

Blockchains Are Everywhere

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■ **I WELCOME ALL** the readers to the fifth issue of year 2021, the September 2021 issue, of the *IEEE Consumer Electronics Magazine* (MCE).

I am pleased that the current issue is dedicated to the blockchain technology. It reminds me that July 2018 cover theme of MCE was dedicated to blockchain. Since then, MCE has published many articles on blockchain. Blockchains are being deployed as well as explored to be deployed in almost all applications that one can imagine.

STATE OF THE ART OF BLOCKCHAIN

Blockchain was introduced in 2008 to initiate the cryptocurrency bitcoin. However, the blockchain technology can be considered as a specific example of distributed-ledger technology (DLT) or shared-ledger technology. Due to its attractive features including distributed or decentralize ledger, immutability, cryptographic security, chronological time stamping, and auditability, blockchain is being explored for any day-to-day applications that we can think of including smart cities, smart healthcare, smart agriculture, banking, smart government, smart grid, smart transportation, and Industrial Internet-of-Things (IIoT).

Is blockchain really justified for any applications that we can think of? In an article titled "When Do We Need the Blockchain?," published

in MCE in March 2021, we provided a guideline of when the use of blockchain is really needed.

Blockchain has many technical challenges that really doesn't make use of it a straightforward choice, rather triggered multifront research. Extensive research and development is being undertaken by industry and academia to mitigate the various issues and challenges of blockchain including the lack of scalability, high energy consumption, high latency, lack of privacy, limited onchain storage capability, fake block generation, lack of standardization, and 51% attack, so that it can be used in lots of applications.

A broader concept called DLT, such as Tangle, HashGraph, directed-acyclic-graph-based blockchain, is emerging to be more convenient than the traditional blockchain to be useful for various applications. DLT (including blockchain) is being used currently in many applications. A large variety of industry-driven commercial blockchains as well as open source blockchains are available for use. This drive from academia and industry has blockchain deployment in variety of domains and going to make an omnipresent technology just like Internet.

FEATURE ARTICLES

How Blockchain, Virtual Reality, and Augmented Reality are Converging, and Why: This article motivated me to make blockchain theme for the current September 2021 issue. This article presents a visionary perspective on

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convergence of blockchain and virtual reality considering various applications in which these technologies are needed.

Reputation-Based Miner Node Selection in Blockchain-Based Vehicular Edge Computing: This article presents an approach for selection of the minor nodes in the blockchain so that attacked minors can be removed from the consensus process for efficient operation of the blockchain.

Mitigations on Sybil-Based Double-Spend Attacks in Bitcoin: This article discusses methods for solving the double-spending problem in the cryptocurrency.

Consumer Exposure to Counterfeit Hardware: This article highlights the issues of counterfeit hardware along with some protection strategies.

Message Integrity and Authenticity in Secure CAN: This article presents a method for protocol for authentication of message in control area network (CAN).

P-MEC: Polynomial Congruence-Based Multimedia Encryption Technique Over Cloud: This article presents an encryption method for security of multimedia data.

COLUMNS

Bits Versus Electrons—Living the Beta Life: This article presents vision on the impact of technology on lifestyle.

The Art of Storage—Storage and Memory in Head Mounted Displays: This article discusses memory requirements of head mount displays.

Energy and Security—Towards Next Generation Robust Cryptosystems: This article introduces different paradigms for encryption to make it robust from hacking.

Future Directions—Consumer Technology and the Possibilities in a Gap Between Medicine and Wellness: This article discusses the deployment of consumer technology in various healthcare applications.

Professional Development—Navigating Neuroimaging Datasets ADNI for Alzheimer's Disease:

This article presents insights of datasets available in the Alzheimer's Disease Neuroimaging Initiative (ADNI).

SOCIOECONOMIC IMPACTS

GlobeChain: An Interoperable Blockchain for Global Sharing of Healthcare Data—A COVID-19 Perspective: This article discusses a blockchain-based framework that can be used for reliable global sharing for health records to be useful during pandemic outbreak.

SPECIAL SECTION

The current September 2021 issue has a Special Section on *AI-Driven Security Solutions for the Internet of Everything*. I sincerely thank the guest editors Deepak Puthal, Amit K. Mishra, and Suraj Sharma for all their time and effort for this strong Special Section. I believe that this Special Section will be an excellent reading for the readers of the MCE as well as the researchers around the globe.

LOOKING FORWARD

I hope that the current issue dedicated to the blockchain technology becomes a good reading for a variety of consumer technology, consumer electronics, Internet-of-Things (IoT), cyber-physical systems (CPS), smart cities, smart healthcare, and smart villages researchers to advance their knowledge. MCE will continue the trend of covering different themes for its enthusiastic readers in future issues on the current topics and emerging topics with the active support of the editorial board members, reviewers, and authors, around the globe.

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