

Master's Thesis

Implementation and Validation of a FPGA based signal acquisition for ranging and communication applications

The optical communication group of DLR's Institute of Communications and Navigation develops experimental laser systems for optical links. The communication system development contains several subsystems including the signal transition from the analog to the digital domain. This is done by the use of analog to digital converters (ADC) which interface with the processing device, in this case a field programmable gate array (FPGA). As the future operation site will be in space the received and digitalized signal is suffering from several impairments either caused by the optical transmission channel or the transition from the optical to digital domain. In order to recover the received signal e.g. atmospheric turbulences or mismatches caused by the use of free-running ADCs have to be compensated for. The successful applicant will support our team in the development of an experimental setup, in particular by implementing and validating the ADC-to-FPGA interface and further sub-functionality in order to enable signal recovery.

Goals:

- Definition of transmission channel and recovery system impairments and possible countermeasures
- FPGA based integration of a ADC-to-FPGA interface realized by use of the JESD204B standard
- FPGA based integration of signal recovery stages like timing recovery (expandable)
- Testing and validation of the implemented functionality including optional field tests

Prerequisites

- Study direction of electrical engineering (Master level)
- Solid skills in VHDL respectively Verilog
- Knowledge in communication theory is a plus
- Experience within the area of analog to digital converters is a plus

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