BLOCKCHAIN TECHNOLOGY FOR OPEN EDUCATIONAL RESOURCE

[1]ABDUSSALAM AHMED ALASHHAB, [2]OBAMEHINTI ADEOLUSEUN

[1]Department of Computer Science, Faculty of Information Technology, Al-Asmarya Islamic University, Libya
[2]Department of Software Engineering, Faculty of Information Technology,Malaysia University of Science and Technology, Malaysia
E-mail: [1]Ab.alashhab@asmarya.edu.ly , [2]lebiobamehinti@gmail.com

Abstract - Blockchain in past few years have received a keen interest because of its characteristics as an irreversible and tamper-proof public records repository for documents, education resources, contracts, properties, and assets. The aim of this paper is to apply blockchain Technology for education in the area of specific open educational Resources. A comprehensive blockchain Technology is presented for open educational Resources which are examined.

Keywords - E-Education,E-Learning,Open Educational Resources, Blockchain, Smart Contract, Ethereum, repository.

I. INTRODUCTION

As an Education Sector, open instructive assets has savored the experience of a critical part of security and suffering advantages. That has landed at a hammering end with the happening to cutting edge progresses, for instance, social, compact, examination, the cloud, man-made thinking and the Internet of Things. Propelled instruction is shaken by irksome powers, and supervisor among them is electronic learning. Money related need has been an essential driver for understudies wrapping up progressively open to and trusting of better methodologies for getting to learning. Extended interest in the sharing economy has in like manner served to prompt purchaser trust in the mutual model. The degree of conveyed participation in guidance is creating at a speedy rate, making new sharing models and business openings. The previous couple of years have seen an increasingly unmistakable fascination for Bitcoin and blockchain. Bitcoin is a cryptography kind of cash which inclines toward the innovation of blockchain. Holding to the way that the first and most basic use of blockchain advancements is Cryptocurrencies, as of late further use cases have been proposed. In this proposition, we investigate the current inclining and significant blockchain application which spotlights on ethereum and savvy contract.

The Blockchain is a novel problematic innovation dependent on cryptography. It has been known about crafted by Nakamoto [1]. characterized blockchain has a distributed system which is unchanging, straightforward, secure and needs no outsider obstruction, he demonstrated how this innovation can turn into the center part to help exchanges of the advanced cash (bitcoin). With the presentation of blockchain, numerous fields, for example, fund, bookkeeping, and land will get a positive effect utilizing the advantages of this innovation. One territory in which blockchain innovation could assume a crucial job is the utilization of blockchain innovation to oversee land titles

In Libya, the Archives, by and by the arrangement of utilizing documents which happens to be the conventional method for keeping instructive assets (open educational resources) has not paid enough to the earning need of understudies, this ought to be a main subject of conflict as it legitimately have sway on the natives [2]. Open instructive assets ought to be overseen appropriately in Libya in light of the fact that training is a key factor to the development of the populace, in order to meet a world class worldwide focus of legitimate treatment of related training subjects. This could likewise give a decent cooperative energy in the Education Sector needs to clear path for government to accomplish more in structure more schools and instructive offices, where training is a main consideration to be considered by Africa on the loose. Blockchain is generally recognized as a noteworthy leap forward in deficiency tolerant circulated processing, following quite a while of research in this field. In excessively compact terms, [3] we can characterize the blockchain as a database that contains every one of the exchanges at any point executed in a distributed system. It comprises of a lasting, disseminated computerized record, impervious to altering and did all things considered by every one of the hubs of the framework. The significant headway exhibited by this development is that the framework is open and individuals don't need to know or trust in each other to interface: the electronic trades can be subsequently affirmed and recorded by the centers of the framework through cryptographic estimations, without human intercession, central expert, reason for control or pariah (for instance governments, banks, cash related foundations or various affiliations). Despite whether a couple of center points are tricky, deceitful or vindictive, the framework can successfully affirm the trades and shield the record from modifying through a logical segment called confirmation of-work, which makes human

intervention or controlling authority inconsequential. [4] Blockchain could in this way be viewed as a conveyed record of records that is unchanging to assault. The Ethereum [5] stage has been standing out for its great help to the execution of keen contracts, for example programs that are executed in a decentralized manner. As an irreversible and carefully designed open records vault for reports, contracts, properties, and resources, the blockchain can be utilized to install data and directions, with a wide scope of uses. This paper examined the significance of Blockchain innovation utilized in Education on how it very well may be use to keep appropriate record of open instructive Resources (OER).

1.1 Key contribution to proposed Work

We propose the use of blockchain technology, which is used. A design methodology that enables blockchain technology to manage effectively open educational resource where it is tamper proof and highly immutable and visible for every student to access the open educational resources

II. BACKGROUND AND RELATED WORK

There exists, to the learning of the author no single, formal meaning of blockchain an innovation that is commonly acknowledged. Many use Bitcoin as a beginning stage, clarifying blockchain innovation by its first application, digital currency. In any case, there are frameworks that aren't caught very well by that definition, that still are for the most part delegated blockchains.

The Blockchain innovation attempts to acquire the destinations of security and namelessness and along these lines stores the unique finger impression of a computerized resource without putting away the advanced resource. [6] highlights all banks are currently engaged in developing a vision of what this technology means for their business. [7] discussed in re- search and practice that the main parameters for blockchain implementations such as security, data privacy, and usability are subject to select the best algorithm to ensure consensus and validity. [8] found that proof-of-work approaches that require high levels of energy but guarantee relatively high levels of consistency and protection against forgery by any actor in the network (e.g., in Bitcoin) compete against less costly ones. Such alternative approaches require a portion of a trust in some elements of the network, such as actors based on the resources they put at risk during validation (e.g., proof-of stake) or in the manufacturers of devices that are used to validate transactions (e.g., proof-of-elapsed time in Hyper-Ledger Saw-tooth Lake). For the design and deployment of Blockchain implementations [9] there is different parameters that are required to be considered while designing and deploying the implemented blockchain. Concerning elective definitions there is the one by[10], the author of Ethereum: a blockchain is an enchantment PC that anybody can transfer projects to and leave the projects to self-execute, where the present and every single past condition of each program are in every case freely unmistakable, and which conveys exceptionally solid crypto economically verified assurance that projects running on the chain will keep on executing in precisely the way that the blockchain convention specifies [11]. The meaning of blockchain made by Buterin isn't thorough or specialized, and is positively not indistinguishable from Bitcoin, however, figures out how to incorporate numerous qualities of blockchain frameworks. An endeavor to characterize diverse blockchain innovations was made by [12], however it neglects to give an attractive definition. A specialized the council has been framed inside ISO to characterize zones for institutionalization. [13] They have however to distribute a formal definition yet depict blockchain as a common, changeless the record that can record exchanges crosswise over various ventures, It is an advanced stage that records and checks exchanges straightforwardly and securely, expelling the need for agents and expanding trust through its profoundly straightforward nature. IBM proposes a comparative definition saying that a blockchain is a common, changeless record for account the history of exchanges [14]. The accompanying definitions are from the sources just referenced. A blockchain is a dispersed figuring design where a PC is known as a hub if they are taking an interest in the blockchain to organize. Each hub has full learning of the considerable number of exchanges that have happened, data is shared. Exchanges are gathered into hinders that are progressively added to the conveyed database. Just one square at once can be included and for another square to be added it needs to contain scientific evidence that confirms that it follows in succession from the past square. The squares are in this way associated with one another in a sequential request. The above definition is a wide one, incorporating practically all current executions of blockchain.

As history has appeared, innovation players, for example, Amazon, Google what's more, Facebook and their increasingly conventional adversaries progressively vanishing. As of now, Google has propelled Google Apps for Education (GAFE), a free, cloud-based profitability suite with devices practically identical to the Microsoft Office suite. This offering is alluring for schools as it results in critical cost reserve funds in both authorizing and server support costs. GAFE has developed to more than 30 million clients around the world, as indicated by the organization, and has turned into an industry standard for cooperative cloud applications, disturbing the position of customary sellers offering to learn the executives' frameworks [15] Amazon is another valid example. Its course reading rental

model is cutting into conventional course reading distributors' incomes. Though still in beta configuration, its Amazon Inspire commercial center for independently publishing, curation and conveyance of instructive substance will rival MOOCs and customary distributors. As opposed to holding on to perceive how innovation mammoths will shake things up, establishments of advanced education can profit by headways in instructive innovation, including blockchain

III. BLOCKCHAIN TECHNOLOGY, IMPORTANCE TO OPEN EDUCATIONAL RESOURCES

Educators consistently distribute research and papers as a feature of their work. Under the customary framework, there is little approach to know whether a comparable scholarly examination is in progress when a teacher starts his or her inquire about. Furthermore, there is much robbery of the exploration itself. The utilization of blockchain makes a difference address these issues. Blockchain could enable instructors to distribute content straightforwardly while monitoring reuse, without putting confinements on the source material. Such a framework would permit educators to be remunerated dependent on the degree of real use and reuse of their educating materials, like how they are compensated dependent on the number of references to their examination papers. Understudies and organizations could then make measurements put together choices with respect to which educating materials to utilize. Educators could declare the production of their assets and connection to them, just as different assets they utilized in making the material. Free access to the educational materials, could be granted to teachers as indicated by the level of reuse of their separate assets. In an open situation, coins would not be spendable however, would prefer to be utilized to decide the author's conspicuousness. A further developed usage may naturally check assets to recognize the level of different assets that were reused and consequently issue grants. For model, a "brilliant" (or self-executing) contract could appropriate installment to creators based on how frequently their material is referred to or utilized. students would never again need to experience go-betweens, for example, examine diaries, which regularly breaking point use by charging high access expenses. Below is a proposed frame work on how the blockchain technology could be adopted.

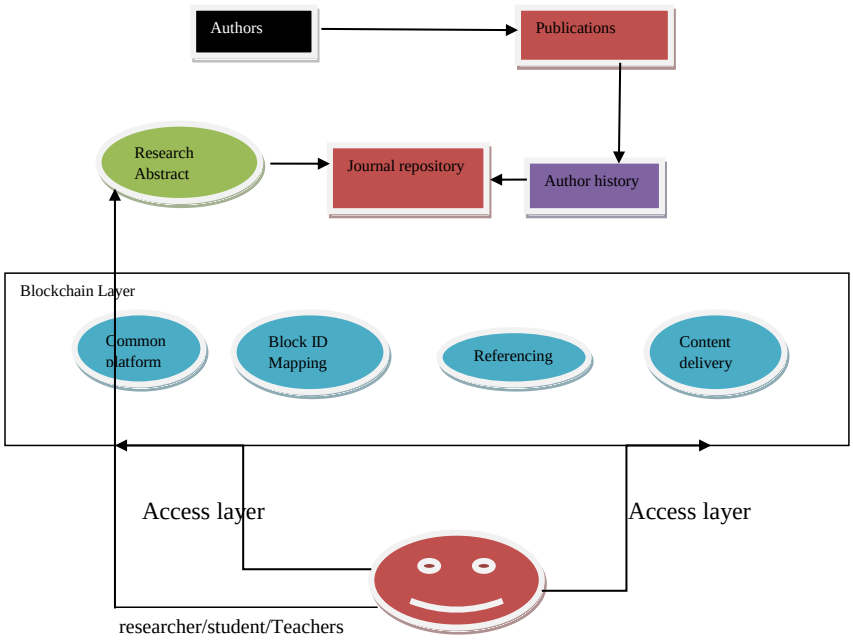


Fig.1. open educational resources structure

IV. BLOCKCHAIN OPEN EDUCATIONAL RESOURCES STRUCTURE

The frame work above, vividly explain how every content of an open source material, written by an author is stored in the block chain layer which is openly accessible to students, researchers, teachers for the purpose of either writing or teaching or doing further researches. Blockchain technology has not only made it available to every participant but also made it highly secured, transparent, flexible to use, tamper proof against an alteration of any kind and this is a plus as against the archives which is the traditional way of keeping educational materials which can be muted and not fully tamper proof.

V. DESIGN METHODOLOGY

The methodology for the proposed method for managing effectively open educational resources, is adopted form [15]. The design methodology for open educational resources is composed of the following steps, first for any user the setup of the Ethereum node is required. Second, the functions are clearly defined and finally, the process between the users (students, researchers, teachers) are described in the following sections

Ethereum Node Setup

The basic components of the Ethereum nodes are students, roles, open materials and the process is described in the following

Students/Researchers and Roles

For the definition of open educational resources we need to write a smart contract code which is an executable code, we need to design a template, which is one to many users. The participants for the smart contracts are as follows:

The Government or schools who is responsible for the smart contract.

Users/Authors, Students, teachers, researchers who is responsible for the creation of the Ethereum Wallet in order to have access in the public blockchain p2p (peer to peer) nodes.

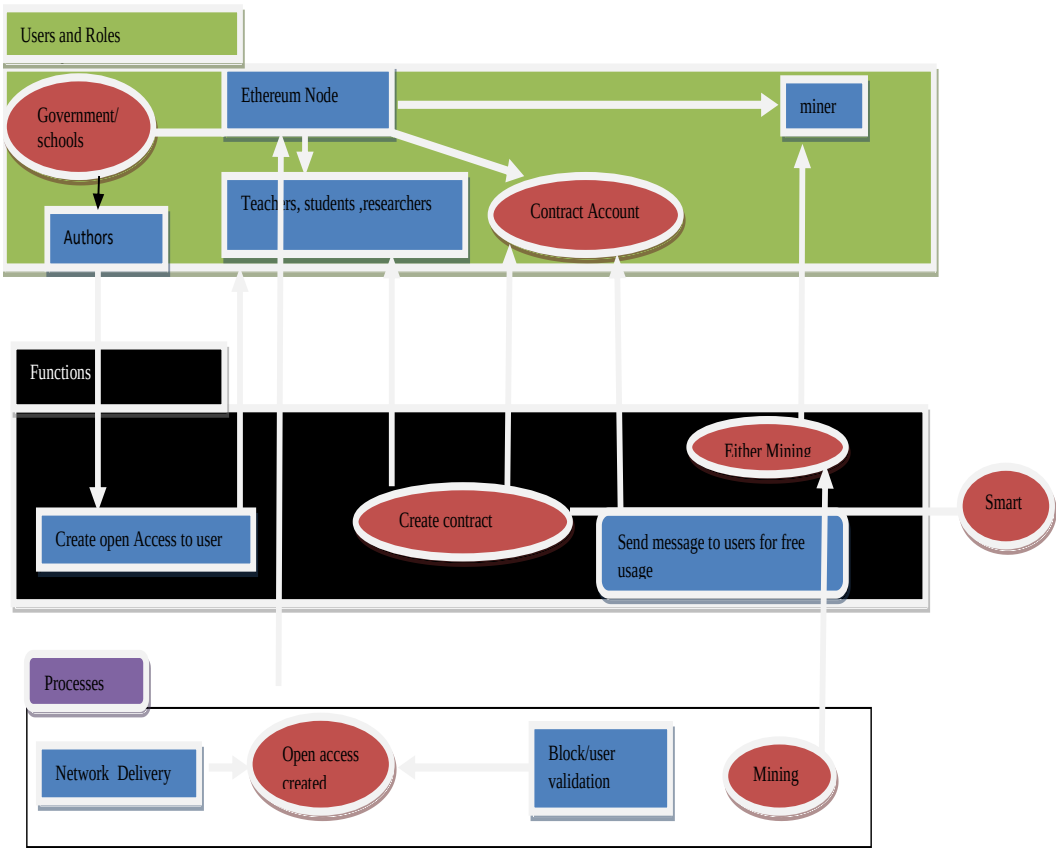


Fig.2. Proposed open Educational Resources system-use case components

Functions

The functions that are required for the smart contract in Blockchain foropen Educational Resources are the following

- Create open access to user
- Create smart contracts
- Send messages to users
- Mine Either

For the ethereum processes we have Block/user Validation: this process is for validating the user or block Network delivery: this process is necessary for new user/node to join the p2p Blockchain Network.

Open Access Created: it allows the author of the book or if managed by government or schools to create transaction with the users and also the smart contract to create messages.

Mining: this process is the mining stage and broadcasting a new block or user to the blockchain to give indication that a new node or user has been added

5.1 Get Prepared for Blockchain

Blockchain expectation to absorb information is steep. Usage raises huge innovative, working and plan of action issues, just as the need to guarantee cooperation and the accessibility of learning and assets to explore different avenues regarding and send circulated record innovation. In any case, with such

convincing use cases, it's inescapable that present selection rates will as it were increment. Here are three activities instructive establishments can take in the present moment to start planning for blockchain:

- **Promote understanding.** There's a squeezing need to impart block chain's complexities in a clear and intelligible way that reverberates with target partners. Area specialists, pro analysts, scholastics and industry pioneers have a significant task to carry out here.
- **Experiment.** Blockchain applications for training are grabbing steam. However, educational associations need proof to demonstrate that blockchain offers huge worth, through the open educational resources either to themselves or to their understudies. Understanding the capability of blockchain without these models is simply hypothesis. There's at present a major push in the business to lead pilots to acquire a fine-grained comprehension of where the genuine potential falsehoods.
- **Be a part of the development.** Blockchain can't be disregarded. It's set to topple the instruction segment and will profoundly affect current players in this market, so it's essential to be part of this advancement procedure. This is a period of extraordinary open door for the individuals who act definitively and decisively. The improvement of the innovation should be viewed as a mutual fitness I the instruction advertise, to guarantee a fitting equalization of private area advancement, alongside defending the open intrigue.

VI. CONCLUSIONS

Blockchain is situated to reorganize the Education Sector. It is fundamental for driving lights to start now to comprehend and try different things with the innovation, both separately and as a feature of a consortium. While couple of organizations is prepared to put intensely in blockchain, commencing the discourse inside and with partners crosswise over scholarly community with a test run of it on the open educational resources to serve as its immutable database, will empower them to be arranged once openings rise, with the scale and criticalness to convey both game changing business worth and learning encounters

REFERENCES

[1] Nakamoto, S , Bitcoin: A Peer-to-Peer Electronic Cash System , (2008) , https://bitcoin.org/bitcoin.pdf
[2] Buterin, V. (2015) On Public and Private Blockchains. Ethereum Blog, Crypto Re-naissance Salon. 7th August 2015.
[3] Deloitte , What Is Blockchain? , (2016) , https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/Innovation/deloitt e-uk-what-is-blockchain-2016.pdf
[4] Cognizant , Blockchain goes to school , (2019)
[5] Sharples, M. and Domingue, J. (2015) The blockchain and kudos: distributed system for educational record, reputation and reward', Proceedings of 11th European Conference on Technology.
[6] Glaser F, et al, (2017)
[7] Walsh C, et al. (2016)
[8] Tschorsch, F. and Scheuermann, B.(2016),
[9] Noyes, C. (2016a)
[10] VitalikButerin
[11] Hitoshi okada, shigeichiro Yamasaki, Vanessa bracamonte (2019) proposed classification of blockchain based on authority and incentives
[12] "Demystifying Blockchain," Cognizant Technology Solutions, Jan. 18, 2017, https://www.cognizant.com/perspectives/demystifying-blockchain..
[13] Carla Rudder, "Five Blockchain Statistics: CIO Reality Check," The Enterprisers Project, Feb. 1, 2018, https://enterprisersproject.com/article/2018/2/5-blockchain-measurements cio-rude awakening.
[14] Kraft, D. (2016) 'Difficulty control for blockchain-based consensus systems', Peer-to-Peer Networking and Applications, Vol. 9, No. 2, pp.397–413.
[15] Karamitsos, I., Papadaki, M. and Al Barghuthi, N.B. (2018) Design of the Blockchain Smart Contract: A Use Case for Real Estate. Journal of In-formation Security, 9, 177-190.

★★★