

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, ALLAHABAD



Blockchain Project Report

Instructor: Dr. J. Kokila

Title : Certificate System

(<https://github.com/Mridul20/Certificate-generator>)

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I. IMPROVEMENTS (FEATURES ADDED) AFTER C2

- Admin
 - View registered institutes in portal
 - Remove institutes from portal

- Institute
 - A login platform and dashboard for institutes
 - Update institute details
 - Revoke certificates after generation

- Student
 - A login platform and dashboard for institutes
 - Update students profile details
 - A profile page to view all certificates issued to a particular student

II. OBJECTIVE

While the number of universities, tertiary education students and number of graduates per year constantly increase, the need to easily verify degree certificates generates new business opportunities.

In this project we project use blockchain technology to build a platform to generate and verify certificates thus creating a secure platform for both students and companies. As a large number of

students graduate every year, the problem of fake certificates is a big issue. One can easily get fake certificates in India. Companies hiring thousands of freshers spend large amounts of money to get the educational certificates and transcripts verified of applicants.

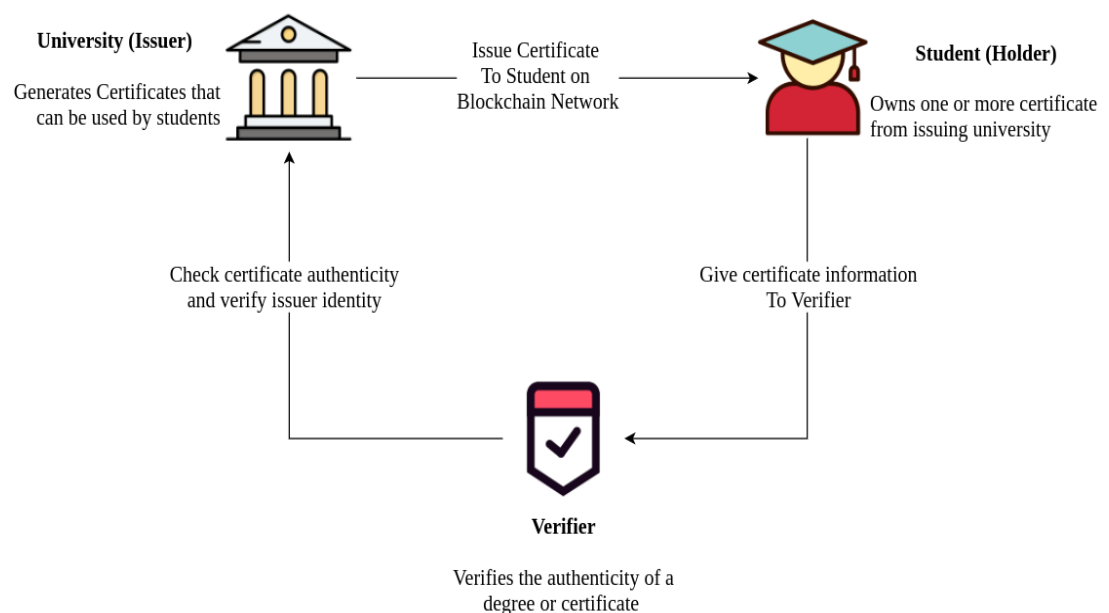
A Digital Certificate using blockchain technology can address this problem.

III. NEED FOR BLOCKCHAIN

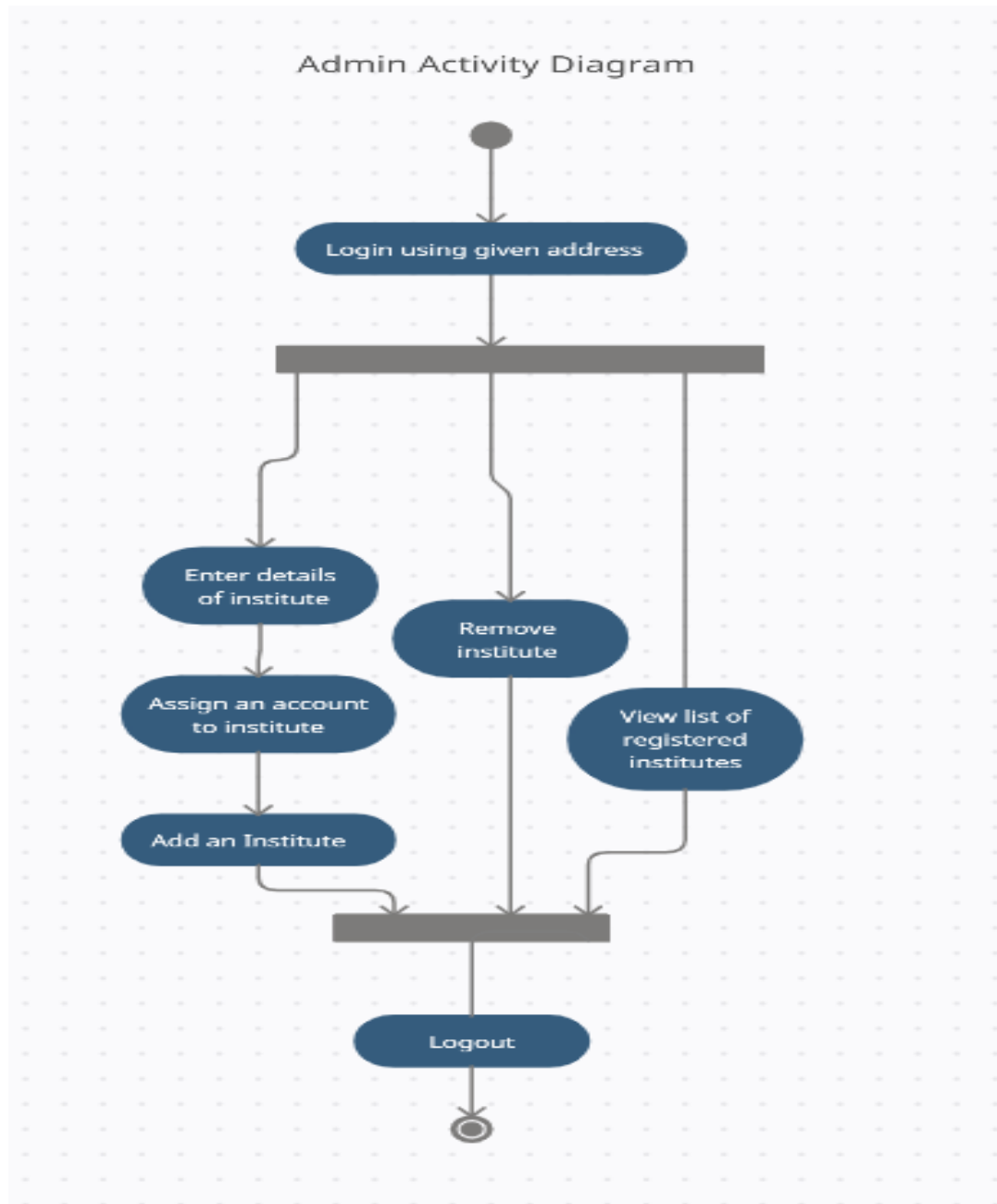
- **Integrity and Transparency** - Each certificate will have its own unique address on blockchain and once a certificate is uploaded it can not be modified.
- **Verification of Authenticity** - It issues blockchain certificates by creating a transaction from the issuing institution to the recipient on the Ethereum blockchains. That transaction includes the address of the certificate itself.
- **Decentralization** - Blockchain is a decentralized distributed digital ledger collectively maintained by a network of computers, called nodes. The data in the blockchain cannot be modified by a person without the consent of everyone else who maintains the records. This makes the data secure. There is no central authority which holds the power to issue certificates.

IV. ACTORS AND THEIR FUNCTIONALITIES (Features)

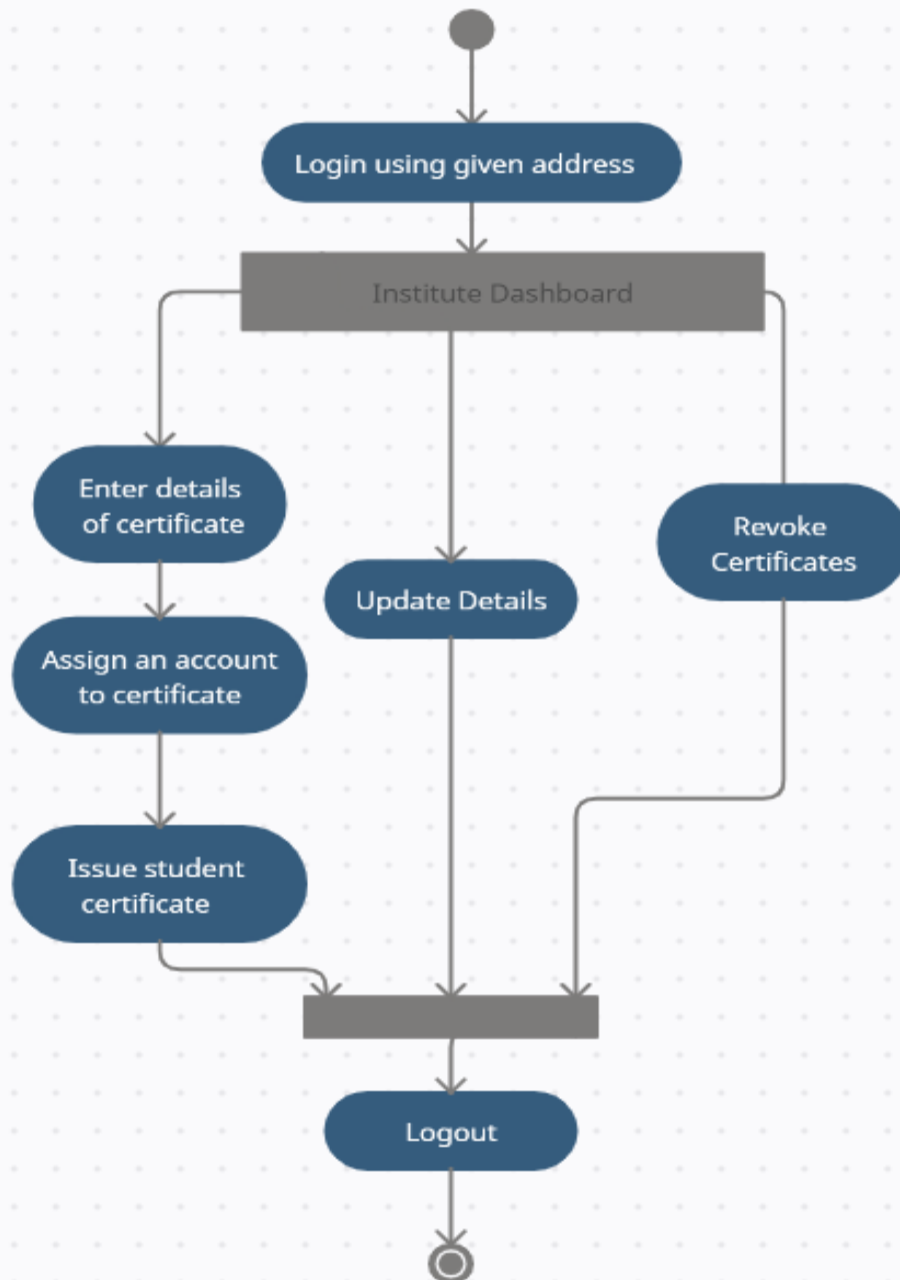
- Admin
 - Manage Institutes (Add / Remove)
- Universities
 - Issue academic certificates.
 - View academic certificates issued.
- Students
 - Receive academic certificates from universities.
 - View and manage received academic certificates.
 - Share academic certificates with third party verifiers
- Verifier
 - Receive certificate data from students.
 - Verify certificate authenticity with blockchain platform.



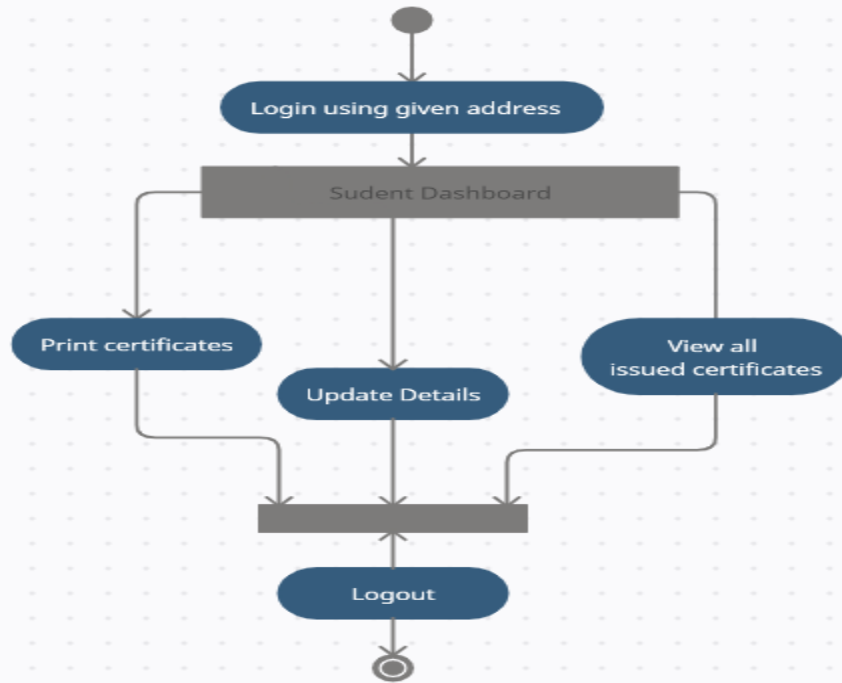
V. ACTIVITY DIAGRAM



Institute Activity Diagram



Student Activity Diagram



Verifier Activity Diagram



VI. BLOCKCHAIN DETAILS

The smart contract will be hosted on the Ethereum network, so the system will be secured by millions of miners securing the Ethereum blockchain. It is a permissionless blockchain network which uses the Proof of Authority consensus mechanism.

VII. Existing work in Education Sector

Many Universities have already used blockchain to create a trusted, distributed, and shared infrastructure that will become the standard for issuing, storing, displaying, and verifying academic credentials, digitally.

- Certificates and identity management
 - Digital Credentials Consortium(MIT)
 - BCDiploma

VIII. CODE DETAILS

The smart contract has been written in the Solidity language. It defines various functions for generating and verifying certificates and registering institutes and students.

The frontend has been written in Node.JS and it provides a GUI for all the functionality defined in the contract. We have used web3.js to integrate contract methods with our frontend.

IX. FRONTEND SCREENSHOTS


- Home Page

CERTIFICATE DETAILS

Certificate Address

We'll give certificate details.

Verify



Admin Institute Student

- Admin

- Admin login

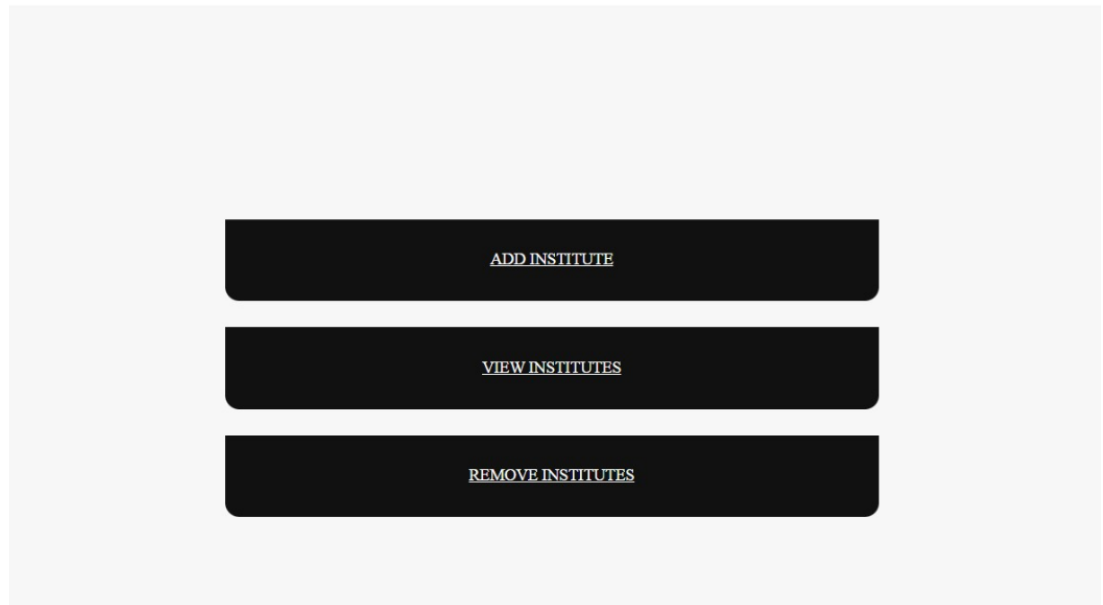
ADMIN LOGIN

Account Address

SIGN IN

- Dashboard

ADMIN : 0X5EAC3501197C27B720215D909900ED0BE23E45A8



- Add institute

ADD INSTITUTE

Institute Name	
Acronym	Web Link
Courses Offered	
ADD INSTITUTE	

0xB52aff08a283c686678d4cc1a4f9C78887e0BEfa

- View institute

Institutes	Acronym	Courses offered	Link
Indian Institute of Information Technology, Allahabad	IIITA	AI BCC	iiita.co.in
Indian Institute of Technology , Delhi	IITD	AI BCC	iitd.ac.in

- Remove institute

REMOVE CERTIFICATE

Certificate Address

REMOVE

- Institute

- Institute login

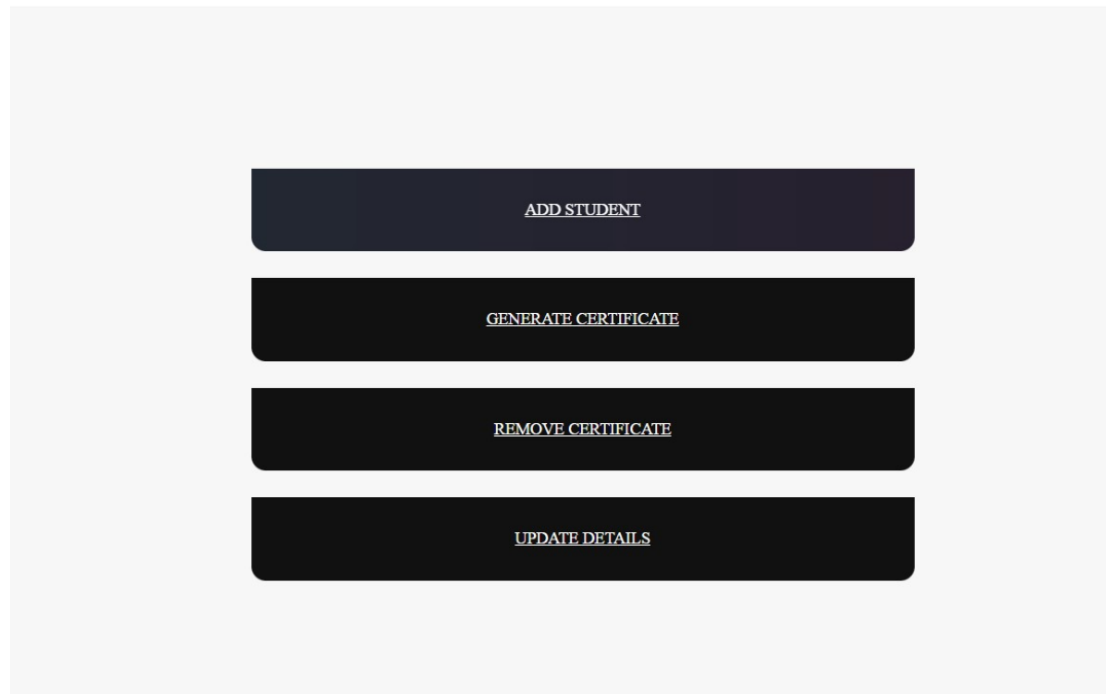
INSTITUTE LOGIN

Account Address

SIGN IN

- Dashboard

INSTITUTE : 0XB52AFF08A283C686678D4CC1A4F9C78887E0BEFA

A light gray rectangular area containing four dark blue buttons stacked vertically. Each button has white text in the center.

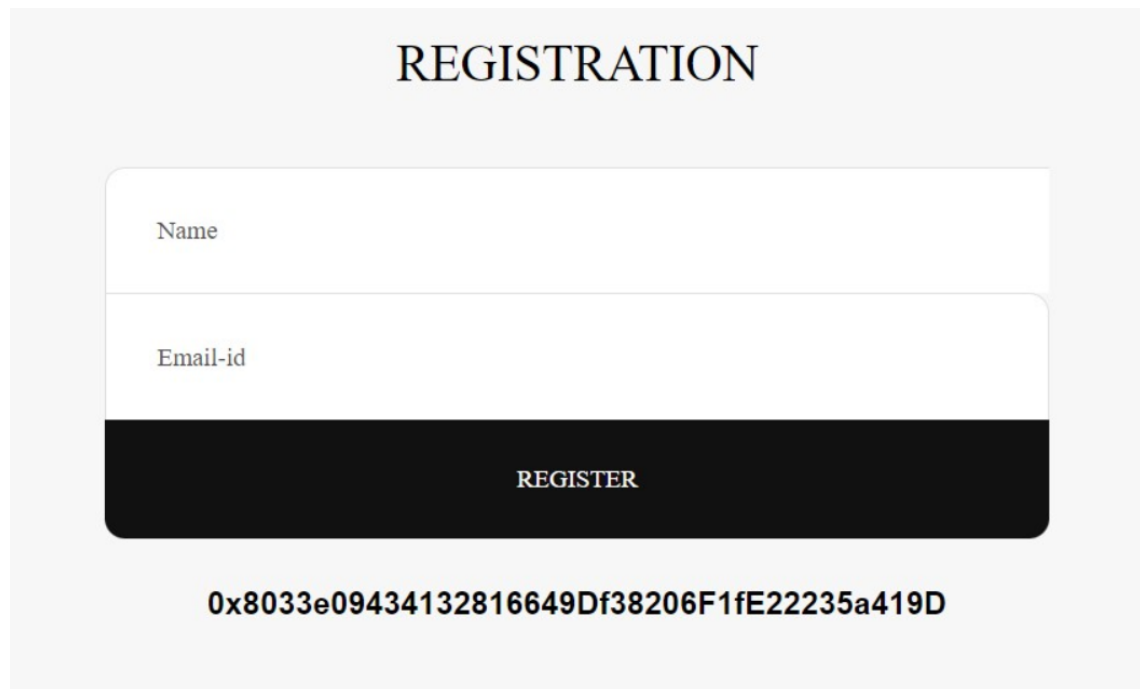
ADD STUDENT

GENERATE CERTIFICATE

REMOVE CERTIFICATE

UPDATE DETAILS

- Add Student

A light gray rectangular area containing a registration form. The form has a title, two input fields, a submit button, and a hash value at the bottom.

REGISTRATION

Name

Email-id

REGISTER

0x8033e09434132816649Df38206F1fE22235a419D

- Generate Certificate

GENERATE CERTIFICATE

First Name	Last Name
Duration	
Course	
Student Address	
GENERATE CERTIFICATE	

0x129d20340Ae516236817c08887810282e037009c

- Remove Certificate

REMOVE CERTIFICATE

Certificate Address
REMOVE

- Update Institute details

UPDATE INSTITUTE DETAILS

Institute Name

Acronym

Web Link

Courses Offered

UPDATE INSTITUTE

- **Students**


- Student login

STUDENT LOGIN

Account Address

SIGN IN

- Profile page



Mridul Mittal
Address
0x8033e09434132816649Df38206F1fe22235a419D
Certificates : 3

Certificates

0x129d20340Ae516236817c08887810282e037009c IIITA	BlockChain & CryptoCurrency	View
0xf597Bbe3874d8C17A2686a161eA125788b974E23 IIITA	Artificial Intelligence	View
0x794a741DF8E59847533cc6B18d667B33fc057042 IITD	Deep Learning	View

- Certificate

Certificate of Completion
This is to certify that
Mr. Mridul Mittal
has completed the course
Blockchain & Crypto Currency
Institute : IIIT Allahabad

Duration
6 months

X. REFERENCES

- <https://www.researchgate.net/Framework-for-Educational-Certificates-Verification.pdf>
- <https://digitalcredentials.mit.edu/>
- <https://www.bcdiploma.com/en>
- https://www.researchgate.net/publication/348602358_Blockchain_Technology_and_its_Application_in_Libraries
- <https://github.com/Amrita-TIFAC-Cyber-Blockchain/Distributed-Ledger-Framework-for-an-Adaptive-University-Management-System>