# Contents

## Acknowledgment

### 1 Introduction

1.1.1 UWB History 1

1.1.2 UWB Advantages 3

1.1.3 UWB Communication 4

1.1.4 UWB Application 6

1.2 Objective 7

1.3 Methodology 8

1.4 Research Contribution 8

1.5 Organization of Thesis 8

### 2 Fundamentals UWB Antenna

2.1 Introduction 10

2.2 Overview of Broadband Antennas 11

2.2.1 Biconical Antenna 12

2.2.2 Frequency independent Antenna 12

2.2.3 Fractal Antenna 13

2.2.4 Planar Antenna 14

2.3 UWB Antenna Requirement 14
2.4 Methods to obtain UWB requirements and its limitations 15

2.5 Summary 17

3 Design and Analysis of Printed Monopole Antenna 21

3.1 Introduction 21

3.2 Printed Tapered Antenna 22

3.2.1 Antenna Geometry 23

3.2.2 Parametric Study 24

3.2.3 Surface Current Distribution 28

3.2.4 Radiation Characteristics 29

3.2.5 Band Notched Printed Tapered Antenna 30

3.2.6 Measurement 32

3.3 Step Monopole Antenna 34

3.3.1 Antenna Geometry and Design 35

3.3.2 Parametric Study 37

3.3.3 Surface Current Distribution 42

3.3.4 Radiation Characteristics 43

3.3.5 Band Notched Antenna 44

3.3.6 Measurement 48

3.4 Pentagonal Antenna 50
3.4.1 Antenna Geometry and Design 51
3.4.2 Parametric Study 52
3.4.3 Radiation Characteristics 55
3.4.4 Band Notched Antenna 57
3.4.5 Measurement 58
3.5 Time Domain Analysis 61
3.6 Arrow Shaped Antenna 64
  3.6.1 Antenna Geometry 64
  3.6.2 Surface Current Distribution 65
  3.6.3 Travelling Wave Characteristics 68
3.7 Summary 71
4  Design and Analysis of Printed Slot antenna 72
  4.1 Introduction 72
  4.2 UWB slot antenna 73
    4.2.1 Antenna geometry and design 74
    4.2.2 Parametric study 75
    4.2.3 Surface Current Distribution 77
    4.2.4 Radiation Characteristics 79
    4.2.5 Band Notched Slot Antenna 80
4.2.6 Measurement 85

4.3 Summary 88

5 Conclusion and Future Work 89

5.1 Summary of thesis 89

5.2 Future work 91

6 References

7 Publications