Iterative Heuristics for Timing & Low Power VLSI Standard Cell Placement

KFUPM Project Number COE/ITERATE/221

Progress report number 2

October 2001 - March 2002

Sadiq M. Sait, Habib Youssef, and Aiman Al-Maleh

Contents

1 Introduction

This report covers the work during the second 6 months period of COE/ITERATE/221 project. The report highlights the time duration of the reported period, tasks completed with the contribution of each investigator, budget utilization and list of equipment ordered for purchase, difficulties faced, and relevant publications.

2 Time duration

This report covers the second six months of the project, i.e., from October 2001 to March 2002.

3 Tasks Accomplished

Among the tasks stated in the original proposal the following were covered during the second report period.

Task 2. Literature review. (completed)

Task 3. Design of encoding scheme suitable for iterative algorithms. (completed)

Task 4. Design and experimentation of neighborhood search strategies. (completed)

Task 5. Fuzzification of various iterative heuristics. (Completed)

Task 6. Implementation of proposed algorithms. (In progress; two algorithms were implemented)

Task 7. Documentation of developed software. (In progress)

Task 8. Generation of periodic and final reports as well as conference and journal papers. (In progress)

Details of most of the tasks will be covered in the detailed progress report submitted along with this summary report. The project is progressing according to the proposed schedule.

3.1 Task Achievement Diagram

In this document, the work carried out during the second 6 months of the project is mentioned. The report highlights the tasks accomplished so far. Referring to the task achievement diagram (Figure 1), the work during the above mentioned period primarily consisted of successful completion of tasks 2, 3, 4, and 5, and initiation of task 7. Tasks 6, 7, and 8 are in progress.

Task 3 was completed as we have designed an efficient solution representation and encoding scheme. A number of neighborhood search and perturbation techniques were

Task	(Months)							
	0–3	4–6	7–9	10–12	13–15	16–18	19–21	22-24
1	x	x						
2	x	x	x	x				
3	x	x	x					
4		x	x	x				
5		x	x	x				
6				x	–	–	–	
7		x	x	x	–	–	–	–
8		x		x		–	–	–

Figure 1: Task Achievement Diagram.

designed to accpomplish task 4. Task 5 has also been completed and we have fuzzified the overall cost estimation. Also during the implementation of SimE algorithm, different stages of the algorithms were fuzzified. As part of task 6, we have implemented two of the proposed algorithms namely Simulated Evolution (SimE) and Stochastic Evolution (StocE). Task 7 is also in progress as we have already documented the tool and translators developed by us. Completion of this report and authoring of a number of international conference papers was completed as a part of task 8.

4 Budget Utilization

4.1 Man Power

Total Amount Allocated = SAR 95,800/-

Budget Utilized

- Principal Investigator (Dr. Sadiq M. Sait) @ SAR 1200/- per month = SAR 7200/-
- Co-Investigator (Dr. Aiman El-Maleh) @ SAR 1000/- per month = SAR 6000/-
- 2 Graduate Student, Research Assistant = SAR xxxx/-
- Secretary = SAR xxxx/-

Total utilization during this period = SAR xxxxx/-

4.2 Travel

Total Amount Allocated = SAR 30,000/-
Total utilization during this period = SAR 0/-

4.3 Equipment

Total Amount Allocated = SAR 23,000/-

Equipment:-

XXXXXX

XXXXXXXX Order were placed for One Pentium 800 MHz/1GigaHertz machine and printer = SAR 16,000/- (yet to arrive)

Consumables:-

Floppies, tapes, zip drives, printer toner, stationary ... = SAR xxxx/-

Total utilization during this period = SAR XXXXX/-

5 Difficulties Faced

No difficulty was faced during this period which can result in the deviation from the original objectives of the proposal.

6 Publications

1. Sadiq M. Sait, Habib Youssef, and Junaid A. Khan, "Fuzzy Evolutionary Algorithm for VLSI Placement", *in proceedings of GECCO'2001, held in New York, USA in July 2001.*

2. Sadiq M. Sait, Habib Youssef, Aiman H. El-Maleh, and Mahmood R. Minhas, "Iterative Heuristics for Multiobjective VLSI Standard Cell Placement", *in proceedings of Int'l Joint Conf. on Neural Networks IJCNN'2001, held in Washington, D.C., USA in July 2001.*

3. Sadiq M. Sait, Habib Youssef, Junaid A. Khan, and Aiman H. El-Maleh, "Fuzzy Simulated Evolution for Power and Performance Optimization of VLSI Placement", *in proceedings of Int'l Joint Conf. on Neural Networks IJCNN'2001, held in Washington, D.C., USA in July 2001.*

4. Sadiq M. Sait, Habib Youssef, Junaid A. Khan, and Aiman H. El-Maleh, "Fuzzified Iterative Algorithms for Performance Driven Low Power VLSI Placement", *in proceedings of Int'l Conf. on Computer Design ICCD'2001 September 2001.*

5. A detailed report covering technical details and other activities during the second 6 months is also submitted with this progress report.

7 Acknowledgements

The research team acknowledges King Fahd University of Petroleum and Minerals for all support.