar, Miraj-Sangli Road, Miraj , Dist. Sangli - 416414

NAAC

EMPIRE - 2024

EXHIBITED MODELS OF PROJECT INNOVATION & RESEARCH IN ENGINEERING

National Level Innovative Project Exhibition & Competition

Certificate

It is our pleasure to Certify that M/Miss./Ms. Yashashri Sandip Deshmukh

from Department of Computer Engg. of KBPCOE, Satara

has participated as Participant / Co-ordinator for the event Project Competition

and declared as Winner / Runner - up / Participant / Co-ordinator in **EMPIRE - 2024,**

held on 31st May 2024.

Department Co-Convener	Mr. S. M. Gramopadhye Convener	Prof. Dr. P. D. Madhale Dean MBA	Prof. Dr. S. N. Hublikar Dean Engineering	Prof. Dr. A. C. Bhagali Director

Shri Ambabai Talim Sanstha's

SANJAY BHOKARE GROUP OF INSTITUTES, MIRAJ.

(Approved by AICTE New Delhi, Govt. of Maharashtra & Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere for Engineering, Shivaji University, Kolhapur for Management & MSBTE, Mumbai for Diploma Courses)

Tilaknagar, Miraj-Sangli Road, Miraj , Dist. Sangli - 416414

NAAC

EMPIRE - 2024

EXHIBITED MODELS OF PROJECT INNOVATION & RESEARCH IN ENGINEERING

National Level Innovative Project Exhibition & Competition

Certificate

It is our pleasure to Certify that M/Miss./Ms. Akshata Ashok Dhumal

from Department of Computer Engg. of KBPCOE, Satara

has participated as Participant / Co-ordinator for the event Project Competition

and declared as Winner / Runner - up / Participant / Co-ordinator in **EMPIRE - 2024,**

held on 31st May 2024.

Department Co-Convener	Mr. S. M. Gramopadhye Convener	Prof. Dr. P. D. Madhale Dean MBA	Prof. Dr. S. N. Hublikar Dean Engineering	Prof. Dr. A. C. Bhagali Director

Plagiarism Checker X Originality Report

Similarity Found: 0%

Date: Tuesday, June 04, 2024
Statistics: 4 words Plagiarized / 1527 Total words
Remarks: No Plagiarism Detected - Your Document is Healthy.

---

1 | Pg DepartmeScienceand ri A Report 3 Bhsale Pnd Of Final Year B. Tech Computer Science & Engineering Under the guidance of Prof. Shabina Sayyad-Modi (Department of Computer Science & Engineering.) Academic Year 2023-24 2 | Pg DepartmeScienceand ri C ertificate Thisrtifyat the pf wooe proed " Bloin Batificae eratiolidaiotem " I 3 | Pg ACKNOWLEDGMENT We e s ty express r tude "Karmavr haurao Patil College of Engineering, ata Cer ci Engineering rtment oning the project topilockcased Ceon and Valion" & for alless to various Facilities. We sincerely wish to express hearty thanks to our Project Guide Prof. Shabina Sayyad- Modi for her encouraging & inspiring guidance.

His/her valuable suggestions were a constant source of inspiration for us. We wish to express our thanks to our Head of Department Prof. Dangat G.D. for encouragement & providing us with the best facilities for our project work. We would also like to thank the other teaching & non-teaching staff. Last but not the least we would like to thank all our friends, who helped us directly or indirectly. Helpful hand rendered by all of them will remain for a long time in our memory. Finally, we admit that cooperation, coordination & hard work are our keywords for success. Thanking, 1. Jadhav Omraj Manoj 2. Dange Akhilesh Vilas 3. Bhosale Prasenjit Indrajit 4. Deshmukh Yashashri Sandip 5. Chavan Aniket Sanjay 6.

Dhumal Akshata Ashok 4 | Pg INDEX Sr. No Name of the chapter Page No. 1 Introduction 2 Literature Review 3 Objectives 3.1 Problem statement 3.2 Objectives. 3.2.1 Project Objectives 3.2.2 Academic Objectives 4 Project Overview 4.1 Scope 4.2 Architecture 4.4 Project modules. 5 Requirement Analysis 5.1 Hardware Requirements 5.2 Software requirements 6 Application Design 6.1 Data Flow Diagram 6.2 Use Case Diagram 6.3 Activity Diagram 6.4 Class Diagram 6.5 Sequence diagram 6.6 Collaboration

Diagram 6.7 Database Diagrams (If Applicable) 6.7.1 ER Diagram 5 | Pg 7 Methodology 8 Implementation 8.1 Technology 8.2 Steps to be taken towards project Completion 8.3 Project Scheduling 8.3.1 Plan of Action 8.4 Cost Estimation 8.5

team structure 9 Advantages & Limitations 10 Applications 11 Future Scope 12 Conclusion 13 References 6 | Pg ABST The "OnliB - BCGratiand datiproject at forefof ioniing ional methodoloin contemporar digiera.ional stems rable rity a chesfraudulavitan inefficien the pross of cate issce and veon. In rnse to theseallhe project, named "Bain Innovator," proposes ficate manage builhe Et hereum bl This iniatiis by coitto not the security ues also inefficieninherenin ng particularly the of India.

psto acomprehive ion that asses enticertifice liBlev tethe em a ghtened ofsecu imabilertificatron and valion proc The proposed systs posioned to sficantle the integrittal certificates b elinatithe associated unauthorid ess, rgery, alons. on unique smart and centrz storage the m underpins sophicated yet use - friach.ject strives to establiradigmertifica management, treffiandasibity indieonal itons, nd organizatike in t digi In addites, the "Based Cicate Genon and Valion ystem"project roducasigniant adigmshift thevelocity eliitof certificissand datiTraditsystems often challwith ed processes, eby pedthe ious tiand on certificpropose systs chaenge by seamly intng smart contracts on. This omated achnot expeditthe ertificate upess also t and cise rificatiof rtificates.

y gamating ced chwith user - centr design, projeendavours establisa vel c eate ement em offering swift, e, user - friendly erieto gn the of contempor digi 7 | Pg 8 | Pg 9 | Pg | Pg | Pg 7. Valiation The valion proeauthenticity ofertificate systm authenticees by verifying data storon the blockchain assohe provided UL or QR | Pg | Pg | Pg 6i Dia 6sra | Pg 6ram: 6araogra | Pg 6basgf Applcae): 6.7.1 E | Pg | Pg IMENTAT 8gy The stack osen the imof "OnliB - BCate Generon and Valioncludes: • Bn Ethereum • Stragu Sdit • Webli Frame: Django • Frond: R • Version Control: Git • Developt Enmen Visual So C 8 Steps be Taken Tordsject Coetin The project wilcomplal well - deeps, ing: • Reqiremenysis Fquirements of the proje. • Designditecture: Cng a dign and architcture plan. • Developt: Implemeng the various modulonalies. • Testin Rng to ensure the rabily and security of the systm.

• Dept: Dng the system for init • User Feedack Cectiedback ny ry adjust • Op: Optimforefficiency. • Docutation Paricuon for future er • 8ject Schedul: 8.3.1 Plan: The project wilw a - structured ti Mont1: equirement nalysiand em esign. h Deveof re onalies Mont3: testing feedbcollctiMont4: ystem optimizatiand testing. Montent and user trainih 6: Documentatizati | Pg 8t Esmao Costestimon ocuson catiexpes tmemtialion, tprectdoes rrica monetnvestm i ts ornfructe. The detled analysis wil cover publiis and poti lcensi ng

forarour 8m Structure: The precteamst skiled presss witihe varous fids: Team Ler – OmraManh Grou Memb • Akhilesh Vil • Aniket S • Akshata Ashok • Yashashri Sukh.

• Pt Indrajihosale | Pg ADVANTAGES& LIITATIS ADVAN 1. Becu • Our syste and nearly isibl This mates ae from fory and cc 2. Certifit Be Al: • Once ertificaronthe they n't changor aked.This sur certifice always gnuine. 3. Faster Cere Issuce: • Bdirectlisscertifon blo project es te r paperwong a qain ficates. 4. E: • Slior codes ow and e - free rificatiof rtificate benefitingndiviati 5. Tranarendst: • Everything about certificeatided secur builrust and keeps evccountabl 6. Relile Valiation • Our systrings aistendabley to chates, m easir organizatio spotal ones from fak 7.

Sey: • Educatiinstutiand es an ecostsby randmanual checks, and mece, thid up to bi. 8. Mod an Relevant: • In digiworld, project eps rtificatesup date v aliwith modern praces. 9. User - Friend • The em designed simcitin nd, easof e r certific holders and those | Pg IMITAT • Needs The systn intctiy for both certifice and verion. Liminternet accay imonali • In S Is Tricky: The tisetup, creatismart ntracts connngthe systto ing framewoe comme - consum . | Pg APPLIATINS The "Onlilockch - Bertificatertidatiect has veal - wo applions, ing: 1.Eual Ins: • Universiti can use them to issrify aemirficates secu 2.Governt Agen: • Government cn the y issand enting certificcens 3.Corpe: • Ccan ine process issand emplcertificons, ensuring the valiy of qualions. 4.Onndin • Pring onli courses leve the systue veri certifin course complon. 5.Professial Association • Cal ement: rofessiassociatis issand alicertificons memberships, ensuring the authenticity of profional credenti 6.Healthector • Medical Cati Healte instutiem to issnd verify medic lirtificatind contion s for medieonals. 7.Hu Resou • EmplRHR cause systto eduonal qualions profssicertificatiofpotential streamning hiring process. 8.Ldlice: • Legal cuments:Lawfirms atory odies blon issan verifying lents and complcertificcing treducing fr | Pg 9.Fincialervices: • Ciance Conanks and financial intutue and verify comple and regulatory atiencndust 10.Tradddstry: • Sls Con: Trade organizons and indusue skis certificati ensuring that workeve the necaliating. | Pg FUTUREOP The project hing future avr enhaexpansion 1.In of AI andMache Lin • Implementing AI machine rning enhathe em's abily identify prevent frertifieffecti 2.Mobe Appcationport: • Developimobiapplions rs aconvwy managand verify cmartphones and tablets. 3.In with Addal Bs: • Exploring egratiwith blockchain beyond to users e choices and flexibity. 4.Inerabity withegacy S • Sess on: ng liwith ing ems by educatiitons, corporatiment agencies to ensur smooion and broadeon. 5.Stra: • Automated rocessLeversmart acts automccate uan valion workflows, reanual ion and enhanncy. 6.Ehcedterface an Eerience: • User - CD ontiy the intand erito the systmore uitand essifor rs, those lited expertise. 7.Cus an Personzation • TailSions:Offring izablefees methe ecificneeds er instutiions, allze the ceesign and iss process. | Pg 8.Silrovemen • Handlicing the systty to handle an increasing number of users and certifihout csing pe.

| Pg CONON In on, inton blockchain in "Online lockchain - Bd CGatianValion" repa roundbre iniatiin field certificent. This innovative approaching chall the for future here tal are re, rent, easilaccessiB leveraging chain's yptographic ecurity nd aliledg project ficantl reduces the lihood of certificery while erity and intonal contexts. Fct'sitty, and efficienti itas transformative ce the ion certificate systThrough ated certificissce catipes, projec tensurtrsparencyandopenness, streamlng nistprocedurand cing inton.

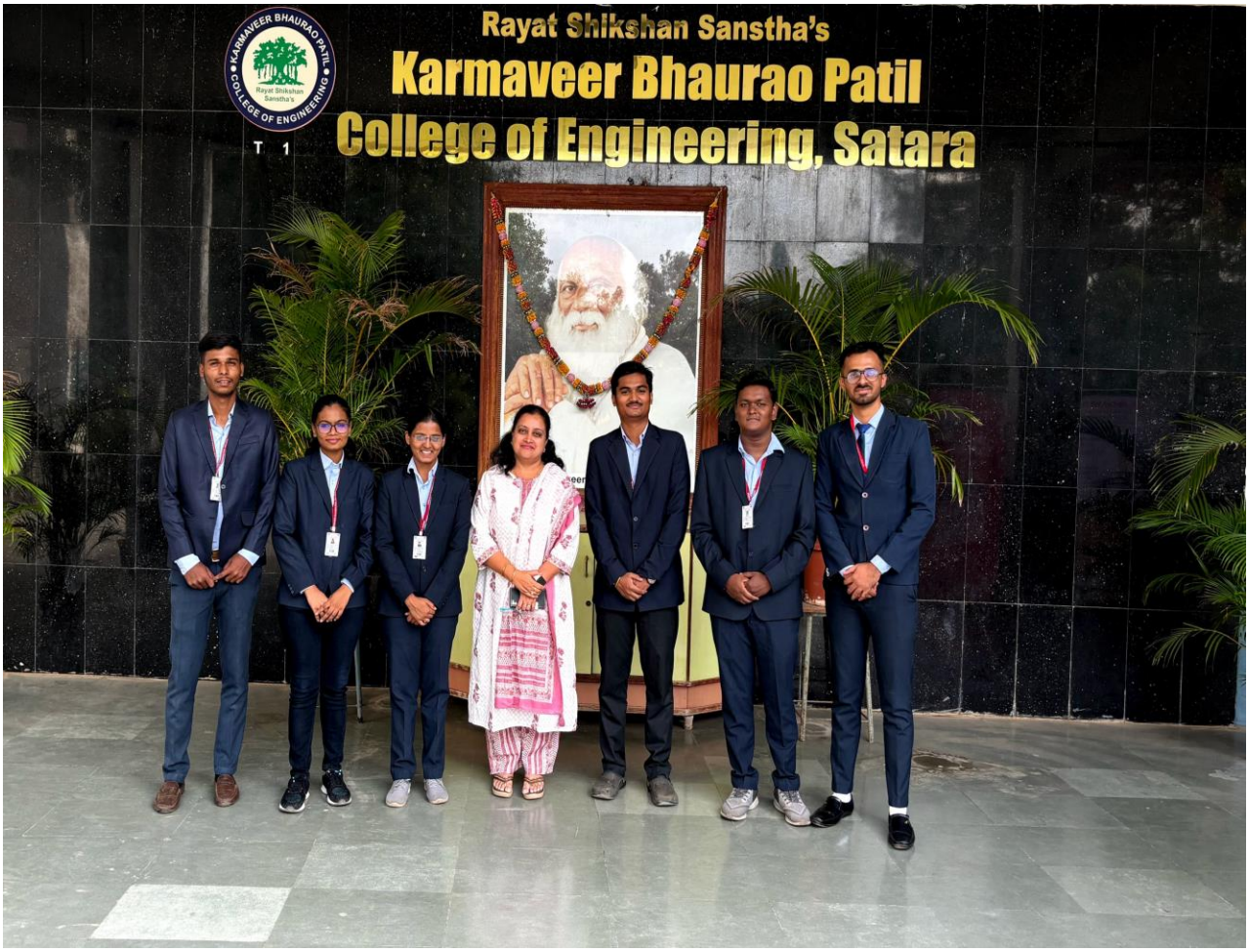
As project , ongoing aboratiwith and nuous willbe to it long - term ess fadvthcrdibity value digal entiin s digi | Pg REFERES I. "lockchain - B Acadmic en by Davies This discusses use blockchain to academicredentian explores itentiefits for eduonal itut II. "lockchainncipdlis" by Marc Pkingt part of RarHandbon al reditby XOllean MajlZheng, author a overview blockchtechnology it applions. This iati ifeatialion. III.

"lockchainin du: trodu Review the tof rt" by Alexander ch dréia ato Spubliin ublions, This paper es acatiof n in on, certificand von among otrs. IV. "s lockchain - b Certifites Lrng: TechIssues FDireons"by chsler, B Vuorikari, . z, shed the InternatiJournal EducatiTechnology Higher on, authors int the al ects invol depl ying - bdigicertificat withi of lea V. "lockcerts: Op frastrufor adCredtials Bn authored M. porny, D. and appears IEEE ecury rivacy. This paper roduBcerts, openstandardesigned blockhain - baseddigi certificng itplementation and exploring potal applicati VI.

"lockchainolus for Credtials an Certes an lenges from the ueanPerspive" by aulivanMpubliin opean al f EducatiThis er exploblockchain ions r edentiand certificannes the chengeh their im VII. "inB - B ystems Sre dTrurthy en pbed IE Trans onenabdecuug b K. R X. Wang, Lou. The ectufor oping - based ystems reli and safe credals, that invole crodatinted in thi | Pg 1.Frooules | Pg | Pg

INTERNET SOURCES:

<1% - status.net › articles › best-examples-thank-messages


Rayat Shikshan Sanstha's
Karmaveer Bhaurao Patil
College of Engineering, Satara
KARMAVEER BHAURAO PATIL
COLLEGE OF ENGINEERING
Rayat Shikshan Sanstha's
T 1