

# TABLE OF CONTENT

<i>List of Figures</i>	xv - xx
<i>List of Tables</i>	xxi-xxii
<i>List of Abbreviation</i>	xxiii-xxiv
<i>List of Symbols</i>	xxv - xxvi
<i>Preface</i>	xxvii - xxviii
;	
<b>Chapter 1 Introduction</b>	1
<b>1.1 Applications of Radar</b>	3
<b>1.2 Motivation</b>	6
<b>1.3 Literature Review</b>	11
<b>1.4 Research objective and Proposed Contribution</b>	20
<b>1.5 Plan and Scope</b>	21
<b>Chapter 2 Experimental Measurement Setup, Data Acquisition Procedure and Pre-Processing Evaluation</b>	25
<b>2.1 Introduction</b>	27
<b>2.2 Experimental Measurement Set-up</b>	28
<b>2.2 Data Acquisition Procedure</b>	32
<b>2.3 Pre-Processing Evaluations</b>	34
<i>2.3.1 Wall Parameter Estimation</i>	34
<i>2.4.1.1 Experimental set-up for wall dielectric</i>	34

	<i>calculation</i>	
	2.4.1.2 <i>Measurement Procedure</i>	35
	2.4.1.3 <i>Wall dielectric calculation</i>	36
	2.4.2 <i>Antenna Delay Calculation</i>	37
	2.5 <b>Conclusion</b>	38
<b>Chapter 3</b>	<b>Analysis of Imaging Algorithm for Shape Detection</b>	39
	3.1 <b>Introduction</b>	41
	3.2 <b>Analysis of Imaging Algorithm</b>	41
	3.2.1 <i>Backprojection</i>	43
	3.2.2 <i>Delay and Sum Beamforming</i>	47
	3.2.3 <i>Frequency-Wavenumber</i>	49
	3.3 <b>Result and Discussion</b>	51
	3.4 <b>Conclusion</b>	62
<b>Chapter 4</b>	<b>Optimal Thresholding Technique for Shape and Size Detection of Target from through-the-wall radar images</b>	65
	4.1 <b>Introduction</b>	67
	4.2 <b>Methodology</b>	68
	4.2.1 <i>Data Acquisition</i>	69
	4.2.2 <i>Average Subtraction</i>	70
	4.2.3 <i>Image Formation</i>	70
	4.2.4 <i>Image Enhancement</i>	72
	4.2.5 <i>Formulation of Statistics Based Optimal Thresholding</i>	

	<i>Technique and Implementation</i>	74
<b>4.3</b>	<b>Result and Discussion</b>	
	<i>4.3.1 Validation of Developed Thresholding Technique</i>	78
<b>4.4</b>	<b>Conclusion</b>	80
		82
<b>Chapter 5</b>	<b>Application of Artificial Neural Network for Recognition of Target</b>	85
<b>5.1</b>	<b>Introduction</b>	87
<b>5.2</b>	<b>Methodology</b>	88
	<i>5.2.1 Data Acquisition</i>	89
	<i>5.2.2 Average Subtraction</i>	89
	<i>5.2.3 Image Formation</i>	90
	<i>5.2.4 Image Enhancement</i>	92
	<i>5.2.5 Statistical Based Thresholding Technique</i>	93
	<i>5.2.6 Target Shape Recognition using Artificial Neural Network</i>	94
<b>5.3</b>	<b>Result and Discussion</b>	102
	<i>5.3.1 Validation of ANN Model for Scale and Rotation Invariant</i>	103
<b>5.4</b>	<b>Conclusion</b>	109
<b>Chapter 6</b>	<b>Summary, Conclusion and Future scope</b>	111
<b>6.1</b>	<b>Summary and Conclusion</b>	113
<b>6.2</b>	<b>Scope for future research work</b>	117

<b>References</b>	119
<b>Author Relevant Publications</b>	129