

## Executive Summary

The topic of encryption deals with making information secure by manipulating it in a way that only the intended recipient can make sense of it. Cryptography has recently gotten increased attention in popular media due to emerging technologies like quantum computing that threaten to undermine current encryption mechanisms. Almost every computer in the world encrypts sensitive information, and encryption is crucial for entities like the government and large corporations to keep their secrets safe from prying eyes. This study wanted to test if cellular automata, computer simulations of biological cells, could be used to design an encryption algorithm that is secure to various types of attacks. By using a type of cellular automata that is easily reversible but also secure, the algorithm is able to use that, along with user-specified information like a password and parameters for the cellular automata, to encrypt a file well enough to resist infiltration by a potential malicious attacker. The user-defined information plus the cellular automata is used to scramble the information contained in a file. To turn the encrypted information back into readable information, the recipient needs both the “secret key” generated in the encryption step, and the exact cellular automaton parameters. The algorithm passed most of the tests and shows that reversible cellular automata are good candidates for use in encryption algorithms.