Public Abstract

First Name: Kittisak

Middle Name:

Last Name: Sajjapongse

Adviser's First Name: Tina

Adviser's Last Name: Smilkstein

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term: SP 2010

Department: Computer Engineering

Degree: MS

Title: GUI FOR DEBUGGING AND DEVELOPMENT OF RECONFIGURABLE, EVOLVING SYSTEMS
ENABLED BY EMBEDDED HARDWARE BLOCKS

A flexible hardware testbed for Evolutionary Computation is developed in our research. The purpose is to realize a system with an ability to implement a wide variety of Evolutionary Computation applications. In this literature, General Purpose Evolutionary Algorithm Testbed (GPEAT) is described. GPEAT provides a flexible substrate for Evolutionary Computation applications on hardware platform using reconfigurable device such as FPGA. GPEAT consists of GPEAT core, debugging hardware, configuring GUI (Parameter-entry GUI) and debugging GUI. Parameter-entry GUI enables users to construct an Evolutionary Computation system on hardware with minimal knowledge on hardware designing. The GPEAT core obtains system parameters through the GUI and operates accordingly as users specify to find appropriate solutions from search space. Debugging interface is also provided through debugging hardware and debugging GUI to assist users in evaluating implemented system.

GPEAT provides users friendly environment to instantiate and debug Evolutionary Computation application on hardware. VHDL code is generated according to the system description parameters by the GUI. The design, then, be programmed into reconfigurable device. Xilinx ISE and ModelSim XE-III (MXE-III) simulator are used as tools for implementing the GPEAT system on Xilinx® Spartan 3E starter kit. Chromosomes, fitness values and other information of the implemented system is pulled out from the device through debugging hardware, which is attached to the GPEAT core, and is visualized by debugging GUI. With this system we tried to decrease the barrier of evolutionary algorithm designers to implement their designs in hardware and allow for easier debugging, revision and research on evolutionary hardware systems.