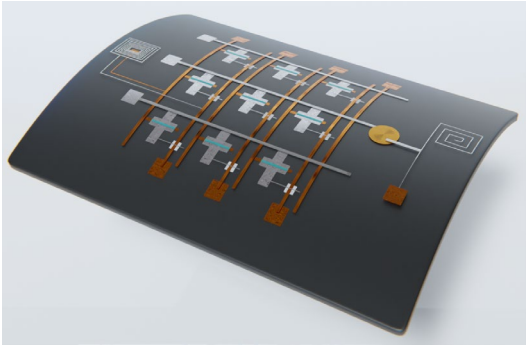
Master Thesis/HiWi: Characterization and optimization of printed adder circuits

Karlsruhe Institute of Technology
Institute of Nanotechnology

Adders are digital circuits and the main building block of arithmetic logic units (ALU) in a central processing unit (CPU). Typically, an adder adds two signal binary inputs amounted in the sum and carry output. In this manner, not only digits can be added, but also addresses, indices, increment and decrement operations are performed. Fabricating adders with industrial inkjet printers will enable novel applications in fields such as internet of things (IoT), computing, and health care.



Start: as soon as possible
Post date: 07/2024

This thesis aims to apply additive manufacturing techniques, such as ink-jet printing, to realize adder circuits. Conventional and pass logic gates, which are specially suited for unipolar transistor technologies, configurations will be evaluated. During the course of the thesis, you will be able to gain skills in printing methods, electronic characterization of devices, optical microscopy, and circuit simulation, while working in an attractive interdisciplinary environment at the interface of physics, material science and engineering.

The following skills are beneficial but not mandatory (can be learned):

- Knowledge in ink-jet printing
- Knowledge in digital circuit design
- Experience in device characterization of electronic devices
- Experience in working in a chemical laboratory
- Hands-on mentality
- High interested in experimental work

This thesis is adapted for students from the following courses:

- **Electrical engineering**

Contact:
Prof. Dr. Jasmin Aghassi-Hagmann
Institute of Nanotechnology
jasmin.aghassi@kit.edu or
Dr. Gabriel Cadilha Marques
Institute of Nanotechnolgy
gabriel.marques@kit.edu