

Diplom- / Master- / Bachelorarbeit

Reliability of Electrical Circuits

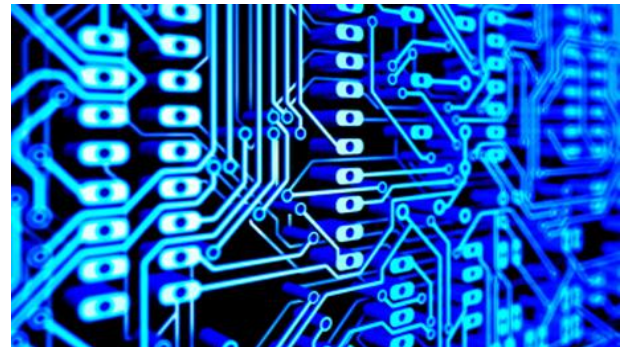
Technology Scaling enables us to achieve higher performance via smaller transistors and more complex logic circuits. However, to continue this trend, new materials and new transistor types had to be introduced. These new Materials (high-k dielectric) and new transistor types (FinFET/Tri-Gate) are unfortunately increasingly susceptible to degradation effects. Electrically superior materials are inferior in terms of reliability and ever smaller transistors become increasingly harder to manufacture. Therefore we need to study the effects, which degrade the system and propose estimation as well as mitigation techniques to keep the degradation effects at bay.

Goals:

- Work on current research topics
- Experience research first-hand by treating your thesis as a real contribution to the scientific community
- Apply electrical engineering techniques on problems from computer science, electrical engineering and physics

Potential Thesis Topics

- Estimate the reliability of complex circuits (microprocessors & dedicated hardware for special tasks)
- Improve reliability by employing or developing new mitigation techniques for degradation effects in electrical circuits
- Synthesize complex circuits down to the SPICE level
- Explore reliability of new technologies (FinFET, GAA, etc.)



Img src: nuffieldfoundation.org/

Skills acquired with the Thesis

- Profound understanding of degradation effects (aging, manufacturing variability, soft errors (neutron particle strikes))
- Work in a research environment
- Technical writing

Skills required for the Thesis

- Experience with SPICE simulations

Start Date

Immediately or within a couple of months.

Language

The thesis can be written and presented in either English or German.

Supervision:

Dipl. Inform. Victor van Santen

victor.santen@kit.edu

<http://ces.itec.kit.edu/~vansanten>

Dr.-Ing. Hussam Amrouch

amrouch@kit.edu

<http://ces.itec.kit.edu/~amrouch>