CHAPTER 5

CONCLUSION AND FUTURE WORK

5.1 CONCLUSION

A simple, secure integrated IoT architecture named as 'SiC-Chain' has been developed which provides real-time data handling in a cold chain environment. This layered architecture enables SCM entities in cold chain to take suitable decisions easily. Typically, the SiC-Chain architecture division into layers promotes modularity, scalability, security, simplified development, flexibility, and ease of maintenance. The three types of operations for SiC-Chain architecture namely SiC-Chain Enrollment, SiC-Chain transactions and SiC-Chain Secure IoT has been implemented and fishing industry for small businessmen has been taken as the sample application for implementing SiC-Chain. A smart IoT device – 'SiC-SBox,' cloud-based data processing and storage system- SiC-Chain Backend on the Cloud, with a user-friendly smart SiC-Chain dashboard has been developed for small scale cold chain applications. The three modules of SiC-Chain architecture namely SiC-SBox, SiC-Chain Backend on the Cloud and SiC Chain Application with a smart Dashboard has been tested and evaluated. SiC-SBox has been functionally tested for interfacing and data collection, processing, and transmission. By measuring the average response time, the operations of SiC-Chain backend on the cloud have been tested. Finally, the SiC-Chain application has been tested for its functionality, interface, useability, database, and compatibility.

A non-linear S-Boxes, the basic building boxes of the cryptographic algorithm, using Logistic Chaotic Map are generated. To further improve the security of web-based application, dynamic key dependent algorithm is developed. The data between the IoT devices and platform in SiC-Chain architecture has been securely transferred using a dynamic key dependent algorithm. The performance evaluation of non-linear S-Boxes is evaluated based on non-linearity, both Differential and Linear Approximation Probability and Dynamic key dependent algorithm is evaluated based on strict avalanche effect, average encryption/decryption time, throughput and memory consumption. Through

experiments and comparisons, with previous works, the conclusion is that the proposed non-linear S-Box has good nonlinearity, both differential & linear approximation probability and strict avalanche effect to resist both linear and differential attacks. The SiC-Chain security layer helps in encrypting and decrypting of IoT data for any cold chain applications.

5.2 FUTURE WORK

SiC-Chain architecture can be included with a greater number of IoT devices linked to the SiC-Chain application. A mobile notification feature can be implemented to alert the SCM entities when the senor value overshoots or undershoots the threshold values. This user-friendly single click SiC-Chain architecture can be implemented in a real time cold chain environment there by making it beneficial for small scale cold chain industries. Key partners can be extended to distributors, retailers and consumers. The activities of SiC-Chain architecture help to monitor the commodity using smart phones, direct supply to distributors, retailers, and consumers, secure data transactions and large data handling. Thus the aim of the SiC-Chain architecture must be to provide SCM entities with an automated web-based monitoring system for small scale cold chain applications.