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The use of optically controlled transparent and blockchain technology for the processing of large-scale data arrays

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ABSTRACT

This paper is devoted to the study of methods for improving the capabilities of measuring large data arrays through the use of optically-controlled transparent and Blockchain technology. The research results are presented with the help of the developed method, which made it possible to evaluate the effectiveness of the proposed improvements ie the speed of data processing large sizes. In this paper, the main areas of application of the blockchain technology, its main properties are analyzed. During the work, the prospects for the development of this topic were determined, the main principle of the work of blockchain technologies and optically-controlled transparent. It has been determined that one of the main functions of the blockchain is its parallel processing and data analysis. With the help of the technology of the blockchain and with the help of optically controlled banners, a matrix filled with certain information was processed, we transformed each data cell with the hash-function into a hash-code. Also, the processing time and the hash function were investigated.
Keywords:optically-controlled transparent, blockchain technology, large-scale data arrays, hash-function, hash-code.

1. INTRODUCTION

Specialized computing systems (CS) are systems that are capable of performing complex operations with large-scale data, which are fed into arrays. In order to ensure the proper speed of operations in the specialized CS, it is necessary to create for them the possibility of parallel input, processing and output data. This can be done by using parallel methods of input, processing and output for specialized operating systems. The main ones are methods based on multi-tire buses, based on the parallel use of the frequency set and on the basis of controlled banners. The blockchain itself is a list of blocks.[1,2,3]. These digitally recorded "blocks" of data are stored in a linear chain. Each block in the chain contains data (e.g. bitcoin transaction) and is cryptographically hashed. Each block includes the hash of the prior block in the blockchain, linking the two, ensuring all data in the overall "blockchain" has not been tampered with and remains unchanged. This has the effect of creating a chain of blocks from the genesis block to the current block. Each block is guaranteed to come after the previous block chronologically because the previous block's hash would otherwise not be known. Each block is also computationally impractical to modify once it has been in the chain for a while because every block after it would also have to be regenerated. The linked blocks form a chain[4,5,6].

A blockchain is essentially a distributed database of records or public ledger of all transactions or digital events that have been executed and shared among participating parties. Each transaction in the public ledger is verified by consensus of a majority of the participants in the system, and once entered, information can never be erased. The blockchain contains a certain and verifiable record of every single transaction ever made. Bitcoin, the decentralized peertopeer digital currency, is the most popular example that uses blockchain technology. The digital currency bitcoin itself is highly controversial but the underlying blockchain technology has worked flawlessly and found wide range of applications in both financial and nonfinancial world[7,8,9].

For today, Blockchain technology itself is non-controversial and has worked flawlessly over the years and is being successfully applied to both financial and non-financial world applications. Last year, Marc Andreessen, listed the blockchain distributed consensus model as the most important invention since the Internet itself. Johann Palychata from

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BNP Paribas wrote in the Quintessence magazine that bitcoin's blockchain, the software that allows the digital currency to function to transform the even world of finance and beyond[10,11,12].

Newest digital economy is based on the assurance on a certain trusted authority. Any all online transactions rely on trusting someone to tell us the truth—it can be an email service provider telling us that our email has been delivered; it can be a certification authority telling us that a certain digital certificate is trustworthy; that is, any information must be true and verified from other network users; or it can be a social network such as Facebook telling us that our posts regarding our life events have been shared only with our friends or it can be a bank telling us that our money has been delivered reliably to our dear ones in a remote country. It provides an opportunity to secure the transmission and storage of information or other financial products The fact is that we live our life precariously in the digital world You need to be sure, and often check the information, and rely for the security and privacy of our digital assets. The fact remains that these third party sources can be hacked, manipulated or compromised.[13,14,15].

For such purposes the blockchain technology comes handy. It has the great potential to revolutionize the all digital world a distributed consensus where each and every online transaction, past and present, involving digital assets can be verified at any time and in the future too. It does this without compromising the privacy of the digital assets and parties involved. All this is done consensus and anonymity are two important characteristics of blockchain technology, which has a rather great advantage[16,17,18].

2. PROBLEM STATEMENT

Optically controlled transponents (OCTs) represent a thin plate of electro-optical material and a conductive layer of semiconductor applied thereon. On both sides, this plate has two transparent electrodes.

Managed banners are used to input, output and process information in specialized operating systems. They are capable of working with large amounts of data, which is the main condition for their use in such operating systems.

Now blockading technologies are actively developing in the world. They can find their application in other areas of human activity, for example: medicine, cybersecurity, education, research, law enforcement-related areas, sales and leasing of machines, and even services for listening to online music, etc[19,20].

This technology can be considered as a specialized computing system with the method of parallel input processing and output data. The main hypothesis is that the blockchain establishes a system of creating a distributed consensus in the digital online world. This allows participating entities to know for certain that a digital event happened by creating an irrefutable record in a public ledger. I t opens the door for developing a democratic open and scalable digital economy from a centralized one. There are tremendous opportunities in this disruptive technology and revolution in this space has just begun. This white paper describes blockchain technology and some compelling specific applications in both financial and nonfinancial sector. We then look at the challenges ahead and business opportunities in this fundamental technology that is all set to revolutionize our digital world.

Managed transparent serve for the input, output and processing of information in the specialized OS Managed banners are capable of handling large amounts of data, which is a prerequisite for them application in such OS. By way of controlling the modulation of the light beam distinguish electrically and optically controlled banners. Both types can perform discrete or analog modulation. In the first case, the banner must have a nonlinear characteristic, in the second case, on the contrary, it is linear the dependence of its optical properties on the control signal[21,22,24].

3. MAIN RESEARCH MATERIAL AND RESULTS

With the help of the technology of the blockchain and with the help of optically controlled transparent, a matrix filled with certain information was processed, we transformed each data cell with the hash function into a hash code. The processing time and the hash function were investigated[23].

To date, we have received the following data: for 512-bit units, the data processing time is 0.325ns, and the construction of hash functions according to 512-bit blocks is 181,174ns. That is, with the help of optically controlled and their main properties, the speed of parallel processing, input and output of large-size arrays of data increases**.**

In figure 1 shows an example of a specialized OS based on a controlled-optical transparent.

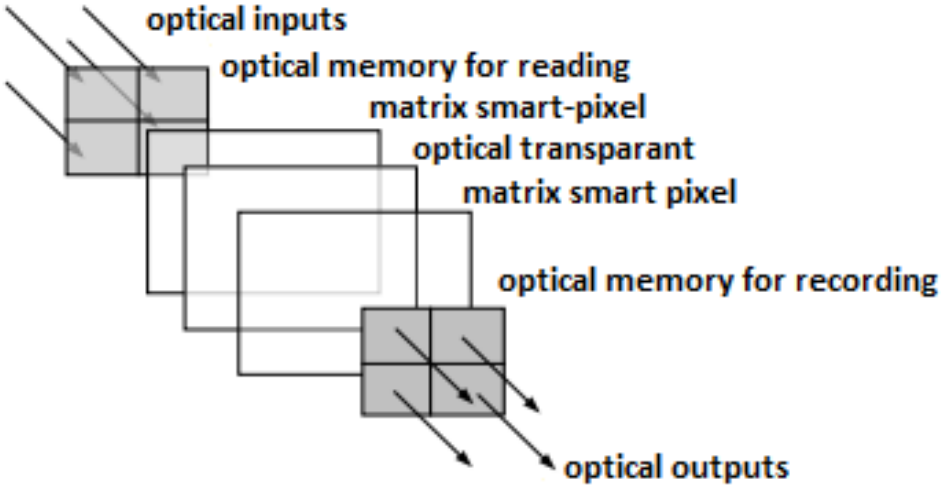

Figure 1. Specialized OS based on a managed transparent.

4. APPLICATION OF DIFFERENT TYPES OF TRANSPARENCY TO COMPLETE COMPLEX OPERATIONS IN SPECIFIC SUBSTANCES

As shown above, optical banners can be constructed as thick semiconductors, and on semiconductors with quantum wells. Each of these options has its advantages and disadvantages, however, such banners are highly integrated. This feature of them is very important for the creation of optoelectronic systems, including specialized based calculators optical transparent. However, transparent can be created not only on the basis of semiconductor material. Yes, today among other types of electrically and optically controlled transparent there are also such as PLZT ceramics, liquid crystal, membrane, magneto-optical, microchannel, and others.

We perform a comparison of the above types of banners with semiconductors at them application in CO. Because it is known that special computations are designed to perform complex operations or operations with large-sized arrays, then, for example, we calculate the time of the elemental multiplication of two arrays with a dimension of 10240 x 10240 listed above types of transparents. The block diagram of such operations for two matrices A and B are shown in Figure 2.

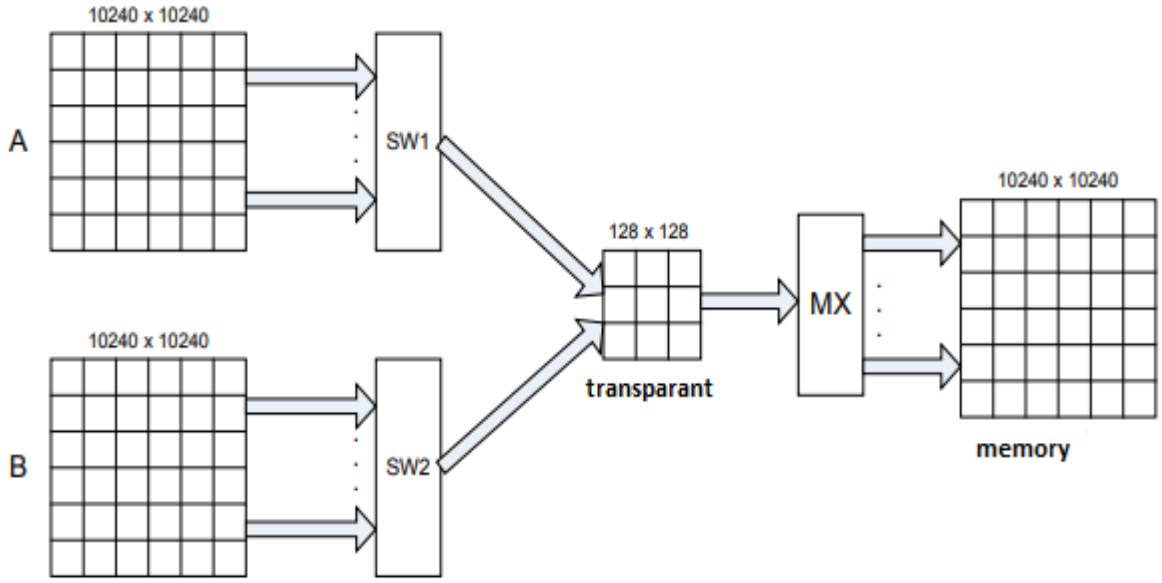

Figure 2 - The block diagram of the elementary multiplication of two arrays of 10240 x 10240 on a special calculator MX - multiplexer, SW1 and SW2 – switches.

Table 1 shows the results of calculations. For comparability of results, the dimension was taken all banners 128 x 128 pixels.

Table 1. The execution time for various optically transparent materials.

№	Type of transparent	The execution time of the elemental multiplication of two arrays of 1020x1020 pixels	
		The optical control	The electric control
1	On PLZT ceramics	t_{sw} + 6,4 + t_{mx}	t_{sw} + 25,613 + t_{mx}
2	Liquid crystals	t_{sw} + 409,6 + t_{mx}	t_{sw} + 224,05 + t_{mx}
3	Membrane	-	t_{sw} + 42,78+ t_{mx}
4	Magnetooptical	-	t_{sw} + 2,573 + t_{mx}
5	Microchannel	t_{sw} + 14,08 + t_{mx}	-
6	Semiconductor	t_{sw} + 65,97 + t_{mx}	-

In Table 1, t_{SW} and t_{MX} are the time spent on the image commutation of 10240 x 10240, and time spent on multiplexing, respectively. Therefore, depending on the type of switches and Multiplexers can calculate the execution time of this operation.

Table 1 shows that the best results at the time of the operation show a semiconductor optical-control transparant with a result of the order of 65 ps, which far exceeds the best result among other types of transparant.

5. CONCLUSIONS

Given the incredible opportunities and great benefits for decentralization, the blockchain technology offers the ability to create businesses and operations that are both flexible and secure with free access to information, i.e. the block technology can be applied to any application, both in financial and non-financial operations. The potential applications of blockchain technology are almost limitless. Currently, several of these applications are still in the development stage or beta testing phase, but they have large guarantees of mass deployment in everyday life. As more money goes to blockchain-based startups, consumers should not be surprised that services and products from the field of Distributed Ledger Technology (DLT) will become more and more popular in the near future. Photonic managed transparent products are used to input, output and process information in specialized operating systems. They are capable of handling large amounts of data, which is a prerequisite for their use in such operating systems.

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