ISSN 2278-3091
Volume 10, No.3, May - June 2021
International Journal of Advanced Trends in Computer Science and Engineering
Available Online at http://www.warse.org/IJATCSE/static/pdf/file/ijatcse1591032021.pdf
https://doi.org/10.30534/ijatcse/2021/1601032021

The Promises of Blockchain and Cryptocurrencies Technology for Architecture and Interaction Design

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ABSTRACT

Blockchain technology is gaining prominence after its first famous implementation as part of the digital currency Bitcoin. It is made up of a series of blocks (the ledger) that give a secure, unchangeable, and auditable list of records. Once a block is recorded using encryption and a distributed database, it cannot be modified. The ledger in the case of Bitcoin stores the history of all monetary transactions. In three sections, this paper provides a review of blockchain technology for an interface design audience: (1) The fundamentals that enable block-chain technology are briefly discussed. (2) Specific examples include the use of HCI in blockchain research and development. (3) In the form of a fledgling research agenda, opportunities and difficulties for HCI and interface design are presented.

Key words: Blockchain, Interaction Design, Human Computer Interaction, Design Semantic of Blockchain, Blockchain Smart Contracts.

1. INTRODUCTION

A blockchain is a set of hinders which contains information or data. [1] Regardless of it seems before, Satoshi Nakamoto published the first practical and well-known application of the Blockchain technology in 2009. Using Blockchain technology, he created the most widely used computerized digital currency, Bitcoin. There is no central server or system that stores Blockchain information. The knowledge is disseminated through millions of computers connected to the Blockchain all over the world. Since data is accessible on each Node and is publicly visible, this structure allows for data notarization. [2] The blockchain is a decentralized disseminated record that permits secure, quick, and cost-effective exchanges to be made in the blink of an eye. With blockchain, the information put away can't be changed once entered which makes it an unchanging appropriated record.

Being a decentralized and disseminated engineering, blockchain permits everybody on the system, to partake in the exchange approval instrument called agreement making it an exceptionally dependable, secure, antifraud lent, and tough for information stockpiling. Blockchain with its huge capacity to make sure about the information gives a few highlights to its clients like information straightforwardness, unchanging nature, quicker exchanges, and above all, no outsider association in exchange engendering. Because of these highlights, blockchain innovation has had the option to draw in a large number of the enterprises so far in the ongoing occasions.[3] A definitive advantage of blockchain is that it permits advanced data to be appropriated however not replicated, which can be gotten to by anybody yet forestalls endeavors at cancellation, modifications, camouflage, or misrepresentation. Computerized data can be copied over a system of thousands and this data can be refreshed routinely which is then in a split second reflected in the system. Each square in the blockchain comprises of information that is installed inside the system overall, and by definition, it is inside the open domain. The constant existence of a blockchain implies that every data that has been generated mostly on blockchain cannot be modified. Sending email as an example of how to obtain everlasting existence. You can't handle to back an email that you've sent to a large number of people. If you want to search a course, you'll just have to request that each of the recipients delete your boring text. This is how nature functions in perpetuity.

[4] Public blockchain, as even the name implies, is a record that does not need permission and can be accessed by anyone. Anyone with access to the internet is eligible to download and use it. In addition, one might search the blockchain's overall background as well as conduct any transactions on it. Members in public blockchains are usually rewarded for participating in the mining process and maintaining the record's immutability. Bitcoin Blockchain is an example of an open blockchain. Private blockchains, in contrast to open blockchains, were those that shared only by trusted members. The owners have complete control over the device. Furthermore, different degrees of consents, introductions, number of entities, approval, as well will alter the rules of a private blockchain. Private blockchains can operate independently or in tandem with other blockchains. These are often used for businesses and organizations. As a result, the level of confidence needed among participants in private blockchains becomes higher.

[2] Bitcoin and its center working innovation, a blockchain, established the framework for another time of computerized distributed exchanges. It likewise cleared away for how arranged frameworks, web administrations, and computerized networks of things to come are to be structured and manufactured. Bitcoin has since picked up authenticity among a great many individuals around the globe, and even a few governments. It is now recognized, supervised, and maintained by a vast global network as a platform for exchanging esteem.

While Bitcoin demonstrated one specific application of blockchain technology, namely a distributed electronic currency system that enables online payments, Ethereum's approach helped to explain the more comprehensive capabilities of blockchain technology beyond Bitcoin.

In doing as such, it opened up a universe of unheard-of decentralized prospects, where increasingly complex builds of significant worth can be fabricated, moved, and made do no sweat and straight forwardness. The previous decade has seen improvements past these two blockchains, yet developments have been piecemeal and solitary in their methodology. They have neglected to give a far-reaching answer for the issues that blockchains and cryptographic forms of money face particularly identifying with ease of use and reception.

[7] The principles of blockchain technology are briefly explored using the case of Ledger as an example to explain the uses and implications of both blockchain and interaction designers' challenges and opportunities. With an evolving interface designs blockchain research agenda that tackles a few of the above-mentioned meta challenges and drawbacks and aims to avoid addressing technology problems as second in such user-centered but built method to HCI. Social inclusion, anti-corruption, accountability, justice, deliberation, democratic representation are all issues that have become very important to the HCI community. Blockchain technology, as well as the aforementioned smart contract features, are likely to become increasingly common in this area, providing valuable openings for interaction designers to participate. [8] Voting rights, accountability and traceability for welfare and aid funding, and reducing tax evasion and bribery by removing the tools that companies now use to conceal capital in international taxes have all been investigated so far.

The promises of blockchain applications going above and above consequences the possibility of mass disintermediation for trade transactions and lifting the curtain that distinguishes customers from producers and sellers from buyers. However, in order to envision new application domains, a transdisciplinary understanding is needed. The emphasis is on economics, manufacturing, and trade so far. Adding new disciplinary considerations to the mix, on the other hand, will reveal a new territory ready for discoveries and explorations. The model suggests that since local governments are closer to residents, they are better able to calculate and balance demand for infrastructure and services with tax collections to fund them.

[7] The idea of crypto secession has arisen as a result of blockchain technology, which MacDonald & Potts describe as one of the most possible paths to non-territorials' decentralizations. As citizens' skills increase and people move to non-territorial areas, fiscal abuse is reduced and ultimately eliminated. They do, however, see drawbacks in how blockchain-based future blocks can help economies self-organize.

2. LITERATURE REVIEW

[9] Blockchain technology is gaining momentum since its first popular use as component of Bitcoin digital currency. A block chain (ledger) offers a safe, immutable, and publicly available list for ordered records. A block can no longer be changed using cryptography and a distributed database once it has been documented. The ledger in the case of Bitcoin contains the record including all money transactions.

In three sections, for audiences with interaction designers, the author offers a critical summary on blockchain technology, briefly outlining the concepts that allow blockchain technology to function. Food significance and supply chain monitoring are used as examples to demonstrate the breadth of potential applications as well as the significant implications for blockchain technology. Challenges and opportunities for HCI, including interaction design, are addressed in the context of the emerging research agenda.

There were two sections to the author's article. First, it attempted not to dismiss technology ingenuity left within computer sciences research labs among sensitive interaction designers, because it is the magic of creative creativity, as well as the abilities of design methodologies, which can make a

massive difference when implemented early in the lifecycle of a new technology. Second, it launched blockchain technology, which not only helps us to reimagine future post-trade infrastructure and processes, but also opens up possibilities for solving structural issues such as socioeconomic injustice by theoretically altering how capital is distributed.

[10] [20] Blockchain, or distributed ledger technology in general, facilitates the development and distribution of only a shared digital bitcoin transaction between a network of computers. According to this paper, that author is arguing that the use of this technology to financial markets provides investors with new options for monitoring the degree of transparency of their resources and trading intentions.

The author presents two special properties of a distributed ledger that affect the supply of these different options in a theoretical model, such as the mapping among identifiers and ends investors and the levels of transparency of ledger, and then investigates how its implementation nature of such key qualities affects investor trading volumes, trading costs, and investments. Despite the possibility of front-running, a most transparent environment offers the best returns to investors. In the absence of full disclosure, while investors are allowed to divide their assets among many identifiers, welfare is significantly higher.

[11] Author focuses on the blockchain technology software curriculum when assessing students' technological abilities. The academic achievement of students and academic achievements throughout education, training, tournaments, practice, and other outside-of-school activities are evaluated using the K-means grouping algorithm based to objectively and effectively assess the practical ability of the students and provide fair advice besides student jobs. The blockchain technology in the framework design applied to student skills assessment system.

The blockchain network tends to be non-destructive and traceable, allowing for the recording of student evaluation outcomes and the raising of student learning credits at any time for overall control of a technical skill assessment process of students. The author presents a blockchain-based student skill assessment applications design scheme that includes clustering algorithm-based student abilities analysis method and overall blockchain-based system architecture design that shows how to construct a potential student abilities assessment ecosystem.

[12] Blockchain technologies open up new possibilities for development of new types of digital networks based on open source. While there is some research on the topic, so far it has primarily focused on legal and technical problems. To extend our knowledge of blockchain technological services and platforms, the study draws on existing research in payments and payment processes, also introduces research agenda's split into three focal areas for operational problems related to the competitive environment, as well as problems of technology architecture.

Inside of each of these areas, the author examines a number of key themes and develops a research questions for each, emphasizing the need for customers and different stakeholder organizations to discuss both opportunities and risks. The researcher contributes to the discussion of new research paths for information systems on applications and services focused on blockchain technology with such a research agenda.

[13] Blockchain is a game-changing technology that has called financial institutions' ambitions into question, sparking innovation projects which have the ability to change many facets of the digital world. Mental models for blockchain technology are hard to come by due to its novelty and difficulty. Sketching on exemplified cognition concepts and materials-centered architecture, the author describes a pioneering approach to design for BlocKit, the physical three-dimensional system for the materialization of the blockchain structure and its core entities.

The author described key properties of such as entities and materialized them into physical objects using clay, paper, as well as transparent containers. BlocKit was evaluated by fifteen professional bitcoin users, with the findings demonstrating its importance for their high level of interest in communicating with and evolving blockchain technology. The author presents an innovative approach to design of these packages, as well as an original vocabulary for talking for them and design consequences, in order to encourage HCI researchers to work on infrastructure design.

[14] Blockchain is a developing technology that allows for the decentralized transactional sharing of data through a large network of untrustworthy respondents. It adds new forms of divided software architectures in which consensus on sharing states can be achieved without relying on a centralized integration point. The fact that there are several implementations and versions of blockchain technology presents a significant challenge for architects designing blockchain-based applications.

Due to the fact that blockchains are still in their infancy, there are no product specifics or credible technology tests to compare them. To assist in the sketch and evaluation of blockchains and blockchain-based structures in software architectures, the paper established a classification and comparison framework. The taxonomy is designed to help with important architectural questions about the efficiencies and quality aspects of blockchain-based systems by capturing the core architectural features of blockchains as well as the taxonomy impact of their key design decisions.

[15] As clinical trials shift toward real-world data collection and sharing of knowledge, there's also a growing demand for

patient-centered solutions that maintain data integrity while allowing researchers and patients accessibility. Blockchain is one of a growing range of distributed ledger technologies that has the potential to improve research data transparency and security. As blockchain-based applications of clinical research implementations are developed, they will be required to comply with all relevant research laws, like ethical principles for consumers and data privacy [16].

Such regulatory requirements are difficult to define and understand for both blockchain developers and research organizations. Furthermore, regulatory bodies and policymakers are yet to offer clear guidance on how to comply with blockchain stakeholders. The clinical evidence-based information privacy laws there in United States, as well as data design requirements and electronic signature guidelines, are discussed in this article. In order to achieve successful blockchain solutions for clinical research, we also provide guidelines for developers, researchers, and research organizations.

3. RESEARCH METHODOLOGY

All of the HCI group's hot topics, such as social inclusion, anti-corruption, accountability, justice, deliberation, and democratic representation, were geared toward a more equitable society. Blockchain technology, as well as the above smart contract features, are likely to become increasingly common in this area, providing valuable opportunity to interaction designers to participate. Voting rights, accountability and traceability for welfare and aid funding, and reducing tax avoidance and bribery by removing the tools that companies now use to conceal capital in international taxes have all been studied so far. Beyond the ramifications of trade transactions and the possibility of mass disintermediation, which would break the barrier separating manufacturers from customers and buyers from vendors, blockchain technology has tremendous potential. However, a multidisciplinary understanding is needed to envision new application domains. So far, the emphasis has been on economics, manufacturing, and trade. Adding new disciplinary considerations to the equation, on the other hand, would expose new scientific territory ripe for exploration.

Designers interested in political sciences, for examples, may want to reconsider Tiebout's design. The model assumes that since local authorities are closer to citizens, they are better way to measure and balance demand of services and amenities with the gathering of taxes to trust them.

"Blockchain technology has spawned the concept of crypto secession, which MacDonald & Potts describe as "a most likely route to ever occur without territorial decentralization." It shows how fiscal exploitation is decreased and ultimately abolished as citizens' freedom to transfer to non-territorial jurisdictions rises. However, they agree that the ability of potential blockchain-based systems to self-organize will be restricted. All three of the blockchain's key elements, the block, the transaction, and the ledger, offer additional functionality to the overall structure, as well as the ability to either be appropriated and redeployed in different variations to satisfy a range of new demands and contexts, well beyond the initial implementation of Bitcoin and other cryptocurrencies [18].

Rather than delegating this research to others, I believe that getting involved with blockchain early will allow the HCI group to not only generate design implications, but also to begin collaborating with computer scientists and technologists far sooner. All, we will develop and take the lead in which blockchain technology research findings are conducted in order to educate its potential development and implementation. That's, however, easier this way, partly due to current norms and standards in the HCI culture.

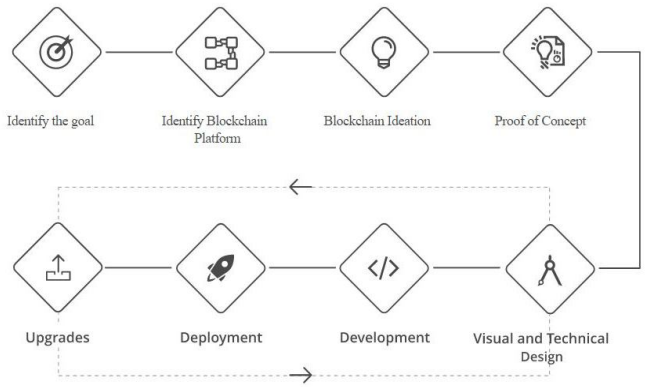

Figure 1: BDK Blockchain Developer Key Proposed Model

It's difficult to accept papers that focus on exploratory as well as experimental testing, as well as pilot projects that don't include clients in advance. We show in figure 2 if a developer follows our proposed model named (blockchain developer key) the application is much batter it increases the efficiency and effectiveness However, I believe that studies that are currently absent from HCI's overall discourse have the potential to form the group's overall research trajectory in order to resolve socio-cultural issues and opportunities that have yet to be explored. In August 2017, a search of all SIGCHI publications in the ACM Digital Library for both the keywords "blockchain" and "blockchain" yielded only one result, compared to 160 results in the ACM Computing Literature Guide. [13] [19] Though blockchain technology and associated features such as smart contracts will still be in their adolescence; interaction designers can now engage in blockchain application research and growth. I suggest a preliminary research agenda based on three possible work and study classes.

3.1 Usage of HCI in research and production of blockchains HCI can help, inspire, and develop blockchain technology in a variety of exciting ways. Blockchain's implementation necessitates the growth and production of a slew of new interactive technologies, games, and frameworks

for a range of domains, including contexts. As in the previous example, tracing and improving supply chains can drastically alter logistics processes at any trading node. Interaction design should ensure that interactions within logistics operators using digital freight management software, as well as interactions between various supply chain stakeholders, are smooth, reliable, profitable, and ethical. How will the blockchain be fully incorporated into the exchange of physical goods? What can we do to ensure that consumers are aware that even a ledger transaction appears to be fully functional, safe, authentic, ethical, and so on.

3.2 Usage of blockchain in analysis and practice of HCI We may be able to use blockchain to support us with our study. In big, dispersed, or federated project teams on complex design expeditions, the ability to use a consistent, permanent, and auditable set of design decisions can be beneficial. In a collaborative creative process, how can the blockchain monitor the person's contributions? What process does the blockchain use to collect (and encourage) user feedback and 'consumption'?

3.3 Foresight by speculative and critical architecture HCI will eventually have an effect on how blockchain is applied and incorporated into society. Design methodologies such as vital futures [9] and sense scenarios [12] [17] will make a difference when it comes to widespread adoption and acceptance of blockchain technology for social and environmental good. Related research questions may use a utopian-dystopian continuum to depict the consequences of academic and media-based blockchain-inspired situations like "programmable wealth," "algorithmic society," and "very little government representative."

3.4 Prototype/ Makeups/ UI/
In this paper we are working on the UI design of Bitcoin applications, in the previous applications no one work on the UI that's why the applications of the Bitcoin are not easily used by everyone because of their graphical views as we show in Figure 2 Pervious Blockchain Applications UI.

Figure 2: Pervious Blockchain Applications UI Live Exchange Rate

So, we changed the graphical views into digital for user better interaction and better understanding. We created a prototype of Bitcoin application where are all the Bitcoins current rates are displaying on the home page in a digital number and we reduce the graphical work. https://hcisuperior.webms.pk/ is the URL for prototype application and below is the screenshots of the application.

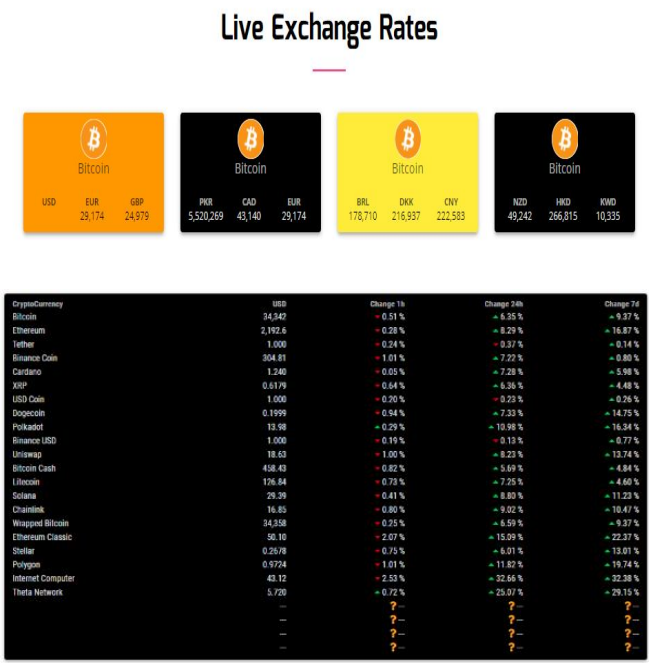

Figure 3: Experimental Prototype Blockchain Application Live Exchange Rates

4. RESULTS AND DISCUSSION

According to the findings, UI UX can be used to address usability concerns in web applications. The efficacy, efficiency, and satisfaction of four widely used adaptive features, including screen rotation, have been computed. The findings are organized into three usability categories and parameters.

4.1 Efficiency

Overall, the accessibility of adaptive and non-adaptive screen rotation environments for genders is inefficient. Female participants' efficacy was very low, with around 23% for adaptive environments and 41% for non-adaptive environments. Due to the adjustment of fingers on the extended keyboard in vertical view, users were wasteful when using the screen rotation feature. However, due to easy, tiny, and enjoyable sub-tasks, the overall effectiveness of the voice commands feature for adaptive environments is 89 percent. There is no significant distinction between the adaptive and non-adaptive environments for male participants. When other characteristics are compared, the efficiency shows a significant difference.

4.2 Effectiveness

The efficiency of the screen rotating features in terms of usability indicated that the major average for adaptive environments is significantly lower. It reveals a significant difference in efficiency of adaptive (56%) and non-adaptive (81%) methods. With the screen rotation feature, the overall gender gap in effectiveness measures is also significant, with females showing lower effectiveness than males. Because the smartphone keyboard had to be readjusted, participants felt uneasy when using the screen rotation feature. Similarly, the efficiency of young females in the voice controls feature found a consistent difference of about 25% in both settings.

4.3 Satisfaction

In a non-adaptive environment, overall satisfaction with the usability of the screen rotation feature is around 5.8, which is higher than in an adaptive environment (around 4.1). In screen rotation mode, female participants were more dissatisfied than male participants. It was also discovered that when the screen rotation mode was turned off, the participants felt more at ease typing the text. Similarly, the voice controls feature provides a higher level of feedback for the adaptive environment.
Male respondents had a satisfaction level of 5.6, and female participants had a satisfaction level of around 6. Similarly, notifications feature increases adaptive environment satisfaction considerably. Male and female participants have 6.3 and 6.6 satisfaction levels in the adaptive environment, respectively.

5. CONCLUSION

Blockchain has appeared its potential for changing conventional industry with its key characteristics: decentralization, persistency, namelessness, and discernability. In this paper, we display a comprehensive outline of the blockchain. We to begin with allow an outline of blockchain advances counting blockchain engineering and key characteristics of blockchain. We at that point talk about the normal agreement calculations utilized in the blockchain. We analyzed and compared these conventions in several regards. Besides, we recorded a few challenges and issues that would ruin blockchain advancement and summarized a few existing approaches for understanding these issues. A few conceivable future headings are too proposed. These days blockchain-based applications are springing up and we arrange to conduct in-depth examinations on blockchain-based applications within the future.

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