Abstract

Reconfigurable systems offer a solution to solve complex problems by combining the speed of hardware with the flexibility of software to improve performance and system performance. Past three decades have seen the introduction of the technology that has radically changed the way one analyses and controls the world around them. A byproduct of Microprocessor development by Intel is the 8051 Microcontroller which finds its use in almost all walks of life. The Microcontrollers are not as well known to the general public, or even the technical community, as are the more glamorous Microprocessors. The public is however very well aware that something is responsible for all the Smart VCRs, clock radios, washers and dryers, video games, TVs etc. That something is nothing but the Microcontroller. Any Microcontroller consists of three main components viz., an Arithmetic and Logic Unit (ALU), a Random Access Memory (RAM) and a Read Only Memory (ROM). An ALU is responsible for Arithmetic and Logic operations like addition, subtraction, multiplication, AND, OR, NOT etc operations. RAM is meant for storing and retrieving the data whenever necessary and ROM serves the purpose of storing the definitions pertaining to the executions corresponding to the opcodes. This paper presents the design, development and implementation of an Arithmetic and Logic Unit (ALU), a Random Access Memory (RAM) and a Read Only Memory (ROM) for 8051 Microcontroller on Field Programmable Gate Arrays (FPGA) using VHDL i.e., VHSIC
Hardware Description Language where VHSIC stands for Very High Speed Integrated Circuits. Xilinx Spartan-3 xc3s50pq208-5 has been chosen as the target FPGA device. The device utilizations for ALU, RAM and ROM have been analyzed and tabulated to explore the design space

References

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