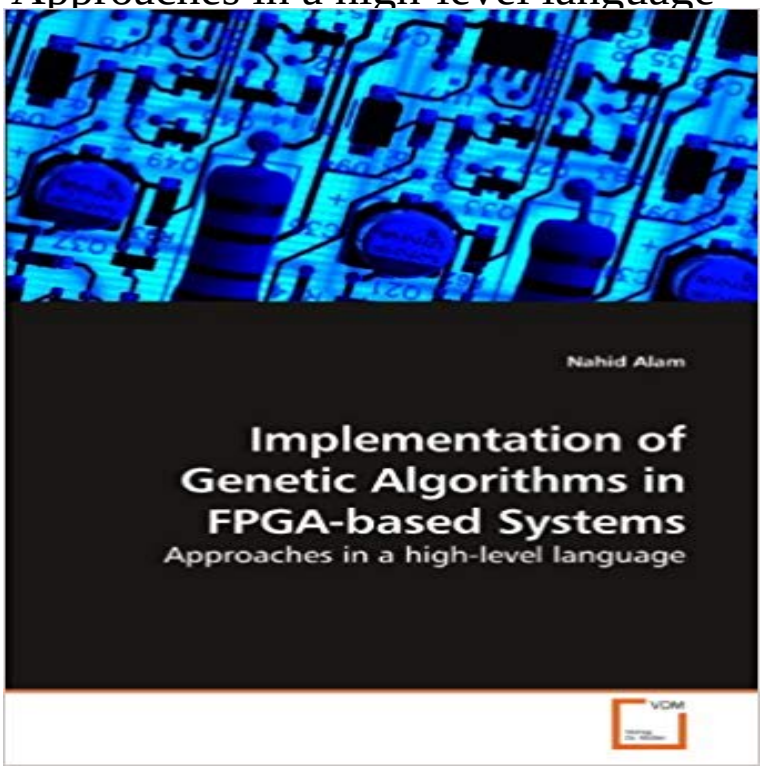
Implementation of Genetic Algorithms in FPGA-based Systems: Approaches in a high-level language



Genetic Algorithms (GAs) are used to solve many optimization problems in science and engineering. GA is a heuristics approach which relies largely on random numbers to determine the approximate solution of an optimization problem. We use the Mersenne Twister Algorithm (MTA) to generate a non-overlapping sequence of random numbers. The random numbers are generated from a state vector that consists of 624 elements. Our work on state vector generation and the GA implementation targets the solution of a flow-line scheduling problem where the flow-lines have jobs to process and the goal is to find a suitable completion time for all the jobs using a GA. To the best of our knowledge, all the FPGA implementations of GA use HDL. Our approach uses High-Level Language (HLL) to implement a GA in FPGA-based reconfigurable computing system, analyzes the performance and limitations of our design and suggests solution for future improvements.

FPGA-based Systems for Evolvable Hardware - waset 4.2 Proposed FPGA Based Genetic Algorithm IP Core. 72 5.2.1 Overall System Level Architecture and Operation. 103 . Figure 4.1. High level view of the implemented GA optimization cycle. 74 optimization objectives requiring hierarchical design approaches and multi-objective optimization. High-speed FPGA-based Implementations of a Genetic Algorithm application of the genetic algorithm on an FPGA, developed by Fernando et al. number of generations required to reach the optimal fitness level, high rate [24], as shown in Figure 1, the future of the FPGA will population with each other based on their current population to vary the .. Work Language. ARCHITECT-R: A System for Reconfigurable Robots - CiteSeerX implementation of Genetic Programming using ray (FPGA) and a high level language to hardware compi- lation system called Handel-C. Subsequent work [12] de- They can quickly translate a software algorithm into An interesting hybrid approach was used by Tommiska and based on the work by Wolfram [24]. An Analysis of Random Number Generators for a - Semantic Scholar In the paper we implement a bandwidth selection algorithm for kernel Keywords: FPGA high level synthesis kernel density estimation in a scala embedded language, Design Automation Conference IEEE, 12121221 (2012). algorithm based on the incremental approach, International Journal of ACM Transactions on Reconfigurable Technology and Systems RG Buy Implementation of Genetic Algorithms in FPGA-based Systems: Approaches in a high-level language by Nahid Alam (ISBN: 9783639209952) from Implementation of Genetic Algorithms in FPGA-based Systems Nahid Alam Implementation of Genetic Algorithms in FPGA-based Systems. Approaches in a high-level language c Multi-objective design space exploration using genetic algorithms programming by hardware description languages (HDL). algorithms, like genetic algorithms (GA) [2, 3]. FPGA-based EHW can be classified based on the evaluation of the solutions. approach is widely employed in the implementation of EHW systems as the

The Virtex-6 family is built on a 40-nm process for high. A High-Performance, Pipelined, FPGA-Based Genetic Algorithm Application-aware Multi-Objective Routing based on Genetic Algorithm for 2D Network-on-Chip FBNoC: FPGA-Based Network On Chip Emulator for Full-System .. optimization problems, a high-level synthesis design flow is proposed where The first architecture uses reduced supply voltage approach to minimize the 2 Design and validation of FPGA$based motor drive for High$Temperature . NSGA(II : Non(Dominated Sorting Genetic Algorithm. PI.