Sector: Computer Science & I.T

STUDENT PROJECT SCHEME 2025-2026

Project Proposal On

Blockchain and NLP-Enabled E-Learning Certificate Issuance and Verification System for Tamil Nadu

Submitted to

TAMIL NADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

(Department of Higher Education, Government of Tamil Nadu)

Submitted by

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TAMIL NADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY
(Department of Higher Education, Government of Tamil Nadu)

Website: www.tnscst.tn.gov.in

APPLICATION FORMAT FOR STUDENT PROJECT PROPOSAL

Please fill all the details in this MS word file. Convert to a pdf file, get it approved from the project guide / head of the department and head of your institution. Keep ready the scanned pdf file of 1) Signed Application form 2) Declaration and Endorsement and fill-up the Google Form. Note: Handwritten proposals & multiple entries in Google form will not be accepted.

https://tinyurl.com/TNSCST-SPS-2025

1.	**Project Title:** Blockchain and NLP-Enabled E-Learning Certificate Issuance and Verification System for TamilNadu
2.	**Sector** (strictly choose only one): Computer Science & I.T
3.	**Name(s) of project guide(s):** Ms. Abisha D Assistant Professor, Department of CSE Email: abisha_cse@nec.edu.in Mobile: 9159849422
4.	**Name of Team Members (Strictly not more than four students in a batch):** *(Type names in Capital Letters as provided in your college)* **Name:** PRIYANKA S **Year of Studying/Department/Course:** IV/CSE/BE **Email id:** 2212043@nec.edu.in **Mobile No:** 9025192940 **Name:** BRAHMA SAKTHIESWARI G **Year of Studying/Department/Course:** IV/CSE/BE **Email id:**2212048@nec.edu.in **Mobile No.:**8148345361 **Name:** JESINTHA SHARON S **Year of Studying/Department/Course:** IV/CSE/BE **Email id:**2212057@nec.edu.in **Mobile No.:**6379010034
5.	**Institution Details:** **Name of the Institution:** National Engineering College **Institution category:** Self Finance **Address:** K.R.NAGAR,KOVILPATTI **District:** Thoothukudi **Pincode:**628503
6.	**Introduction:** Academic certificates are vital for proving educational achievements, but traditional

	systems that issue and store them are often easy to forge or manipulate. This project introduces a Blockchain-Based Academic Certificate System that makes certificate issuing and verification secure, transparent, and tamper-proof. Using blockchain and IPFS, each certificate is digitally stored and linked to a QR code for easy validation. Built-in NLP helps detect any mismatches or duplicates, making the entire process more trustworthy for students, institutions, and employers. **Role of NLP** ● NLP ensures certificates are stored with metadata in both Tamil and English, making them accessible for diverse stakeholders. ● NLP chatbots can handle certificate verification requests in natural language. ● NLP can analyze certificate-related communication (like forged documents or mismatched data). Employers can search certificates using plain queries.
7.	**Objectives of the project:** ● To design and implement a secure, scalable, and tamper-proof digital certificate issuance and verification system using Blockchain, QR Codes, and decentralized storage (IPFS) to ensure integrity and transparency. ● To integrate Natural Language Processing (NLP) techniques for: ○ Intelligent search and retrieval of certificates. ○ Multilingual query support (Tamil + English) for inclusivity in Tamil Nadu's education ecosystem. ○ Automated query handling for faster verification by institutions, employers, and government agencies. ● To explore and benchmark storage solutions, including free-tier decentralized storage (IPFS) and paid cloud storage options (estimated ₹1–2 per GB per week), ensuring a cost-effective archival system. ● To evaluate system scalability, adoption feasibility, and budget impact, including deployment on educational cloud infrastructure and integration with Tamil Nadu's academic and government institutions like TNPSC, TRB, DOTE.
8.	**Methodology:** The proposed blockchain-based certificate verification system is designed with multiple integrated modules, as illustrated in Fig. 1.0. The architecture shows blockchain technology, decentralized storage, and Natural Language Processing (NLP) to ensure secure and multilingual verification of academic certificates. **A. Platform Setup** As shown in Fig 1.0, Ethereum test network (Sepolia/Goerli) was deployed to serve as the underlying blockchain layer for certificate registration. InterPlanetary File System (IPFS) was configured to provide decentralized storage for certificate files, ensuring immutability and accessibility. For performance optimization, a local metadata cache was optionally maintained using a relational database to reduce repetitive blockchain queries during frequent verifications.

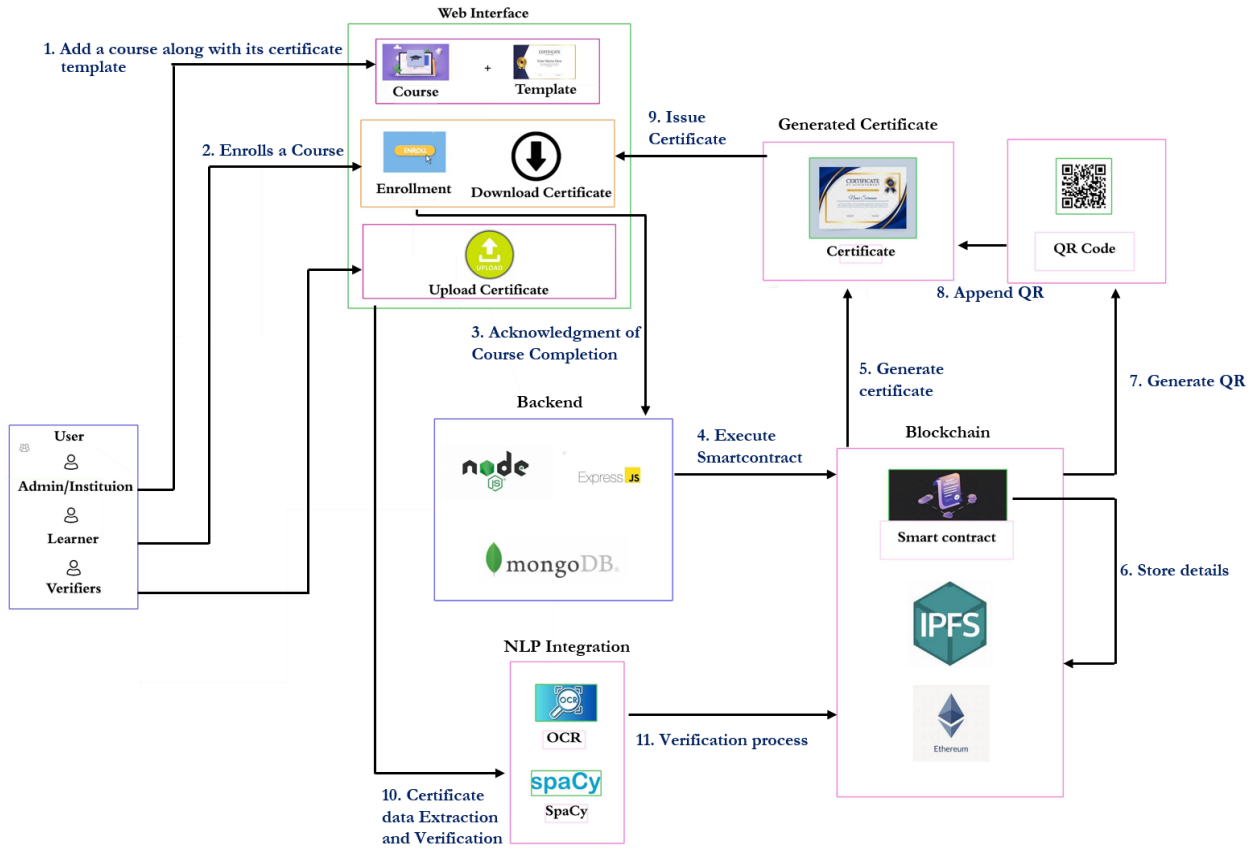

Fig. 1.0 Architecture Diagram

B. Smart Contract Development

In Fig. 1.1, the flow of certificate issuance and registration is depicted. A smart contract was developed using Solidity to provide secure certificate registration and verification. The key functionalities of the contract are as follows:

I. Certificate Hashing: The SHA-256 hash of each certificate file is computed and stored on the blockchain.
II. Metadata Storage: Metadata including student ID, course, issue date, and issuing authority is recorded within the contract.
III. Verification Queries: The contract enables querying of stored certificate information for authenticity validation.

The contract was deployed on the Ethereum testnet, and extensive testing was performed with sample data to validate correctness and reliability.

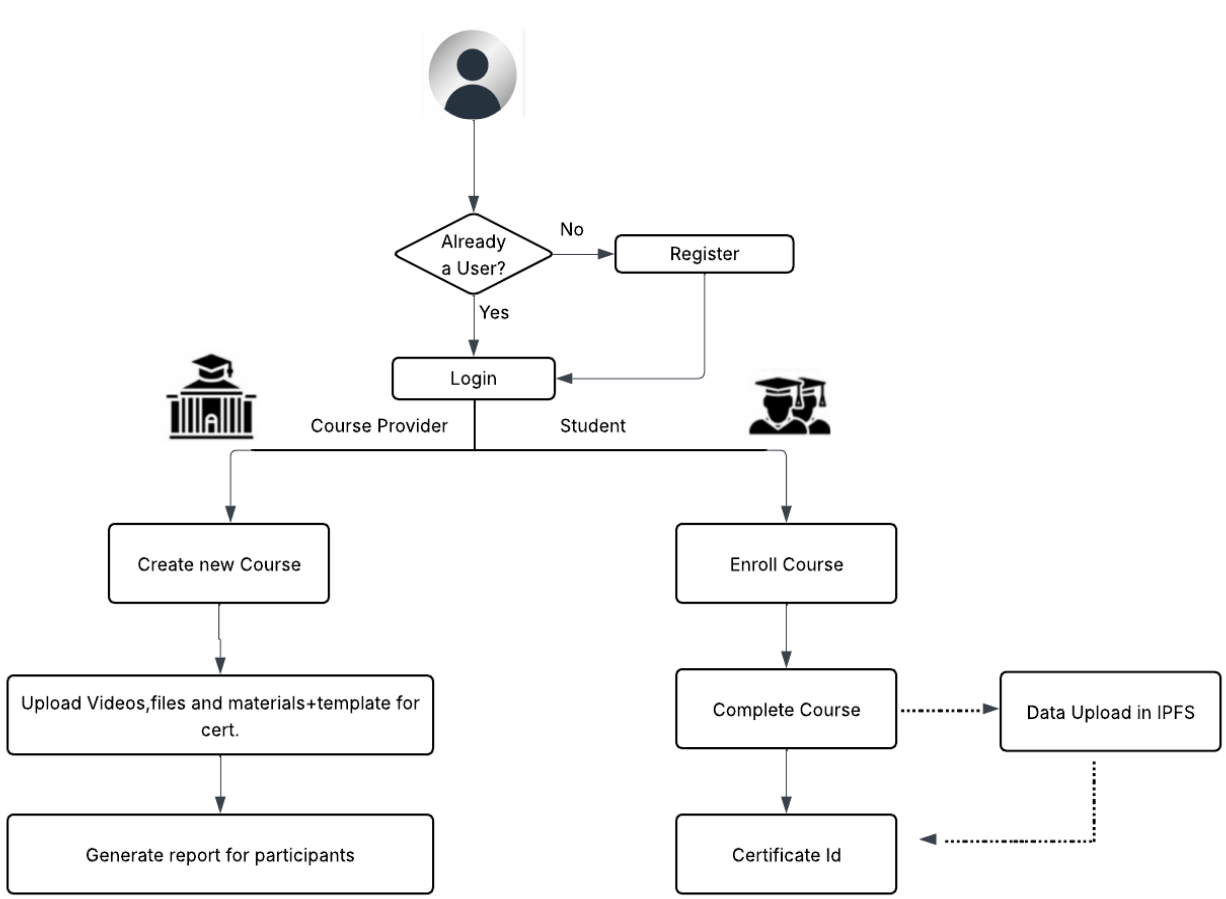

Fig. 1.1 Work Flow Diagram - Certificate Generation

C. QR Code Integration

As illustrated in Fig. 1.1, A QR code module was implemented to embed either the blockchain transaction hash or the IPFS hash. This QR code is printed directly on the certificate PDF, enabling quick validation by scanning and retrieving corresponding records from the blockchain.

D. NLP-Based Verification (Tamil + English)

The verification flow, represented in Fig. 1.2, integrates a Natural Language Processing (NLP) module capable of handling multilingual data. The module extracts text from certificates and cross-checks it against blockchain metadata. It supports both Tamil and English, ensuring inclusivity for regional and global validation. Any mismatches or signs of tampering are flagged for further review.

E. Testing and Deployment

As shown in Fig. 1.2, the system is validated through rigorous testing. The complete system was tested using multiple sample certificates from National Engineering College (NEC). The test procedure included:

- Uploading certificates to IPFS.
- Verifying documents through blockchain lookup and NLP validation.
- Testing across varied certificate layouts, fonts, and languages.
- Conducting user acceptance testing with faculty and administrative staff.

The results demonstrated the feasibility of combining blockchain immutability with multilingual NLP verification for a reliable, tamper-resistant certificate

authentication platform.

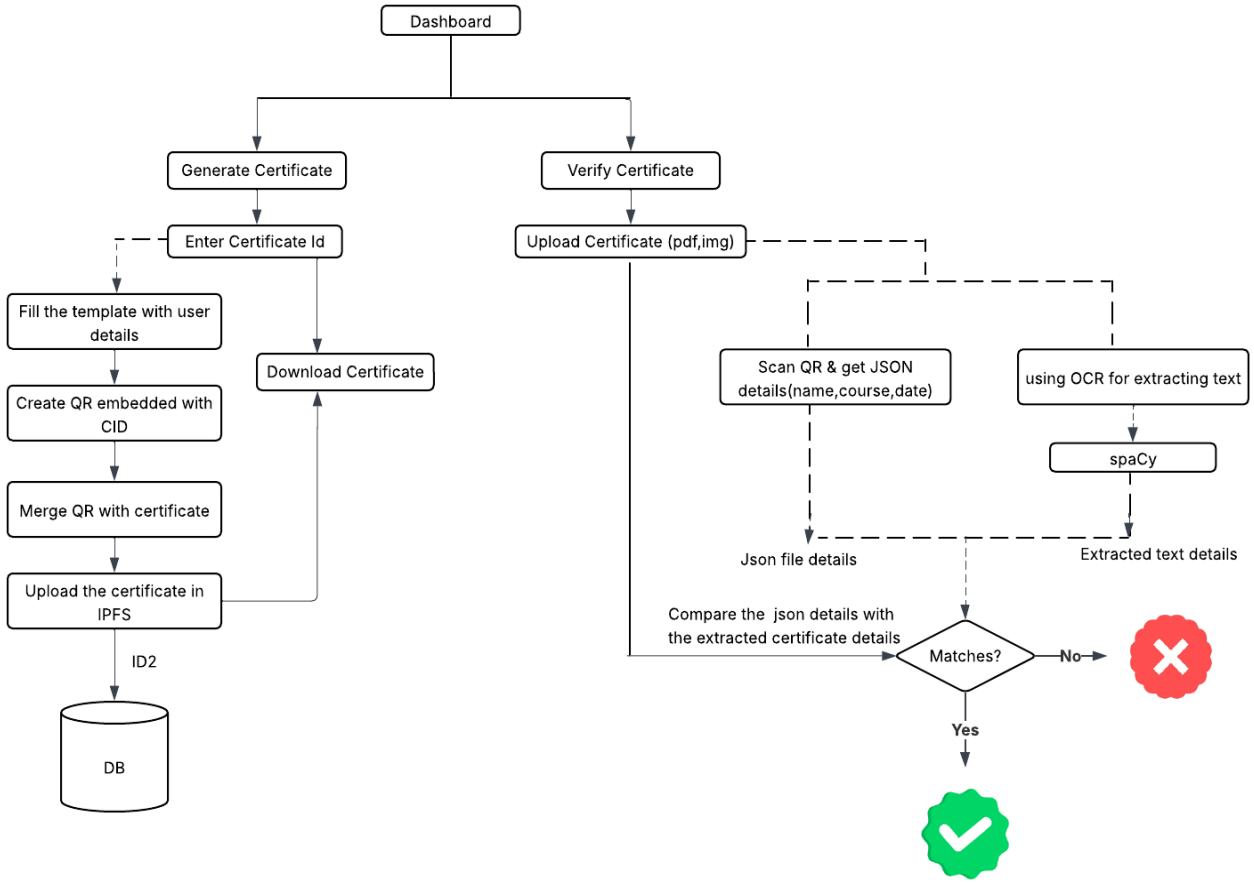

Fig. 1.2 Work Flow Diagram - Certificate Verification

9. **Workplan:**

Task	Duration (Months)
Phase 1: Planning & Setup	0.5
Phase 2: Metadata Generation	0.5
Phase 3: Certificate Creation	1
Phase 4: Smart Contract Deployment	2
Phase 5: Verification Mechanism	1
Phase 6: Web Interface	1
Phase 7: Testing & Deployment	1
Phase 8: Documentation	1
Total	**8**

10. **Expected Outcome of the project:**

- A secure system to issue and verify academic certificates using blockchain

and IPFS.
- Tamper-proof certificates with QR codes linked to verifiable metadata.
- Easy real-time verification without manual checks.
- Reduced forgery through blockchain and NLP validation.
- Simple web interface for issuing and verifying certificates.

11. **Is the project proposed relevant to the Industry / Society?**

Yes / No: Yes

If yes, please provide details of the industry details:

Society Application & Support

Blockchain-verified certificates ensure transparency, prevent fraud, and build trust across education, employment, and governance. They help educational institutions uphold credibility, enable employers to hire qualified talent, allow governments to deliver programs fairly, and encourage EdTech learners to gain socially recognized skills strengthening trust and opportunity in society.

12. **Can the product or process developed in the project be taken up for filing a Patent? No**

Prior Art search done? No

13. **Budget details (The following is a tentative budget with break-up details; it is subject to change depending on the specific project requirements):**

Budget	Amount
a) Cloud/IPFS storage (pilot, 1 year) - Pinata / Web3.Storage	₹2,500
b) Cloud VM / Hosting (DigitalOcean) for 6 months	₹3,000
c) Domain & SSL	₹800
d) NLP Model API / Tools (OpenAI API - pay-as-you-go)	₹1,600
Total	₹7,900

14. **Has a similar project been carried out in your college / elsewhere? If so furnish details of the previous project and highlight the novelty & improvements suggested in the present one:**

No

This is the first project of its kind in our institution. It uniquely combines blockchain, IPFS, QR code verification, and NLP-based validation to issue secure, tamper-proof academic certificates. The system enables real-time verification and detects duplicates, offering a more advanced and trustworthy solution than traditional methods.

15. **Any other details (Please specify):**

- The system is designed to be scalable and modular, allowing integration with multiple institutions and courses
- It supports real-time verification without requiring blockchain or IPFS knowledge from end users.
- The project aligns with Digital India and National Education Policy (NEP) 2020

	goals of promoting secure and tech-enabled academic systems. • The final product can be extended for use in skill certifications, internships, and government training programs.
16.	**SPS Coordinator (Identified by the college):** **Note:** To be identified by the Head of the Institution. The project proposals must be submitted to TNSCST through designated SPS coordinators. **Name:** Dr. S. Thalamuthu **Designation/Department:** Prof/Science and Humanities **Email id:** stmphd2010@nec.edu.in **Contact No:** 9486720174

Note: Any mismatch between the scanned PDF, the details filled in the Google Form, and the hard copy as well as multiple submissions via the Google Form will lead to **disqualification** of the proposal.

Name & Signature of the Project Guide	**Name & Signature of the HOD**	**Name & Signature of the Principal / Head of the Institution (with seal)**
Ms.D.Abisha, AP/CSE	Dr.V.Gomathi, HOD/CSE	Dr.K.Kalidasa Murugavel Principal

DECLARATION

(From Project Students)

We, the project team hereby declare that the information provided in the enclosed project proposal (Title of the Project: **Blockchain and NLP-Enabled E-Learning Certificate Issuance and Verification System for TamilNadu**, College: **National Engineering College**) are true and correct to the best of our knowledge and belief. We understand that the Tamil Nadu State Council for Science and Technology (TNSCST) will not entertain any changes to the project title or the names of the team members under any circumstances.

We further declare that the proposed project work is original, not copied or purchased from any source. We are committed to carrying out the project independently, with appropriate guidance from our faculty and project guide, and by utilizing the facilities provided by our institution. We pledge to maintain academic integrity, avoid plagiarism, and work sincerely and diligently to execute and complete the project as proposed.

We understand that any false, incorrect, or misleading information provided in this proposal may lead to disqualification or other consequences as deemed appropriate. We also authorize the sharing of the project details contained in this proposal with TNSCST, Chennai.

We acknowledge that, if selected, our team is required to exhibit and present the project at the **Annual State-Level Seminar-cum-Exhibition** organized by TNSCST.

The endorsement form for TNSCST, Chennai is enclosed herewith.

Name of the students with Register No. **Signature with date**

1. PRIYANKA S - 2212043
2. BRAHMA SAKTHIESWARI G - 2212048
3. JESINTHA SHARON - 2212057

Name & Signature of project Guide

Name & Signature of HOD (with Seal)

ENDORSEMENT

(From College, endorsement to be taken in the Institution / Department Letter head)

This is to certify that the following students:

1. Ms. PRIYANKA S,
2. Ms. BRAHMA SAKTHIESWARI G
3. Ms. JESINTHA SHARON S

are bonafide final year students of the **Department of Computer Science and Engineering**, enrolled in the **B.E.** degree program at our institution and it is certified that 2 copies of Utilization Certificate (UC) and final report along with seminar paper will be sent to the Council after completion of the project within specified timeline.

We hereby confirm that, if the project proposal submitted by the above-mentioned students under the **Student Project Scheme** is selected by **TNSCST**, our institution will extend full support by providing the necessary laboratory, computer, and infrastructure facilities required for the successful execution of the project.

Furthermore, we assure that appropriate measures will be taken to ensure the project team participates in the **Annual State-Level Seminar-cum-Exhibition** (if selected) and exhibits/demonstrates their project.

If the student team or project guide fails to submit the completed project report and the Utilisation Certificate within the timeline specified by TNSCST (if selected), our institution will ensure that the sanctioned project amount is returned to TNSCST.

Name & Signature of Project Guide	**Name & Signature of HOD (with Seal)**	**Name & Signature of the Principal / Head of the Institution (with Seal)**