# Gwangju Institute of Science and Technology

## Official Press Release (https://www.gist.ac.kr/)

# Professor Euiseok Hwang's research team develops a physical layer communication authentication method for data compression suitable for the Internet of Things

☐ GIST (President Kiseon Kim) School of Mechanical Engineering Professor Euiseok Hwang's research team developed a physical layer * communication authentication ** method for data compression suitable for the Internet of Things (IoT).

> \* physical layer: one of the communication layers containing the inherent physical characteristics and means of wireless communication

> \*\* communication authentication: verifying the identity of a user of a device and the identity between the parties to the communication (server, equipment, etc.)

☐ Existing cryptography-based authentication methods have limitations in IoT device applications due to problems of requiring large amount of energy and having long delay time for communication.

◦ IoT devices with limited hardware resources (memory, communication bandwidth, etc.) have difficult in transmitting large amounts of data in real time. In addition, the high calculation of real-time data transmission and authentication can incur additional management costs, such as the cost of replacing batteries of IoT devices, due to the high power consumption.

☐ Therefore, it is expected that the developed physical layer communication authentication method for data compression will reduce the burden of IoT networks by allowing compressed data transmission and will be effective in maintaining IoT devices.

  ○ Through this study, the researchers reduced the computational complexity of the authentication method, improved the security, and verified the effectiveness using real data for IoT.

☐ The research team developed a data authentication method based on compression sensing * to develop an appropriate authentication method in an IoT environment.

   * compression sensing: a compression technique that completely reproduces a signal without sampling the Nyquist rate

  ○ Data transmission is reduced by transmitting data after compressing at the transmitting end, and data can be recovered at receiving end by sharing the compression matrix used for compression. At the same time, compression and authentication can be performed by using compression matrix as an authentication key.

☐ Analysis of the energy used in communication according to the compression rates showed that up to 80% compression reduced energy use by 80%, and performance was verified by simulations in various environments (number of sub-transmitters, ratio of signal-to-noise power) to verify the security of the proposed system.

  ○ If the number of subcarriers is 64 and the signal-to-noise ratio is 8 dB, then about 1 authentication error occurs on average during 100,000 authentication attempts.

☐ Professor Euiseok Hwang said, "This research has developed a lightweight communication authentication method that can be applied in a large-scale IoT environment, which is very significant. It is expected that this solution will be applied as a suitable security solution for big data environments that share various information in the future."

☐ This research was led by GIST School of Mechanical Engineering Professor Euiseok Hwang (2nd author) and Deakin University School of Information Technology Professor Jinho Choi and was carried out by Research Institute for Solar and Sustainable Energies Researcher Yonggu Lee and was funded by Institute for Information & Communication Technology Planning & Evaluation and was recently published in *IEEE Access*.