Two Approximate Voting Schemes for Reliable Computing

Abstract:

This relies on the principles of inexact computing to alleviate the issues arising in static masking by voting for reliable computing in the nanoscales. Two schemes that utilize in different manners approximate voting, are proposed. The first scheme is referred to as inexact double modular redundancy (IDMR). IDMR does not resort to triplication, thus saving overhead due to modular replication. This scheme is crudely adaptive in its operation, i.e. it allows a threshold to determine the validity of the module outputs. IDMR operates by initially establishing the difference between the values of the outputs of the two modules; only if the difference is below a preset threshold, then the voter calculates the average value of the two module outputs. The second scheme (ITDMR) combines IDMR with TMR (triple modular redundancy) by using novel conditions in the comparison of the outputs of the three modules. Within an inexact framework, the majority is established using different criteria; in ITDMR, adaptive operation is carried further than IDMR to include approximate voting in a pair wise fashion. So, the validity of the three inputs is established and when only two of the three inputs satisfy the threshold condition, the IDMR operation is utilized. An extensive analysis that includes the voting circuits as well as a probabilistic framework is included. The proposed IDMR and ITDMR schemes improve the power dissipation and tolerance to variations compared to a traditional TMR. To further validate the applicability of the proposed schemes, inexact voting has been used in two applications (image processing and FIR filtering); the simulation results show that performance is substantially improved over TMR.

Existing system

Approximate computing has been extensively applied to arithmetic circuits. Addition and multiplication are widely used operations in computer arithmetic; so, full-adder cells have been analyzed for approximate computing has compared these types of adder and proposed several new metrics for evaluating approximate and probabilistic adders with respect to unified figures.
of merit for design assessment of inexact computing under various applications. The tradeoff between precision and power has also been quantitatively evaluated. Inexact voting can be used in a redundant scheme with relaxed precision requirements, because an inexact voter offers advantages for tolerating and approximately correcting errors. However, when exactness and a precise result are strict requirements, an inexact voter may not be suitable.

**Proposed system**

This paper relies on the principles of inexact computing to alleviate the issues arising in static masking by voting. Two schemes that utilize in different manners approximate voting are proposed. The first scheme whose operation was initially proposed by the same authors in , is referred to as inexact double modular redundancy (IDMR). IDMR does not resort to triplication, thus saving overhead due to modular replication; this scheme is crudely adaptive in its operation, i.e. it allows a threshold to determine the validity of the module outputs. IDMR operates by initially establishing the difference between the values of the outputs of the two modules; only if the difference is below a preset threshold, then the voter calculates the average value of the two module outputs.

**Applications**

1) Communications  
2) Digital signal processing

**Advantages**

Area, delay and power reduced

**System Configuration:-**

In the hardware part a normal computer where Xilinx ISE 14.3 software can be easily operated is required, i.e., with a minimum system configuration

**HARDWARE REQUIREMENT**
Processor: Pentium –III

Speed: 1.1 GHz

RAM: 1 GB (min)

Hard Disk: 40 GB

Floppy Drive: 1.44 MB

Keyboard: Standard Windows Keyboard

Mouse: Two or Three Button Mouse

Monitor: SVGA

SOFTWARE REQUIREMENTS


- Front End: Modelsim 6.3 for Debugging and Xilinx 14.3 for Synthesis and Hard Ware Implementation

This software’s where Verilog source code can be used for design implementation.