

## ABSTRACT

The rapid development of the Internet of Things (IoT), increasingly allows physical objects to share information and coordinate decisions with each other nodes. IoT, which will be applied in various fields, has requirements such as limited resources and its device memory capacity, but the security of the data sent is guaranteed. A research idea has been proposed to solve the problem regarding the use of encryption algorithms in IoT applications. Meanwhile, to find the most effective lightweight stream cipher encryption method, through this Final Project, we will analyze several encryption methods.

The Grain v1 algorithm represents the stream cipher standard by NIST (National Institute of Standards and Technology) for hardware implementation profiles, as well as the Espresso algorithm that was developed to accommodate 5G wireless communication. Then we run the randomness and uncertainty testing scheme for the output data from each algorithm. Implementing each program in the RFID application system and test its performance, such as memory usage and computing time on the microcontroller and the network performance.

Therefore, after undergoing a series of tests, this Final Project research can obtain results in the form of analysis and conclusions of the most effective lightweight stream cipher algorithm. So that it can handle security problems in sending data for case studies of RFID applications using the NodeMCU ESP8266 microcontroller.

**Keywords:** *Internet of Things (IoT), RFID, Lightweight Stream Cipher, Grain v1 Algorithm, Espresso Algorithm*