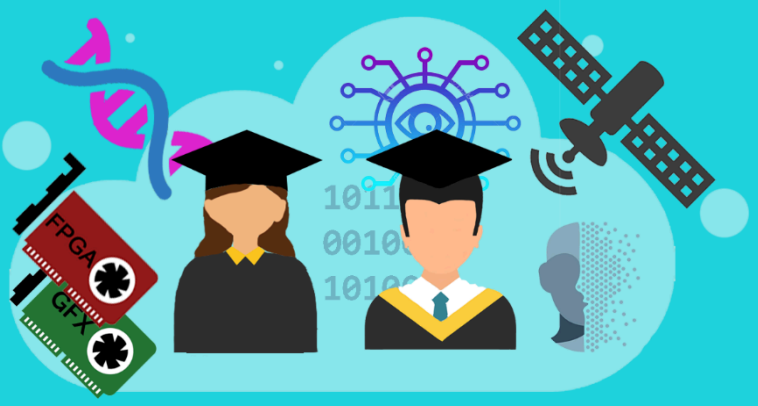
Diploma Thesis

Microproccessors and Digital Systems Laboratory



Optimal Design Space Exploration on Rad-Hard FPGAs

The focus of this thesis is on the systematic exploration of the design space to identify the best configurations for specific applications, such as Digital Signal Processing (DSP) and Vision. The goal is to develop a methodology that optimizes FPGA designs for both performance and resource utilization, taking into account the unique constraints and requirements of RHBD FPGAs.

This research aims to provide a structured approach to design space exploration, leveraging the capabilities of the NanoXplore Impulse tool. By systematically evaluating different design configurations, the thesis seeks to identify optimal solutions that maximize performance while minimizing resource usage. This is particularly important for applications in space, where both performance and reliability are critical.

The methodology developed in this thesis will be applicable to a wide range of applications, providing a valuable framework for engineers and researchers working with RHBD FPGAs. By optimizing the design process, this research will contribute to the development of more efficient and effective FPGA-based systems for use in space and other challenging environments.

PREREQUISITES:

Familiarity with:

- Digital Design
- Computer Architectures
- HDLs (Verilog/VHDL)
- Python
- Kernel Level Development

Desirable:

- Low-Level Programming (C)
- Vivado Toolchain
- Simulator environments (Mentor Graphics ModelSim/QuestaSim)
- AXI Protocol

RELATED MATERIAL:

https://nanoxplore.com/

https://en.wikipedia.org/wiki/Radiation_hardening

https://ieeexplore.ieee.org/abstract/document/8541492

https://ieeexplore.ieee.org/abstract/document/9543692

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