CHAPTER 6

CONCLUSIONS AND SCOPE OF FUTURE WORK

6.1 CONCLUSIONS

This research work mainly focuses on analyzing the crosstalk between the transmission lines of printed circuit boards for signal integrity problems. Analysis has been done based on frequency dependent inductively coupled and capacitive coupled mechanisms for the lines in terms of forward and backward crosstalk parameters. A novel design based on the metamaterials as CSRR has been developed in the ground plane of the PCB for the reduction of crosstalk. Measurements are taken for the fabricated structures of the PCBs with the solid and CSRR etched ground plane. The main advantage of this reduction method in using CSRRs is the ease to implement and the simpler technology in the fabrication process. The results obtained from ADS momentum tool shows a good agreement on the measurements. It is shown that the effect of crosstalk is more in signal integrity analysis and this work analyzes the crosstalk in a simple way to understand and to characterize. The recent developments of the metamaterials in the GHz and THz frequency range make the operation of devices beyond the conventional one.

The modeling and characterization of crosstalk is important for effective transmission of signals in the high speed digital systems. When the operating speed of the circuit board increases the frequency dependant issue also increases which makes the high speed systems to degrade. Hence the
analysis of these crosstalk mechanisms is one of primary goal to achieve better performance of the high speed digital systems.

In this thesis the creation of crosstalk with coupled lines and minimizing the crosstalk are focused with CSRR structures.

Chapter 1 deals with the introduction about the research has been discussed with the idea of complementary split-ring structures.

Chapter 2 is devoted to the general theory of origin of NEXT and FEXT mechanism in coupled lines of a PCB and its types in terms of forward and backward crosstalk.

Chapter 3 discusses the signal integrity concepts associated with the crosstalk using jitter configured eye diagrams.

Chapter 4 is devoted the design of coupled lines with metamaterials as complementary split-ring resonators and analysis are carried out with three types of designs.

Chapter 5 analyses the overall designs with the related configurations. It gives the overall summary of the research work.

Chapter 6 gives the conclusions and scope of future work.

6.2 SCOPE OF THE FUTURE WORK

This work analyses crosstalk mechanisms in the two layers printed circuit boards with top layer as the signal layer and bottom layer as the ground layer. In the current scenario the miniaturization of physical devices increases the crosstalk between the lines. If the PCBs are of more than two layers then the analysis of crosstalk parameters becomes difficult due to the vias.
Therefore, analyzing the crosstalk mechanisms in 4 layers, 6 layers, 8 layers and 12 layers boards with signal integrity characterization is an important area of concern. Implementation of metamaterials in the microwave configured systems and high speed digital systems are one of the most application possibilities for effective utilization Designing SRRs and CSRRSs in the multilayered boards with more than one signal layer with ground plane is a great task to the design engineers.