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A System for Academic Certificates Verification Using Blockchain

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Abstract: *The DApp (Decentralised application) being developed enables easy verification of credentials by storing the certificates on Ethereum blockchain network using IPFS (Inter Planetary File System) which is a distributed file system, thereby making the information stored immutable and secure.*

The website is being developed in three phases. In the first phase, the college enrolls students and uploads their credentials on the Ethereum blockchain.

In the second phase, students can view their credentials and access requests sent by companies. In the third phase, companies can send access requests to students whose credentials they want to verify. Once the students accept the access requests, companies can view and verify the certificates.

Keywords: *Blockchain, Ethereum, certificate verification, web 3.0, IPFS, smart contracts*

I. INTRODUCTION

Forgery of documents is a growing problem and demands the utmost attention. The fraudulent reproduction of certificates has increased significantly in recent years. Fake certificates and misrepresentation of facts are affecting industry, especially the IT sector, which recruits people in large numbers.

Depending on whether the hiring is permanent or contractual, there are different procedures for background verification. For a permanent hire, the client undertakes the responsibility of background checks whereas, in case of temporary staff, companies conduct stringent verification through associates.

This is very time taking process. This problem can be solved using a decentralised system. DApps are built on a decentralized network that is supported by a blockchain distributed ledger. The use of blockchain enables a dApp to process data through distributed networks and to execute transactions.

II. EXISTING SYSTEM

In the existing system, There is no digitalized way to verify the certificate. Although there are some universities that store certificates in digital form but are also in a centralized network where there is a chance of tampering the certificate. This may increase the cases of fraud since there is no means of security and integrity of the data both in manual and in digital form. The main reasons behind this problem are the lack of timestamp facility and method of storing data at a central storage. The employers verify the students credentials using third party lot of money and time consuming too.

III. PROPOSED SYSTEM

In this proposed system, we provide a platform to store and verify the student credentials using blockchain technology. With the help of the unique certificate ID, student can verify the certificate and also the company can verify whether the certificate provided by the student is authorized or not.

As the blockchain is distributed in nature and is popularly known as a distributed ledger, it is not easy to tamper the data stored in a block. The modules of the system are college, student and company. The main features of the project are enrolling the student and uploading the certificate onto the blockchain, both of which are done by college authorities. Students can view their certificates by logging in to their account.

Companies can view the certificates by sending an access request to students whose certificate they want to access. Once the student accepts the access request, company can view that particular student's credential.

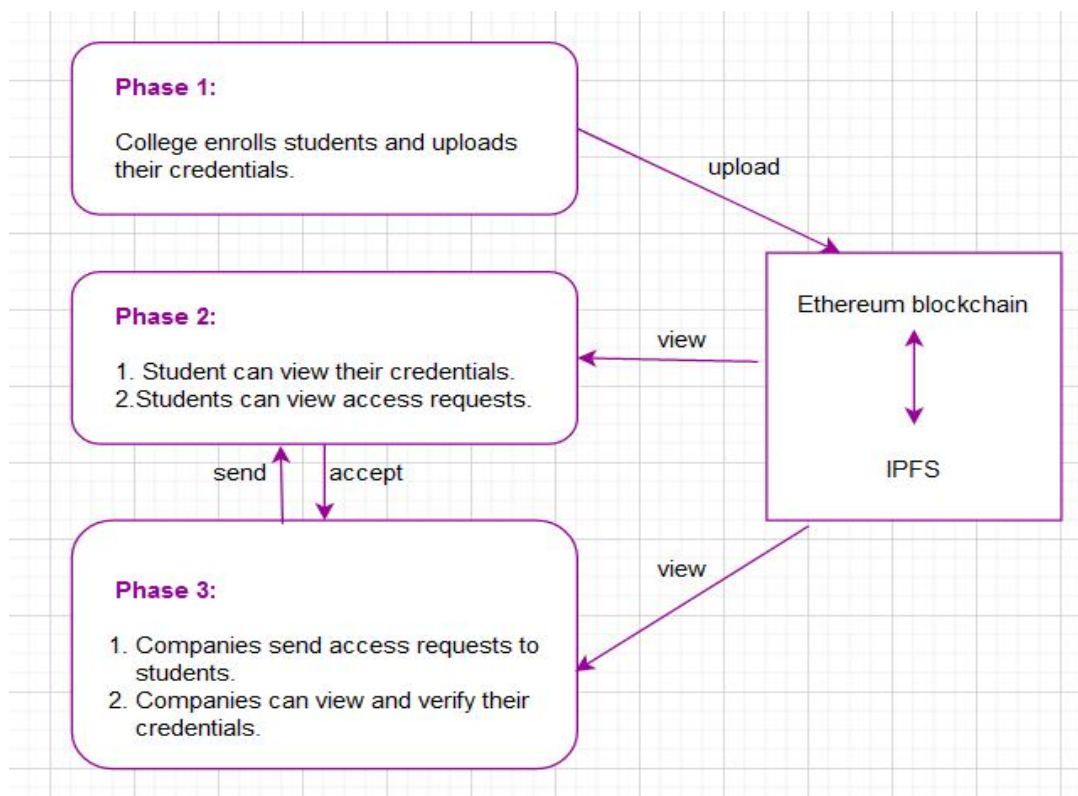


Fig. 1 Architecture of the proposed system

IV. IMPLEMENTATION

The proposed system is implemented and tested by using the following softwares: JavaScript, Truffle, Solidity, Ganache, Ethereum, and Chrome extension Metamask. Ganache is part of the Truffle ecosystem. Ganache is used for the development of DAPP (distributed application, a blockchain) and once it is developed and tested on ganache, it can be deployed on ethereum client like geth or parity. Truffle helps to develop, test, and deploy the DAPP. Metamask is one of the digital currency wallets to store and transact on ethereum using ethereum based tokens. In the front-end, we have used HTML, CSS and JavaScript. Back-end is implemented using JavaScript library node.js. The Ethereum smart contract is implemented using Solidity. The smart contract is compiled, deployed and tested using Truffle. Ganache is used for setting up a local Ethereum blockchain for testing the smart contracts. Ganache provides 10 accounts with fake ether which can be used for transactions while testing. To connect front-end and back-end with smart contract, we have used web.js which is a JavaScript library to build web 3.0 applications. In this system, the marks are stored as an image. Students who want to store their academic details on this authorized platform should approach the consortium. Only the authorized users can add marks into the blockchain. The credentials of the students are added along with roll number, name, marks.

V. RESULTS

On the home page, we have option to login to our corresponding account as shown in Fig. 2. On logging into college account, the college authorities have the option to enroll students and upload their certificates on to the Ethereum blockchain as shown in Fig. 3. A metamask notification pops up to confirm and perform the transaction. College can also view the certificates and details of all the students as shown in Fig. 4. As shown in Fig. 5, students can view the certificate by logging into their account using their id provided by the college. Companies or employers can send access requests to students whose certificate they want to verify as shown in Fig. 6. Students receive those accept requests and can accept or reject the requests as shown in Fig. 7. If accepted, then the employer can view their certificate.

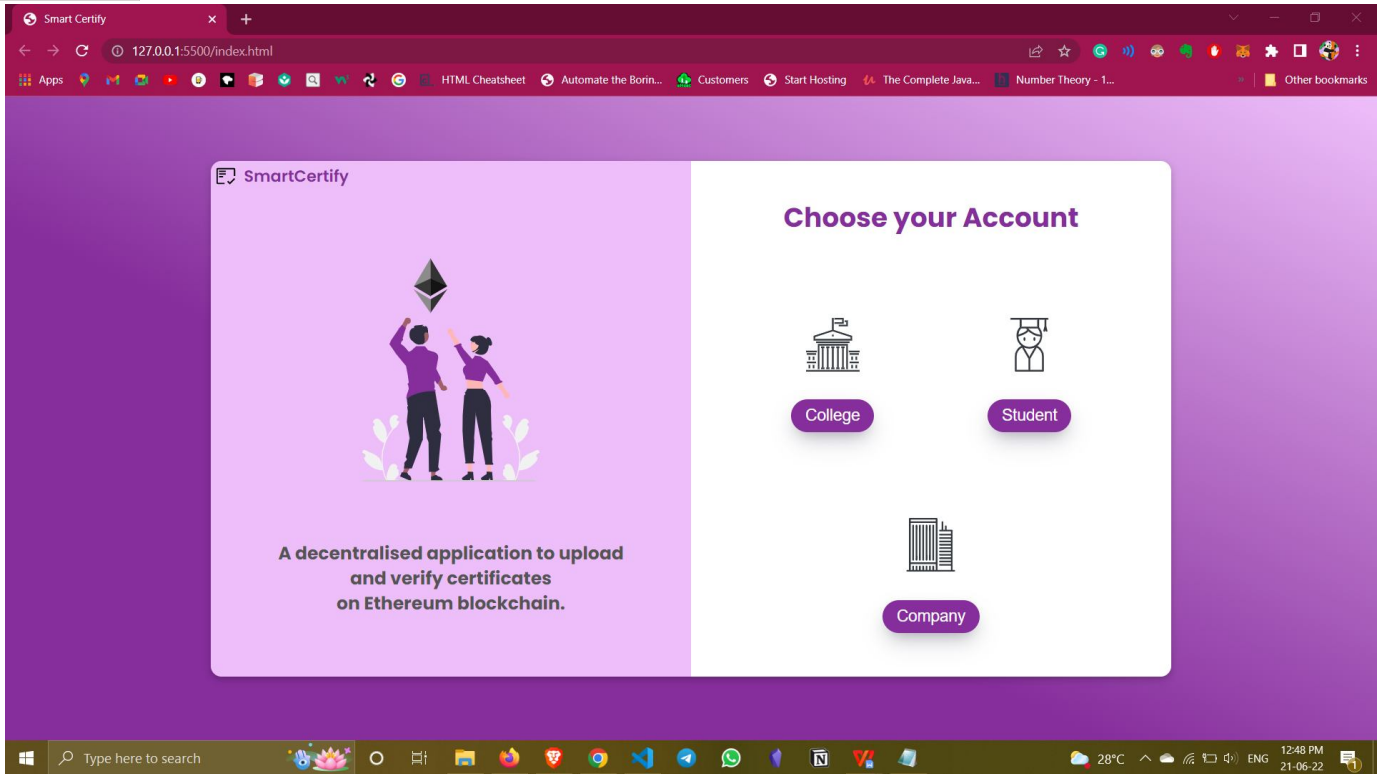


Fig. 2 Home Page

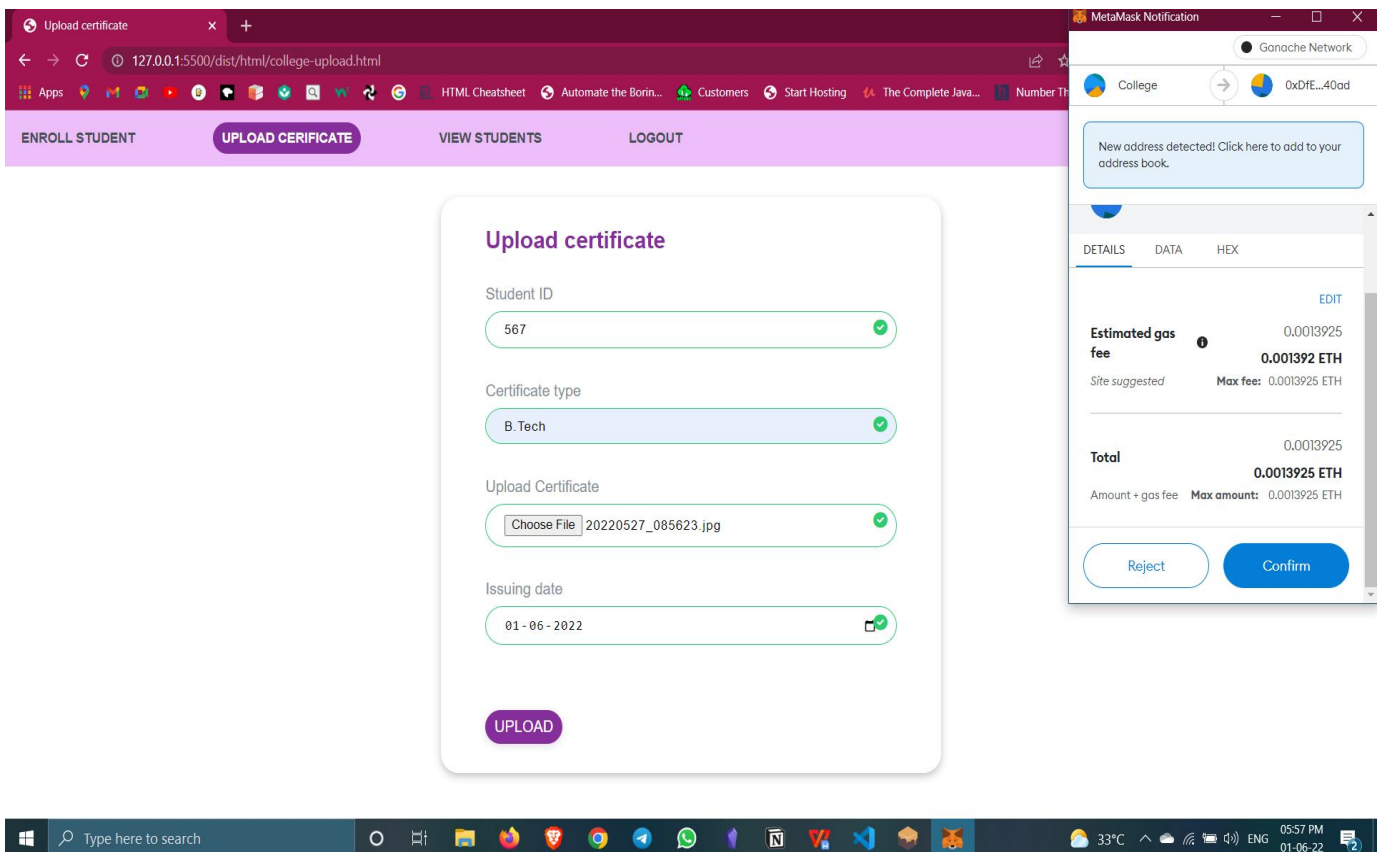
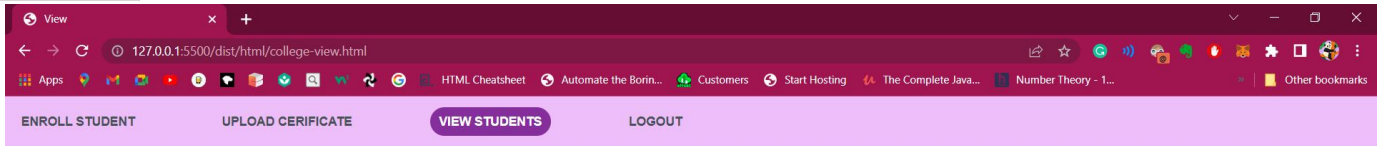


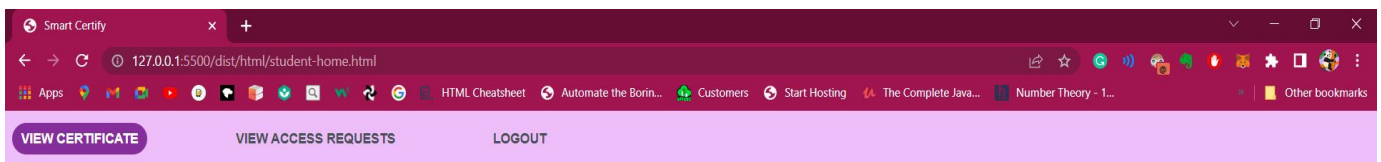
Fig. 3 Uploading certificate to blockchain



Student ID	Student Name	Joining Date	Certificate Issue Date	Certificate
123	Priya	2017-06-03	2021-06-08	View
234	Rahul	2017-06-29	2021-06-25	View
345	Mamatha	2017-06-17	2021-06-17	View
567	Animesh	2018-05-01	2022-05-20	View



Fig. 4 View Students



Student ID	Student Name	Joining Date	Certificate Issue Date	Certificate
567	Animesh	2018-05-01	2022-05-20	View



Fig. 5 View certificate

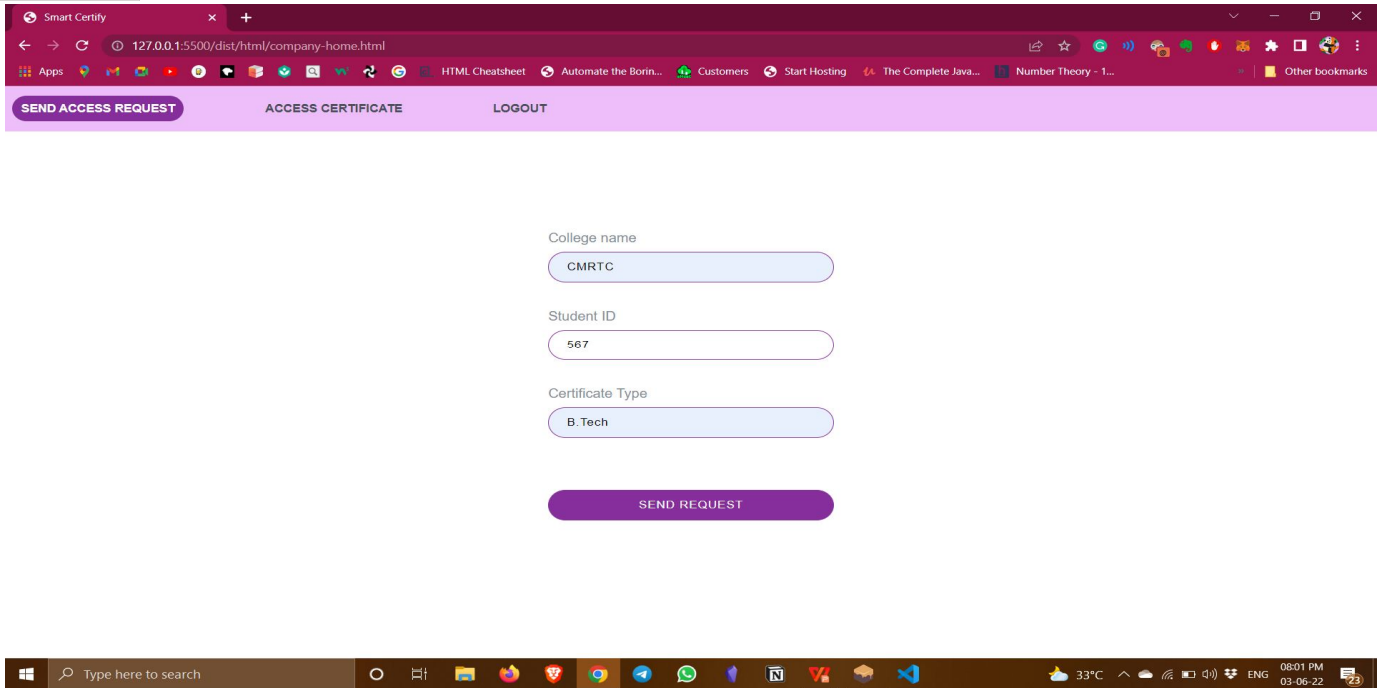


Fig. 6 Send access requests

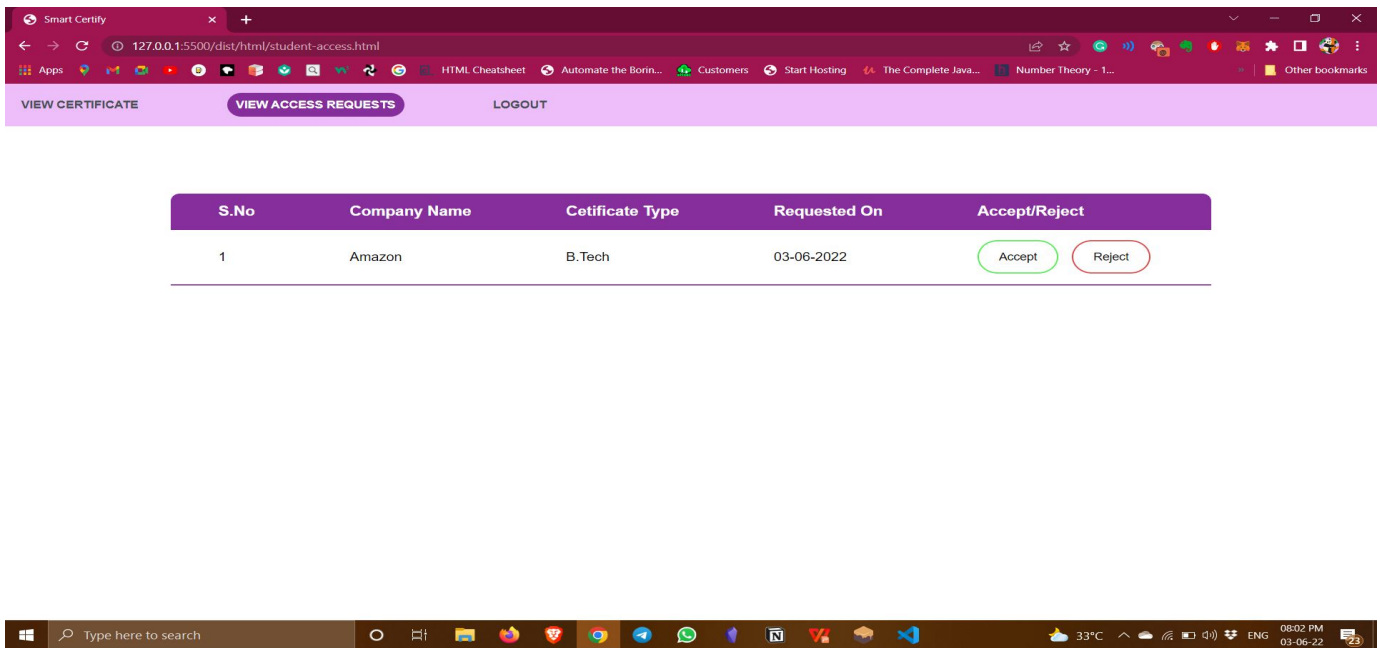


Fig.7 View access requests

VI. CONCLUSION AND FUTURE SCOPE

The data stored in a blockchain will be protected as no one can tamper it or add new transactions to it with a back date. The generated unique ID for each transaction is later used to verify the certificates. This system can be used by all the universities and colleges, in order to provide extra security to the certificates and the students' data. The problem of fake certificates can be eradicated and there will be no question of its validation. In the future, this can be extended to provide integrity to any type of documents not only to the education sector but also to government sectors where a digital document time stamp is required. Not only to store the student marks information but also to store their employment and experience data, and can also be tracked by using this proposed system.



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