Acknowledgment

After successful execution of the technical ideas, it is my pleasure to express my gratitude to the people and to the institutions, who have contributed to the successful completion of my Ph.D. program.

I have been engaged in doctoral research work at my own institute (SAMEER) and under the continuous supervision of Prof. Debatosh Guha, in the Institute of Radio Physics and Electronics, University of Calcutta since 2013.

I would like to express my deepest respect and profound gratitude to my supervisor Prof. Debatosh Guha for his meticulous guidance, sincere inspirations and untiring helps throughout the course of this work. I am indebted to him for his unstinted encouragements, valuable advices, and guidance in writing scientific documents. He was always present at the key points of my researches and developments.

I would like to acknowledge the Society for Applied Microwave Electronics Engineering and Research (SAMEER), Govt. of India, and the Institute of Radio Physics and Electronics, University of Calcutta for providing me all sorts of facilities to carry out my Ph.D. work.

I am deeply indebted to Late Prof. B. N. Das, IIT, Kharagpur and Prof. P. K. Saha, Institute of Radio Physics and Electronics, University of Calcutta for their guidance, teaching and helps to understand the subject of antenna, which helped me in doing a lot of research.

I am thankful to Dr. A. L. Das, Ex-Director, SAMEER who formally permitted me to carry out the Ph.D. work. I express my gratitude and heartfelt thanks to Dr. K. P. Ray, DIAT, Pune, for his helps and encouragements during this work. I acknowledge my cordial thanks and gratefulness to Dr. D. C. Pande, Ex-Outstanding Scientist, LRDE, DRDO for his continuous encouragements to apply and execute this Ph.D.

I am also thankful to Prof. A. Maitra, and Dr. J. Y. Siddiqui of the Institute of Radio Physics and Electronics, University of Calcutta for their help and support. I would like to give special thanks to my fellow researchers Dr. Sujou Biswas, Mr. Koushik Dutta, Ms. Chandreyee Sarkar, and Mrs. Poulomi Gupta of the Institute of Radio Physics and Electronics, for their cooperation and support. I also acknowledge my sincerest thanks to my colleagues Mr. Dipankar Dan, Mr.
Arijit Majumder, Mr. Gourab Braman, SAMEER Kolkata Centre, for their technical supports and helps. I also appreciatively admit the helps of Mr. Shibabrata Mondal and Mr. Indranil Paul for mechanical supports, Mr. Partha Pratim Sardar for measurement helps in Compact Antenna Test Range (CATR), and Mr. Jagabandhu Das for helps in fabricating microstrip antennas.

Finally, I reserve my deepest gratitude to my parents Late Samarendra Kisor Chakraborty, Mrs. Sumita Chakraborty, my wife Mrs. Antara Chakrabarti, my maternal uncles Mr. Pranab Bhattacharyya, Mr. Sujit Bhattacharyya, father-in-law Mr. Asish Kanti Kar and other family members for their inspirations and sacrifices in support of my higher studies. I am also thankful to my daughter Srijita and my son Sutirtho for their understanding on many occasions when I could not attend them. My beloved family members are my constant source of inspiration for academic achievements.

SATYAJIT CHAKRABARTI