

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE NO.
1.1	Types of computing systems	4
1.2	Hardware spectrum of digital design	5
1.3	FPGA Architecture	8
1.4	Structure of Homogeneous FPGAs	9
1.5	Structure of Heterogeneous FPGAs	10
1.6	Flexible 2D, Partitioned 2D, Flexible 1D, Partitioned 1D	12
1.7	Types of Reconfiguration	12
1.8	Static Reconfiguration	13
1.9	Dynamic Reconfiguration	14
1.10	CAD Flow of FPGA based Design	16
1.11	Real time hardware tasks placement without proper planning	17
1.12	Real time hardware tasks placement with proper planning	18
1.13	Diagram of Directed Data Flow Graph	18
1.14	Non real time hardware tasks placement without proper planning	19
1.15	Non real time hardware tasks placement with proper planning	19
1.16	Schematic representation of fitting strategies	23

FIGURE NO.	TITLE	PAGE NO.
1.17	Scenario of real time hardware tasks placement on FPGAs	24
1.18	Non real time dependent hardware tasks modelling	25
1.19	Scenario of algorithmic level optimization based non real time hardware tasks placement on FPGAs	25
1.20	Scenario of logic level optimization based non real time hardware tasks placement on FPGAs	26
1.21	Work Flow of the Research	26
3.1	MER-BF-OL method based Real time Hardware tasks placement on FPGAs	45
3.2	MER-BF-NOL method based Real time Hardware tasks Placement on FPGAs	46
3.3	MER-FF-OL method based Real time Hardware tasks Placement on FPGAs	47
3.4	LIF method based Real time Hardware tasks Placement on FPGAs	49
3.5	BL-FF-RCR method based Real time Hardware tasks Placement on FPGAs	50
3.6	TL-FF-CRC method based Real time Hardware tasks Placement on FPGAs	52
3.7	BL-FF-WS-CLook method based Real time Hardware tasks Placement on FPGAs	53
3.8	BL-FF-TS method based Real time Hardware tasks Placement on FPGAs	54
3.9	BL-FF-WOR Logic method based Real time Hardware tasks Placement on FPGAs	56

FIGURE NO.	TITLE	PAGE NO.
3.10	Comparison of average execution time of small scaled FPGAs (8x8slfa and 8x8llfa)	60
3.11	Comparison of average execution time of small scaled FPGAs (16x16 slfa and 16x16 llfa)	62
3.12	Comparison of average execution time of small scaled FPGAs (32x32 slfa and 32x32 llfa)	64
3.13	Comparison of average execution time of large scaled FPGAs (64x64 slfa and 100x100 mlfa)	66
3.14	Sample simulation environment of Real time Hardware tasks Placement on FPGAs	67
3.15	Comparison of average task rejection ratio of Placement algorithms (8x8 slfa and 16x16 slfa)	68
3.16	Comparison of average task rejection ratio of Placement algorithms (8x8llfa, 16x16llfa, 32x32slfa and 32x32 llfa)	68
3.17	Comparison of average task rejection ratio of Placement algorithms (64x64slfa and 100x100mlfa)	69
3.18	Performance improvement in average execution time of Proposed Placement algorithm with others	71
4.1	Flowchart of Particle Swarm Optimization algorithm	78
4.2	Flowchart of Attractive Repulsive Particle Swarm Optimization algorithm	80
4.3	Flowchart of Gravitational Search algorithm	85

FIGURE NO.	TITLE	PAGE NO.
4.4	Flowchart of Cuckoo Search Optimization algorithm	88
4.5	Simulation results of wirelength minimization of non real time hardware tasks placement on FPGAs	91
4.6	Comparison of wirelength minimization using PSO, ARPSO, GSA and CSO Algorithms	93
4.7	Percentage of performance improvement of CSO algorithm for wirelength minimization in hardware tasks placement	94
4.8	Simulation results of area minimization in non real time hardware tasks placement on FPGAs	95
4.9	Comparison of area minimization using PSO, ARPSO, GSA and CSO algorithms	97
4.10	Percentage of performance improvement of CSO algorithm for area minimization in hardware tasks placement	97
4.11	Simulation results for wirelength and area minimization of tasks placement on FPGAs	100
4.12	Comparison of wirelength and area minimization using PSO, ARPSO, GSA and CSO algorithms	101
4.13	Percentage of performance improvement of CSO algorithm for wirelength and area minimization	101
4.14	Simulation results of wirelength and area minimization with ($\alpha=0.5$, $\beta=0.5$) and ($\alpha=0.6$, $\beta=0.4$) for DDFG1	103

FIGURE NO.	TITLE	PAGE NO.
4.15	Simulation results of wirelength and area minimization with ($\alpha=0.7$, $\beta=0.3$) and ($\alpha=0.75$, $\beta=0.25$) for DDFG1	103
4.16	Comparison of wirelength and area minimization with various weighted co-efficients for DDFG1	104
4.17	Performance improvement of wirelength and area minimization using CSO algorithm for various weighted co-efficients	104
5.1	Regular 16-bit SQR T Carry Select Adder	109
5.2	Logic diagram of 6-bit Binary to Excess-1 converter	111
5.3	Modified 16-bit Square root Carry Select Adder	112
5.4	Modified 16 bit SQR T Carry Select Adder with AOI logic	114
5.5	Detailed circuit diagram of Group 2	115
5.6	Detailed circuit diagram of Group 3	115
5.7	Detailed circuit diagram of Group 4	116
5.8	Detailed circuit diagram of Group 5	117
5.9	Circuit diagram of 2:1 Multiplexer	118
5.10	Circuit diagram of 2:1 Multiplexer	118
5.11	2:1 Multiplexer based OR gate and its Truth table	119
5.12	2:1 Multiplexer based AND Gate and its Truth table	120
5.13	Proposed Carry Select Adder using Muxed AOI Logic	121

FIGURE NO.	TITLE	PAGE NO.
5.14	Performance comparison with respect to PaR completion of existing and proposed adders	123
5.15	Placement and Routing Architecture of adders(M1, M2, M3 are existing adders and M4 is proposed adder)	125
5.16	Placement and Routing architecture of MAC units	127