Doctoral Student

Research subject:
Studies of Circuit Concepts and Robustness to Ionizing Radiation in nanoscale CMOS

Research Subject Description
The integrated process nodes for circuit design in focus of the SIRENS project are 28 nm and 40 nm CMOS. The scope of these studies is to re-consider the analog circuit concepts for specific measurement and detection circuits, currently existing in older CMOS process nodes. To exploit the potential of nanoscale technologies the aspects of: pushing the design concept deeper into early frontend, moving deeper into mixed-signal architecture as well as time-domain measurements have to be strongly considered.

A very interesting and key aspect in this project is studies of the robustness to ionizing radiation, for applicability in extreme environments: high energy physics, synchrotrons or space applications. The corresponding device-level effects have to be considered at several design levels, including: technology aspects, device geometry and finally transistor- and system-level mitigation concepts.

Responsibilities
The doctoral candidate will conduct fundamental research in frame of SIRENS project funded by Austrian Science Fund FWF, being part of international team. Tasks are conducted under guidance and frequent contact with supervisors and they include:

- Display initiative in identifying and resolving research related scientific problems,
- Perform literature study to identify state of the art,
- Study methodologies to collect, analyze and interpret the measurement results,
- Co-development of test circuit concepts for performance and robustness studies,
- Circuit design and simulation,
- Complete circuit layout of designed test-chips under Cadence Design Environment in selected CMOS processes,
- Development of circuit characterization environment including PCB designs, instrument configuration, interface programming,
- Involvement in planning and organization of stress tests for low energy X-ray tests (that will be conducted in dedicated radiation protected laboratories),
- Collection of data and measurement results and conduct scientific analysis.
Since the work is carried out at the higher education institution (Graz University of Technology), where cooperation with students and knowledge transfer are of high importance, it is expected that the candidate will work closely with Bachelor and Master Students on related research tasks.

Occasionally the candidate will have to travel to experimental sites in Europe and to participate in workshops. Further it will be required that the research findings are presented at international conferences and published in journals, as well as in media and events for the general public (like e.g. “Lange Nacht der Forschung”). In coordination with project team and research unit the candidate will be co-responsible for research data management, for data created and collected throughout the project.

**Required Skills / Experience**
- Good understanding of analog and digital circuit techniques
- Experience in design flow and simulation with Cadence integrated circuit design environment
- Experience with VHDL or Verilog programming
- Experience in electrical characterization
- Master’s degree in Electrical Engineering
- Excellent written and spoken English

**Desired Skills / Experience**
- Understanding of semiconductor device physics
- Experience in signal processing techniques
- Experience with design in sub-65nm CMOS
- Knowledge of noise analysis, design and measurement techniques
- Familiar with C/C++, Matlab or Python programming

**Desired Start and Organizational Unit**
Possible start in September 2020
Graz University of Technology, Institute of Electronics
under subscription to Doctoral Programme at Graz University of Technology

**Employment contract**
Employment contract for doctoral student 30 hours/week with salary according to B1 category of the Austrian Collective Bargaining Agreement for University Staff. This corresponds to gross salary of arr. 2200 EUR/month paid 14 times per year.

**Application Submission and Deadline**
CV accompanied by certificates, master thesis (pdf or weblink), letter describing relevance of experience for this research subject and the motivation to join the team
Submit per email to: alicja.michalowska@tugraz.at
There is no fixed deadline. The position will be open until filled.