

# **GIST Blockchain Intelligence Convergence Center publishes papers in SCI-level journals**

- Developing convergence technology, training specialists, and revealing the next-generation Ethereum development plan



▲ The Blockchain Intelligence Convergence Center (Director Heung-No Lee) has been selected for the Ministry of Science and ICT Research Center support project and is researching 'zero-knowledge sensing, cryptographic authentication, and blockchain-based cloud service convergence technology development.'

The GIST (Gwangju Institute of Science and Technology) Blockchain Intelligence Convergence Center (Director Heung-No Lee, Ph.D.) has published successive academic papers regarding their research in SCI journals.

Last July, the Ministry of Science and ICT selected the Blockchain Intelligence Convergence Center (BIC) for support as part of the University ICT Research Center (ICT Research Center Support Project, ITRC). BIC carries out researches with aims to develop "Zero Knowledge Sensing\*, cryptographic authentication, and blockchain based cloud service convergence technology." GIST is the main institution leading the research and where the center is located. The other three participating universities include Korea University, Seoul National University, and Ajou University.

\* Zero-knowledge sensing is a new technology, the center has proposed, that preserves the physical uniqueness of real-world signals such as voice, radio waves, and visual information, protects personal information, and converts the signals into data in a form that cannot be forged or altered.

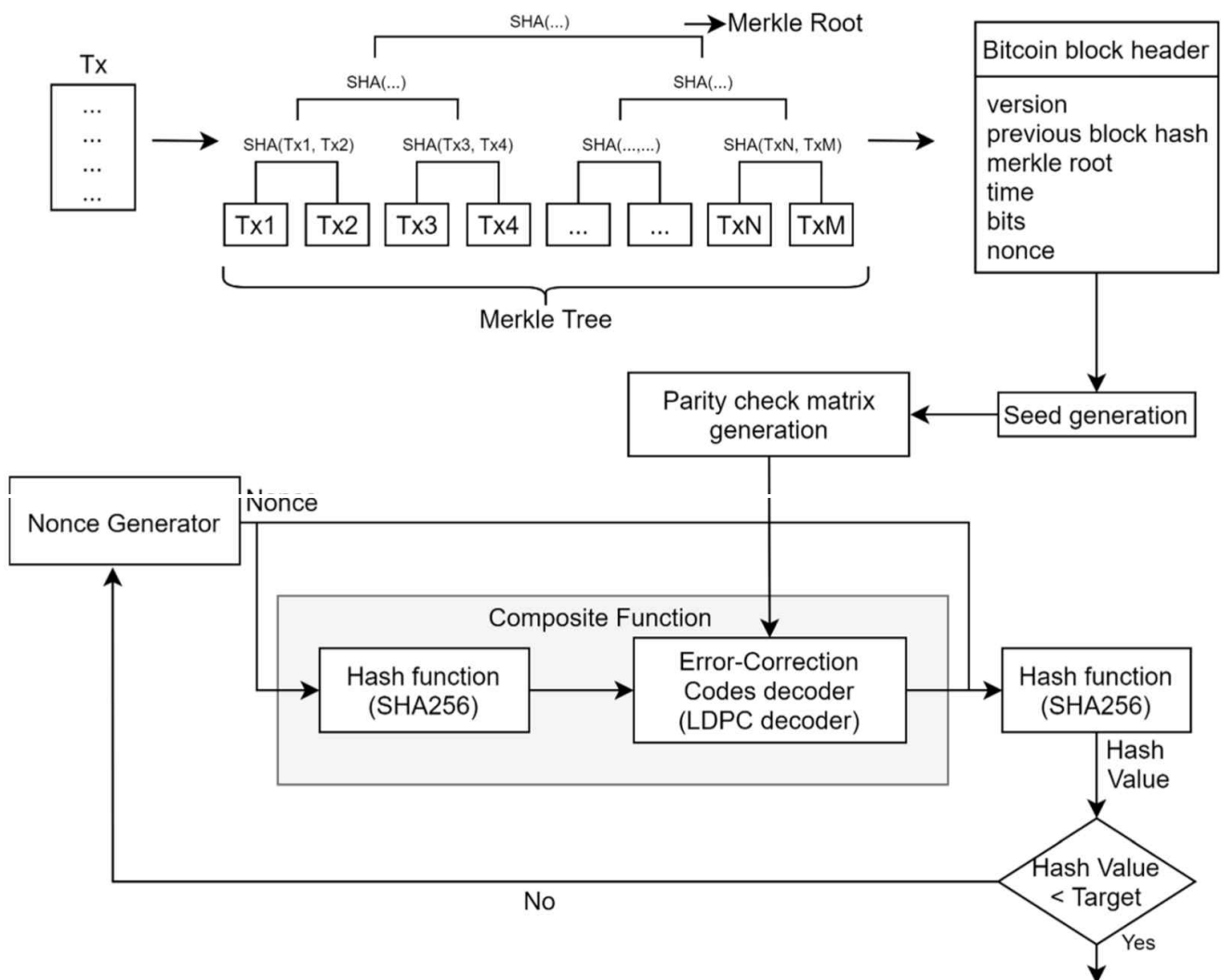
The research goal of BIC is to develop a blockchain convergence technology. This convergence is sought after using the so-called four core ABCD technologies of the 4th Industrial Revolution, Artificial Intelligence, Blockchain, Cloud, and Data. The center aims to focus on key digital transformation technologies, such as

new cryptographic security authentication systems, data-network management systems, and IoT device management systems. The other goal of BIC is to train masters and doctoral students capable of tapping into these new technologies.

Regarding its research results, BIC published a total of 29 papers in 2021. Among them, the paper on "Error-Correction Code Proof-Work on Ethereum" is particularly noteworthy.

This paper applied a new consensus algorithm based on Error Correction Code (ECC) for Proof of Work (PoW), which is one of the core technologies of blockchain.

Existing PoW technology was vulnerable to hash power attacks as application-specific integrated circuits (ASICs) mining become popular which can be manufactured relatively easily since the crypto puzzle algorithm used in mining is fixed. On the contrary, the ECCPoW consensus algorithm provide a novel puzzle generation solution in which the puzzle can be made varies from one block to the other. In addition, thanks to its error-correction code based solution approach, it can provide the benefits of quantum-computer resistant cryptography and crypto puzzles. It can be utilized to enable decentralized and transparent public chain operations since it is almost impossible to develop ASICs and quantum computing miners.



▲ ECCPoW Block Generation Algorithm

BIC has completed the development of the proposed method and has published in world-leading journals, such as IEEE ACCESS. In addition, six other blockchain-related studies have been published in outstanding journals such as IEEE ACCESS,

*Sustainability*, and *ICT Express*. These achievements were made within six months of the center's establishment.

Prof. Heung-No Lee, the director of the center, said, "BIC is striving to innovate technologies and train specialists in the hyper-connected area and emerging industries such as blockchain and metaverse. We aim to contribute to revitalizing the job market as well as start-ups by providing key technologies and enabling developers in the blockchain field."

Meanwhile, other research goals of the BIC research teams is to develop by 2028 a decentralized high-performance distributed ledger technology, an edge computing-based blockchain service infrastructure technology, a DID blockchain-based IoT authentication and security technology.