Modern Research Topics in Test, Reliability, and Emerging architectures

CMOS technology keeps downscaling and devices of 7 nm technology are being issued to the market since 2017. Aggressive technology scaling may increase the possibility of manufacturing defects or lead to process variations and sensitivity to environmental conditions and degradation. Those issues at nanoscale level may threaten both quality and reliability of modern devices and make the exact behavior of semiconductor technology harder to predict. In order to prevent failures in safety critical systems, thorough and cost efficient test and diagnosis must be carried out.

An important reliability indicator of modern devices is circuit timing. One example are Small Delay Faults (SDFs), which can indicate marginal hardware by degrading device performance. Some SDFs are prone to aging and can finally cause either early-life or wear-out failures. Sometimes SDFs are too small to cause certain timing failures under at-speed conditions and can only be detected using sophisticated techniques.

Recently standardized Reconfigurable Scan Networks (IEEE 1687) provide a flexible way to access the huge number of embedded instrumentation, e.g. built-in self-test (BIST), aging monitors, or debug instruments. These networks however introduce new challenges regarding security and the test and diagnosis of the networks themselves.

In order to improve computational performance, power efficiency and reliability based on radical new design principles a new class of innovative computer architectures, Emerging Computer Architectures (ECA) has been introduced. Approximate computing and variable precision computer architectures represent two major research areas in this field.

This seminar addresses the following research areas:

- Design, synthesis and applications of Emerging Computer Architectures
- Yield and reliability challenges
- Test and diagnosis methods
- Faster-than-at-speed test
- Built-in Self-test
- Reconfigurable Scan Networks
- Simulation algorithms

Prior registration via ILIAS is required.
http://www.iti.uni-stuttgart.de/lehre/robustness

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