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Faculty of Engineering and Technology

Department of Artificial Intelligence and Data Science

Presentation
for
Major Project-II

PRESENTATION FOR MAJOR PROJECT - II

ON

Blockchain based Academic Credential Verification System

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SAWANGI (MEGHE) , WARDHA

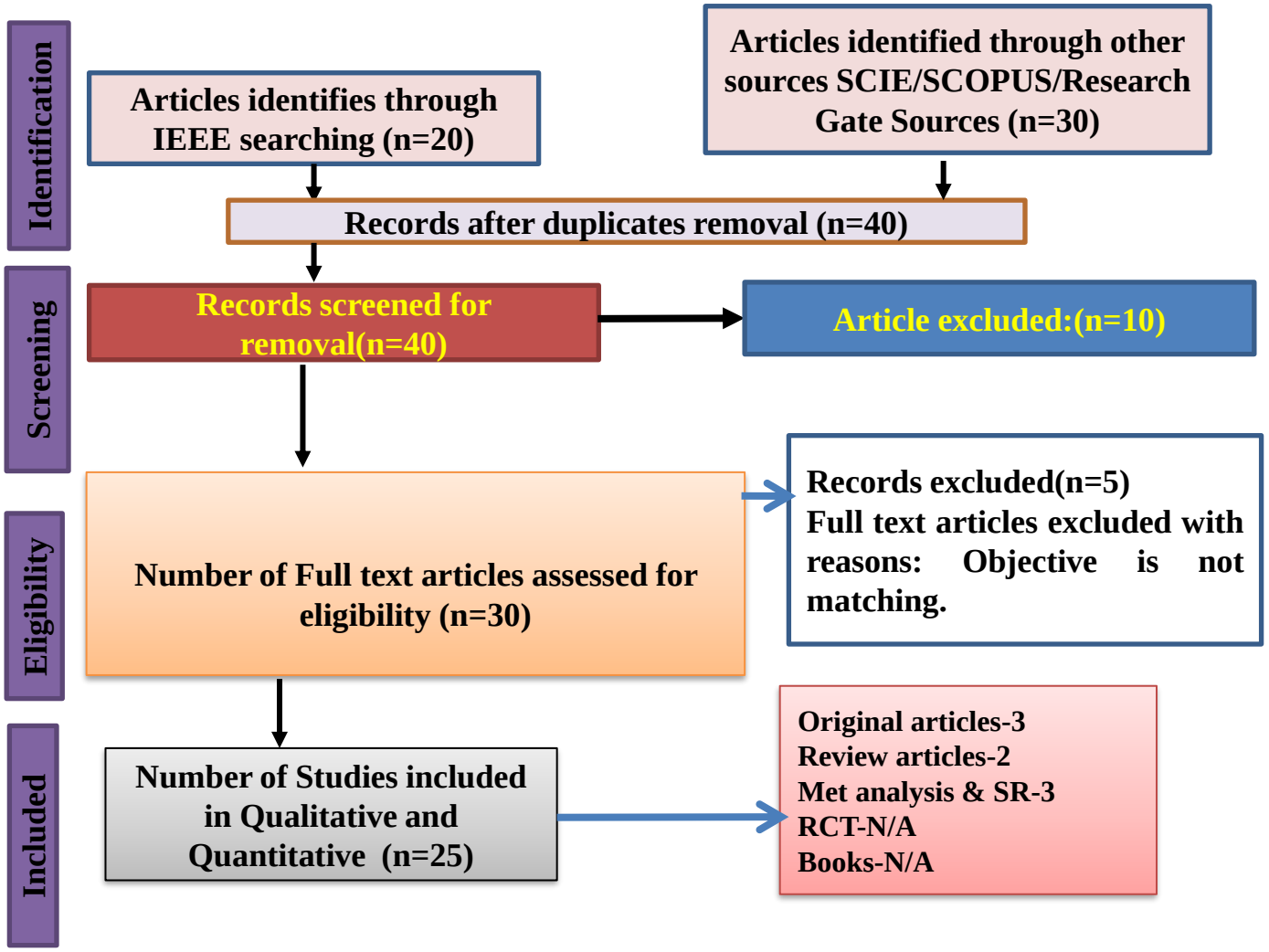
DATE : 03/03/2025

CONTENTS

INTRODUCTION

- Traditional academic credential systems are prone to issues like forgery, loss, and manual inefficiencies.
- Verification of credentials is often time-consuming, costly, and relies heavily on centralized databases.
- Employers and institutions face challenges in confirming the authenticity of certificates quickly.
- There’s a growing need for a secure, transparent, and decentralized system to address these challenges.

SYSTEMATIC REVIEW OF LITERATURE (PRISMA FLOW DIAGRAM)



PRISMA-S EXTENSION

Topic	Item	Checklist item
Data base name	1	PubMed, IEEE, Elsevier, Research Gate, Google Scholar
Registries	2	N/A
MESH TERMS	3	Blockchain, Cryptocurrency, Distributed Ledger Technology, Digital Certificates, Smart Contracts
Search strategies	4	Mesh terms, Keywords, phrases, headlines, terms and citations are used as search strategies to collaborate the data
Selection process	5	• 40 records were screened for eligibility based on the inclusion criteria. • 10 articles were excluded during screening for not meeting the selection criteria (e.g., irrelevance to objectives).
Limits and restrictions	6	• Studies conducted within the last 5 years were prioritized for relevance. • Older studies were included to provide historical evidence or foundational insights.
Search filters	7	• 25 studies were included in the qualitative and quantitative synthesis. • Studies included consist of original research articles, review articles, meta-analyses, and systematic reviews.
Total records	8	• From PubMed, IEEE, Elsevier, ResearchGate, and Google Scholar, 50 records were identified initially. • After removal of duplicates, 40 records remained for screening.

RESEARCH ARTICLES INCLUDED

Sr. No	Type of article	Total
1	Original Article	20
2	SR & MA	5
3	RCT	0
4	Review	7
5	Books	3
Grand Total		**25**

KNOWLEDGE GAP

S. No.	Title of the Article Author Year of publication	Focus of Study, Design, Objectives , Method used and Sample size	Findings of the study and their conclusions	Remarks of the Scholar on limitations
1	Sharples, M. (2024). *The Blockchain and Kudos: A Distributed System for Educational Record, Reputation, and Reward.*	• Explores the potential of blockchain in educational settings for storing academic records, building reputations, and rewarding achievements. Conceptual study—no specific sample size.	• Demonstrates how blockchain could decentralize educational systems by securely recording achievements and enabling peer-to-peer reputation systems.	• Emphasizes the lack of real-world implementations and challenges in integrating blockchain into existing educational systems.
2	Trong Thua Huynh et al. (2022). *eunicert: Ethereum-Based Digital Certificate Verification System.*	• Focuses on developing a blockchain-based solution for verifying digital certificates using Ethereum. Demonstrates a prototype system and its architecture.	• The proposed system ensures transparency, immutability, and ease of verifying credentials. Reduces the risk of fraud and tampering in academic certifications.	• Mentions scalability and adoption challenges, as well as limitations due to high transaction costs on Ethereum.
3	Inamorato dos Santos, A. (2021). *Blockchain in Education – European Commission's JRC Report Preview.*	• Explores the application of blockchain in education, focusing on storing academic credentials and offering transparency. Provides a conceptual framework with no empirical study.	• Identifies blockchain as a tool to revolutionize the education sector through decentralized credential management. Proposes policies to enhance adoption.	• Highlights the lack of large-scale case studies and challenges regarding data privacy laws in the EU.

KNOWLEDGE GAP

S. No.	Title of the Article Author Year of publication	Focus of Study, Design, Objectives , Method used and Sample size	Findings of the study and their conclusions	Remarks of the Scholar on limitations
4	Hammoudeh, Y. A. et al. (2023). *Digital Certificate Validation Using Blockchain: A Survey*.	• Comprehensive survey on blockchain-based solutions for validating digital certificates. Reviews existing implementations and challenges.	• Summarizes the strengths of blockchain in certificate validation, including transparency, fraud prevention, and decentralized verification.	• Notes issues like high energy consumption in blockchain networks and the need for standardized protocols across institutions.
5	Seng, K. C., & Rana, M. E. (2022). *Recommendations for Implementing a Blockchain-Based Educational Certificate Distribution System.*	• Proposes a framework for blockchain adoption in certificate issuance and verification. Includes a review of blockchain technology and an implementation plan.	• Provides recommendations for educational institutions, including interoperability and cost-effective blockchain solutions like Hyperledger.	• Highlights challenges in convincing institutions to adopt new technology due to lack of technical expertise and initial investment costs.
6	Chowdhary, A., et al. (2021). *Blockchain-Based Framework for Student Identity and Educational Certificate Verification.*	• Discusses the integration of blockchain for managing student identities and verifying credentials. Includes a prototype system tested with small datasets.	• The proposed framework ensures security, reduces identity theft, and prevents certificate fraud while offering efficiency in verification processes.	• Implementation challenges include lack of integration with existing academic systems and potential resistance to adoption due to unfamiliarity with blockchain technology.

RESEARCH QUESTION

How can the Polygon blockchain used to create a decentralized, cost-effective, and scalable solution for academic credential verification?

AIM

To design and develop a decentralized academic credential verification system using the Polygon blockchain, aimed at providing a secure, tamper-proof, and cost-effective solution for the issuance, storage, and validation of academic records.

OBJECTIVES

- To Build a secure and decentralized platform for issuing and verifying academic credentials.
- To Use the Polygon blockchain to ensure scalability and cost-efficiency.
- To Provide a tamper-proof mechanism to prevent credential fraud.
- To Enable real-time, global access to credentials for verification.

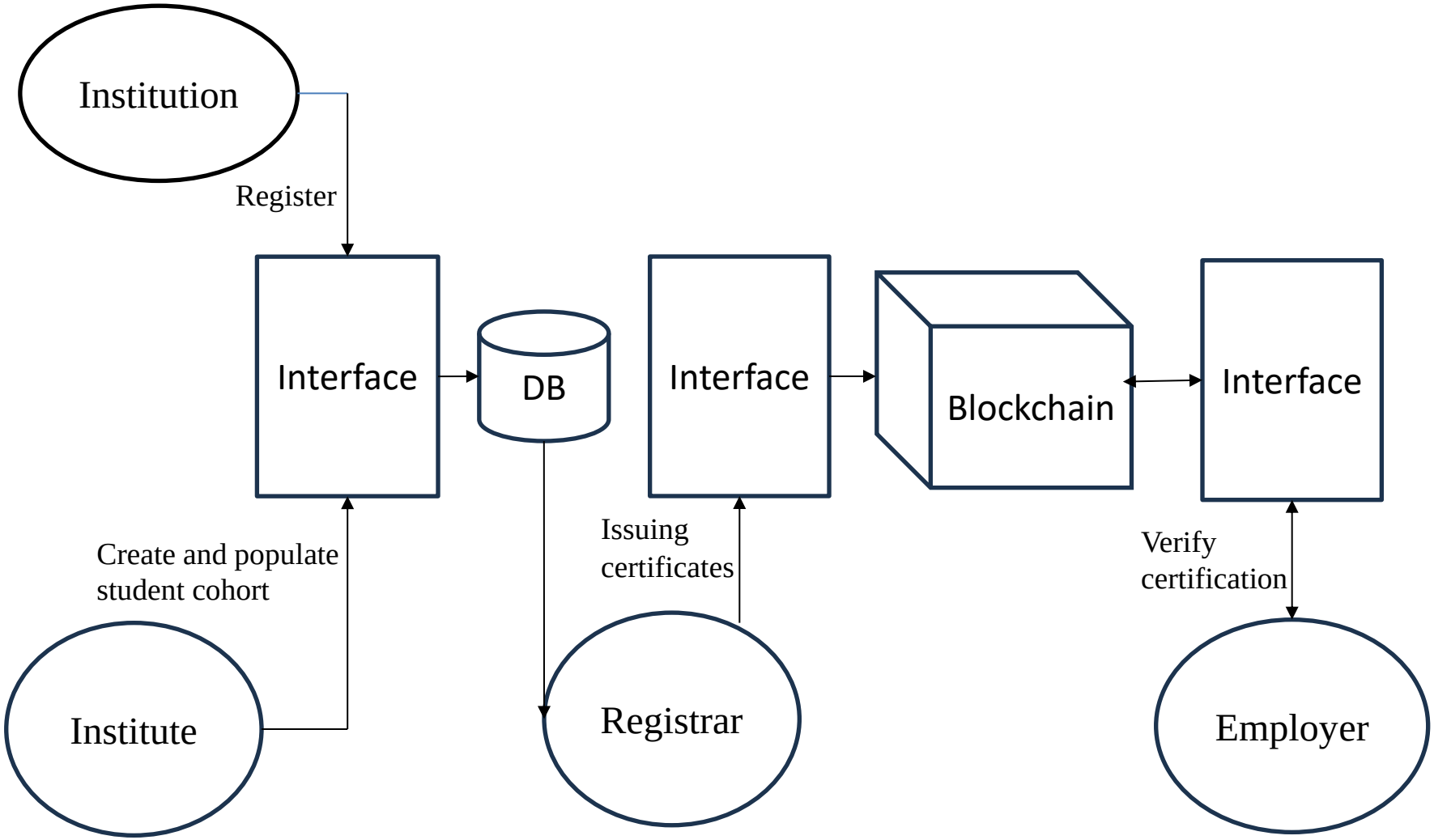
Methodology

Approach:

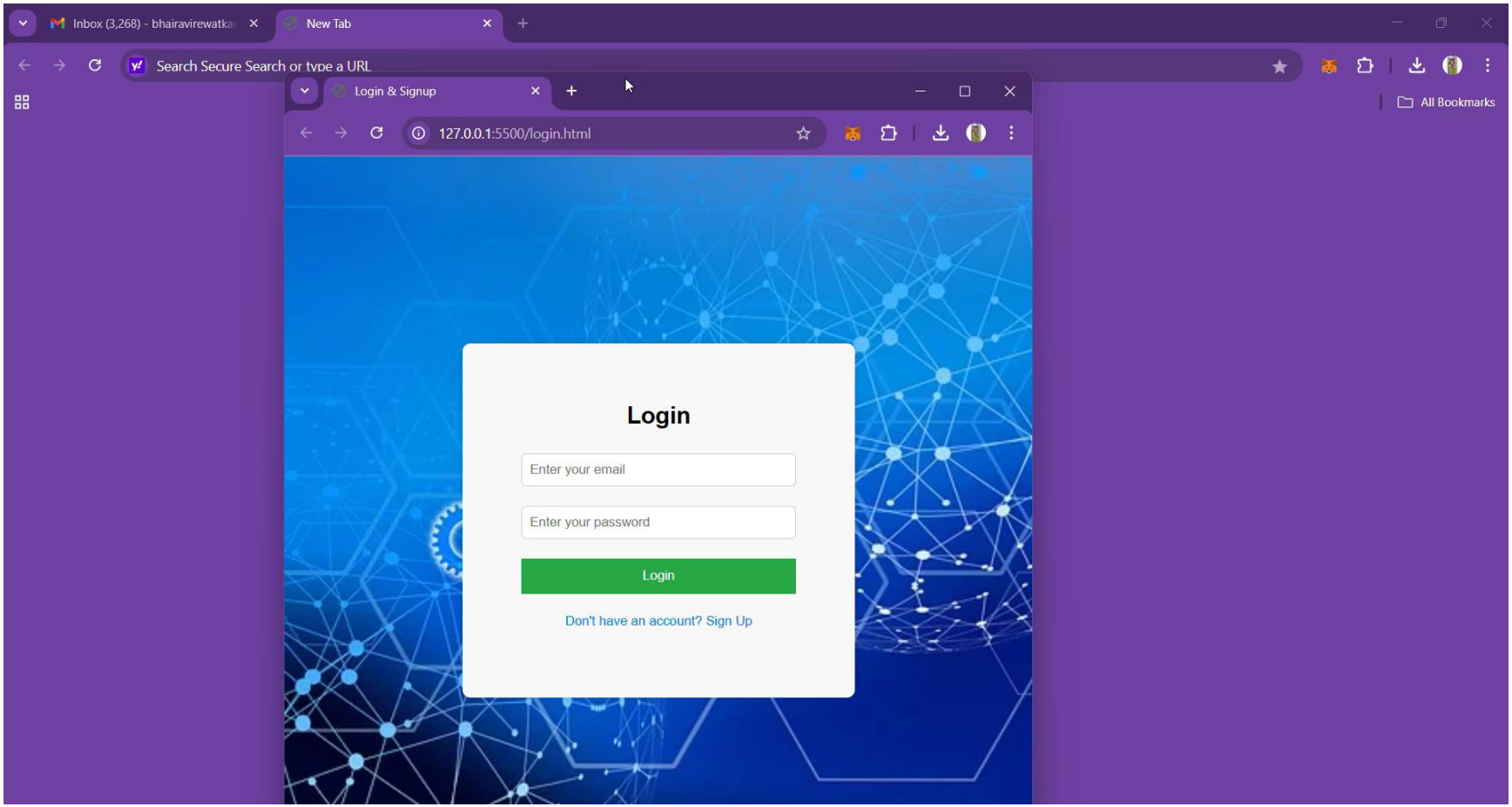
- Requirement Analysis and Research
- Blockchain Platform Selection
- System Design and Architecture
- Smart Contract Development
- User Interface (UI) Development
- Decentralized Storage Integration
- Testing and Quality Assurance
- Deployment and Launch

Technologies: Polygon Blockchain, Solidity, IPFS (InterPlanetary File System), MetaMask, ReactJS (for UI Development), Node.js and Express.js, Web3.js, Truffle Suite

Flowchart


Institution
Register
Interface
DB
Interface
Blockchain
Interface
Create and populate
student cohort
Issuing
certificates
Verify
certification
Institute
Registrar
Employer

Final Demo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New Tab
Search Secure Search or type a URL
All Bookmarks
Login & Signup
127.0.0.1:5500/login.html
Login
Enter your email
Enter your password
Login
Don't have an account? Sign Up

SUMMARY

S no	Point	Compliance
1	Is research gap identified?	Yes
2	Is the research question is in tune with research gap?	Yes
3	Is the hypothesis in tune with the research question?	Yes
4	Is the study design commensurate with the research question?	Yes
5	Is the study feasible ?	Yes
6	Whether the research lead to generation of new knowledge or achieve higher level of evidence?	Yes

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THANK YOU